OXFORD ECONOMICS

Economic Evaluation of Siloxanes in Canada

November 2008

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EXECUTIVE SUMMARY

This report investigates the current sales and use of cyclic siloxanes (D4, D5 and D6) in Canada. It details the results of a survey of the Silicones Environmental, Health and Safety Council of North America (SEHSC) members' sales into Canada by industry. The report then explores the potential socio-economic consequences associated with designating D4, D5 and D6 'CEPA-toxic'. In addition, a quantitative estimate has been developed for the impact of a CEPA-toxic designation on the two largest cyclic siloxane user industries (manufacturers of personal care products and industrial goods) in Canada.

Key findings:

- SEHSC survey respondents sold 26,657 metric tons of siloxanes directly into Canada in 2007/8, with a sales value of CAN$163 million. The personal care and industrial goods sectors are by far the largest recipients of siloxanes.
- Designating D4, D5 and D6 as 'CEPA-toxic' may require users to re-formulate products and/or modify manufacturing processes. The potential redesign of product and machinery would likely involve significant research and development (R&D), as well as substantial testing and recertification costs. This will affect producers' profits and corporate tax payments, and could result in a lower product demand if increased costs are passed along to consumers in the form of higher prices. This would have the added effects of reducing Canadian employment and GDP.
- The results from our analysis suggest that designating D4, D5 and D6 'CEPA-toxic' could cut Canadian GDP by CAN$312 million. In addition, almost 8,000 jobs associated with the manufacture and retail sale of personal care and industrial goods would be jeopardised, with an accompanying loss of CAN$236 million in wages. And these significant impacts do not account for the many tens of thousands of jobs that would be at risk in the hairstyling industry in Canada.
- The international competitiveness of the Canadian personal care industry and other sectors that utilize cyclic siloxanes will also be at risk from a CEPA-toxic designation for D4, D5 and D6. Non-Canadian competitors would not be subject to the same cost and resource burdens associated with the implementation of a substitution strategy so they can offer lower prices in export markets. A 'CEPA-toxic' designation will have clear international trade repercussions by lowering Canada's CAN$2,600 million export of personal care and industrial goods that contain D4 or D5 or D6. Lower Canadian exports will also damage the trade account for Canada and subsequently lower GDP.

1. Introduction

This report investigates the current use of cyclic siloxanes (D4, D5 and D6) in Canada. It details the results of a survey of the Silicones Environmental, Health and Safety Council of North America (SEHSC) members' sales to Canadian customers by industry. The report then explores the potential socio-economic consequences associated with designating D4, D5 and D6 'CEPA-toxic'. In addition, a quantitative estimate has been developed for the impact of a CEPA-toxic designation on the two largest cyclic siloxane user industries (manufacturers of personal care products and industrial goods) in Canada.

2. How much D4, D5 and D6 is supplied to Canada?

To investigate the value of sales of cyclic siloxanes (D4, D5 and D6) in Canada in 2007/8, the SEHSC undertook a survey of its members. The survey asked for the volume and value of sales to Canada split by industrial sector. The industrial sectors selected were agriculture, automotive, aviation, construction, dry cleaning, electronics, food & beverages, home goods, industrial, industrial (defoaming), paper & pulp, personal care, textiles & leather, and other. Six of the seven SEHSC members provided data.

The survey shows a total of 4,085 metric tons of cyclic siloxanes were sold direct to Canada in 2007/8 by SEHSC members (or 15% of all siloxanes sold (Table 1)). The cyclics were sold for CAN$16.2 million, which was 10% of all siloxanes sold. Most sales of cyclics (89% by value and 88% by volume) were to customers manufacturing personal care products. Sales to the industrial, industrial defoaming and dry cleaning sectors were worth CAN$1.5 million. Sales of cyclics to all the remaining sectors were relatively small, so have been included in the other category in Table 1. We analyze the generic socio-economic impacts of designating D4, D5 and D6 as 'CEPA-toxic' under the CMP in Section 3. In Section 4, we investigate the impacts on the Canadian personal care product manufacturing industry. In Section 5, we analyze the impact on sales to the industrial sector (including industrial, industrial defoaming and dry cleaning sales).

Table 1: Value and volume of silicone sales made by SEHSC members to customers in Canada in the financial year 2007/8

Customer-type	Cyclic		Linear		Poly		Total	
Volume (Metric tonnes and % of total)								
Personal care	3,611	14%	64	0%	824	3%	**4,499**	**17%**
Industrial	426	2%	128	0%	3,340	13%	**3,894**	**15%**
Industrial defoaming	1	0%	165	1%	228	1%	**394**	**1%**
Dry cleaning	8	0%	0	0%	0	0%	**8**	**0%**
Other	40	0%	266	1%	17,558	66%	**17,863**	**67%**
Total	4,085	15%	622	2%	21,950	82%	**26,657**	**100%**
Value (CAN$ million and % of total)								
Personal care	14.5	9%	0.5	0%	6.0	4%	**21.1**	**13%**
Industrial	1.5	1%	0.8	0%	22.9	14%	**25.1**	**15%**
Industrial defoaming	0.0	0%	1.4	1%	1.8	1%	**3.1**	**2%**
Dry cleaning	0.0	0%	0.0	0%	0.0	0%	**0.0**	**0%**
Other	0.1	0%	1.0	1%	112.9	69%	**113.9**	**70%**
Total	16.2	10%	3.5	2%	143.6	88%	**163.4**	**100%**

Source: SEHSC member survey

The figures shown in Table 1 will underestimate total sales of cyclic siloxanes to Canada as the survey measures only direct sales made by SEHSC members to end user industries and distributors in Canada. It excludes sales of finished goods and raw materials from US businesses (other than silicone manufactures themselves) into Canada. Similarly, it does not take into account sales to producers or distributors of finished products elsewhere in the world, which are then imported into Canada.

3. The potential economic impacts of designating D4, D5 and D6 as 'CEPA-toxic'

This section discusses the possible impacts on the Canadian economy of the Canadian Chemical Management Plan (CMP) designating D4, D5 and D6 as 'CEPA-toxic'. The impacts on the personal care products and industrial sector are discussed in greater detail in Sections 4 and 5, respectively.

Designating D4, D5 and D6 as 'CEPA-toxic' under the CMP will cause a number of detrimental industry and wider socio-economic impacts, namely:

- ***Require the re-formulation of products and revision of manufacturing processes*** that use D4, D5 and D6 to produce a wide-range of personal care and industrial products. The redesign of product and machinery will involve significant research and development (R&D), testing and implementation costs.

- ***Lower manufacturer's margins, profits and corporation tax receipts.*** If the costs of re-formulating and redeveloping products and productions process are not passed onto consumers and are absorbed within the industry, then firms' profits margins will decline on each product sold. They will therefore earn lower total profits, which will reduce corporation tax receipts. In the longer term, lower profit margins will lower firms' willingness to supply this type of product, redeploying the capital they invest in more profitable sectors.

- **Lower demand and consumers' real income.** If the increased costs of the replacement production procedures are passed on, the prices consumers face will increase. Depending on the sensitivity of demand to price, this is likely to lower domestic and international purchases of personal care and other products that were formerly made with cyclic siloxanes.

- ***Loss of output and jobs in the Canadian personal care goods and other manufacturing industries that previously used cyclic siloxanes***. Lower demand for Canadian products will lower output and employment.

- ***Loss of jobs in the personal care supply-chain.*** Lower sales will mean the manufactures will require fewer inputs of goods and services from their suppliers, which in turn-will affect the turnover, profits and employment in the manufacturers' supply-chain.

- ***Reduce the international competitiveness*** of the Canadian personal care industry and other sectors that previously used cyclic siloxanes. Foreign competitors will not be subject to the same cost and resource burden associated with the implementation of a substitution strategy so will be able to offer lower prices in export markets.

- ***Reduce consumer choice***. The wide use of D4, D5 and D6 is largely due to the unique properties they impart (e.g. viscosity, solvency and feel). Although some candidate substitutes have been identified, a direct one-for-one single substitute that could effectively duplicate all specific product enhancements is simply not available.[1] Accordingly there is the potential for ***deterioration in product performance and reduction in product choice***.

- ***Increase the regulatory burden*** on the personal care industry and other former users of cyclic siloxanes. As well as product integrity considerations, the development of product substitutes presents additional challenges from both a safety and regulatory perspective. New products will need to be re-tested to meet safety specifications and could face additional emission and waste controls.

1 Potential socioeconomic implications: Proposed findings draft assessment report: Canadian Cosmetic, Toiletry and Fragrance Association, October 2007.

4 Socio-economic impact on the personal care products industry

4.1 How are cyclic siloxanes (D4, D5 and D6) used in the personal care industry?

Cyclic siloxanes (D4, D5 and D6) are used in a wide range of personal care products, including:

- Hair products - (e.g. shampoos, conditioners, hairspray)
- Skin products – (e.g. moisturizers, cleaners etc)
- Colour cosmetics – (e.g. lipsticks, mascara, foundation powders)
- Bath and body products – (e.g. bath & shower gel, soaps, lotions, talc, deodorants)
- Fragrance products – (e.g. aftershave)
- Other – (e.g. antiperspirants, sunscreen)

4.2 Potential socio-economic impacts of designating D4, D5 and D6 'CEPA-toxic 'on the personal care products industry

The channels through which potential designation of D4, D5 and D6 as 'CEPA-toxic' will impact all industries are spelt out in Section 3. This sub-section quantifies the impacts for the personal care industry. In particular, we look at the manufacture of personal care products, exports of, and retail of those products.

4.2.1 Impact on manufacturers of personal care goods in Canada

In 2007, manufacturing of personal care goods contributed CAN$477 million to Canadian GDP (see the notes to Table 2 for description of data).[2] This industry employed just over 4,100 workers, paying wage income of CAN$179 million at an average annual wage of CAN$43,442.

To investigate what proportion of this output and employment is at risk from the designation of D4, D5, and D6 as 'CEPA-toxic', we need to know how widely the cyclics are used in the preparation of personal care products. We draw from two sources. The first source is an assessment of D4, D5 and D6 from personal care goods prepared by SEHSC. While the study focuses on the concentrations of D4, D5 and D6 in personal care products, the assessment also provides some guidance on the likely mix of products within the broader personal care industry that contain D4, D5 and D6. For example, 13% of body lotions currently on sale in Canada contain D4, or D5 or D6. The SEHSC survey provides similar data for other personal care products including lipsticks (76%) and diaper creams (30%). No figures were available for hair care products or shower gels.

[2] The following 5-digit NAICS code is used to define the manufacture of personal care goods in Canada: 32562 – Toilet preparation manufacturing. Examples of products in this category include (aftershave, antiperspirants, hairspray, nail polish, shampoos and conditioners). It excludes toothpastes and hand/gel soaps. See Annex 1 for a detailed list of products in 32562.

A second study prepared by the Canadian Cosmetic, Toiletry and Fragrance Association (CCTFA) includes a survey of their 160 members' usage.[3] It finds personal care products containing D4 or D5 or D6 made up 24% of the total retail value of cosmetics/personal care goods sold in Canada.

In order to develop a representative assessment of the likely impact of 'CEPA-toxic' designation on the personal care manufacturing market in Canada from the proposed ruling, we assume that 20% of personal care goods contain D4 or D5 or D6. We believe this to be a conservative estimate based on the findings of both the SEHSC exposure assessment and the CCTFA study.

On this basis, we estimate designation could lower Canadian manufacturers output of personal care products by CAN$95 million a year. We estimate this would lower employment by 824 people and so reduce wage income by CAN$36 million each year (Table 2).

And of course there is potential for further job losses due to the "downstream" use of personal care products. Information provided by the Allied Beauty Association (ABA) indicates that up to 210,000 hairstylists and 34,000 salons in Canada could be affected by designating D4, D5 and D6 'CEPA-toxic'.

In addition, the impact of the potentially lower output and employment has more broad implications. The full impacts on the economy will be much wider if the multiplier effects are considered. The indirect (supply-chain) effect is the impact on the economy that will occur as manufacturers of personal care products purchase fewer goods and services from their suppliers, while the induced (consumer spending) effect is the impact of the loss of spending in the economy by those no longer employed in the personal care manufacturing industry or in the supply-chain.

Table 2: Output of manufactured personal care goods in Canada in 2007

	2007
Output of industry - CAN$ million	$477 million[1]
Approximate % of products containing D4 or D5 or D6	20%
Impacted output of industry – CAN$ million	$95 million
Impacted employment	824[2]
Impacted wage income - CAN$ million	$36 million[3]

Source: Oxford Economics and Statistics Canada

[1] Statistics Canada's estimate of Gross Domestic Product (GDP) of the toilet preparation manufacturing industry (NAICS 32562) in 2007 at basic prices.
[2] Data are available on employment in the soap, cleaning compound and toilet preparation manufacturing industry NAICS (3256). They are not available at the 5-digit NAICS level. So to calculate employment in the toilet preparations manufacturing industry's (NAICS 32562), we multiply its share of NAICS 3256 output by total employment in the more aggregated sector. This gives an estimate of 4,122 people. Impacted employment is 20% of this figure (824 people).
[3] On average, employees in the soap, cleaning compound and toilet preparation manufacturing industry [NAICS 3256] received CAN$43,442 in gross wages in 2007. If 824 staff lose their jobs, wage income will decline by CAN$36 million .

So how would manufacturers' respond to the ruling? Companies will look to develop new or reformulated products that can be introduced into the marketplace to compensate for the loss of revenue from no

[3] Potential socio-economic implications: Proposed findings from draft assessment report: Canadian Cosmetic, Toiletry & Fragrance Association (CCTFA), October 2007

longer being able to produce D4, D5 and D6 based products. This re-formulating and re-design of processes will impose costs on the manufacturer. If these costs are not passed onto consumers and are absorbed within the industry then profits and corporation tax receipts will be reduced. If the increased cost is passed on in full to the consumer then sales, profits and corporations tax receipts will be reduced.

At the same time there could be an increase in the regulatory burden on the Canadian personal care manufacturing sector. As well as product integrity considerations, the development of product substitutes presents additional challenges from both a safety and regulatory perspective. New products will need to be re-tested to meet safety controls and could face additional emission and waste controls.

4.2.1 Impact on international trade

There are also international trade repercussions of designating D4, D5 and D6 as CEPA-toxic. Canada exported CAN$1,309 million of personal care manufactured goods (NAICS 32562) in 2007. Most (80 per cent) went to the US. These goods will no longer be able to be produced and thus exported if they contain D4, D5 and D6, with the impact manifesting in two possible ways (i) lower Canadian exports which will damage the trade account for Canada and subsequently lower GDP, and (ii) make it unattractive for international companies to continue to produce products in Canada for the international market place as they will be stopped from using the key ingredients that give many personal care products their converted attributes (e.g. the smooth and silky properties of shampoos and conditioners).

4.2.3 Retail spending on personal care goods

It is not just producers that will be impacted by the proposed finding of D4, D5 and D6 as CEPA-toxic. Those involved in the wholesale and retail distribution of personal care items will be adversely affected by such a decision and so to the end-consumer. Using retail sales data we can get a good handle of the potential socio-economic impacts on retailers and the wider economy, which are presented in Table 3.[4]

Table 3: Impact on retail sales, retail jobs and GDP in 2007

	2007
Retail sale of cosmetics and fragrances (e.g. lipstick, aftershave) - CAN$ million	$2,206[4]
Retail sale of toiletries (e.g. toothpaste, deodorants) - CAN$ million	$1,265[4]
Retail sale of soap (e.g. soaps and shower gels) - CAN$ million	$316[4]
Retail value of personal care products that potentially contain D4 or D5 or D6 - CAN$ million	$3,788[4]
Approximate % of personal care products containing D4, D5 or D6 in personal care products	20%
Retail value of personal care products containing D4, D5 or D6 - CAN$ million	$758
Retail sales per employee - CAN$ 000s	$231
Impacted retail jobs	3,282
Impacted wages income - CAN$ million	$77

Source: Oxford Economics and Statistics Canada

[4] The retail sales estimates are taken from the quarterly retail commodity survey. The retail sale of toiletries and soap is estimated by disaggregating the broader 'Other toiletries & personal equipment category' using detailed spending estimated on personal care goods from the UK Expenditure & Food Survey, 2006.

The key points to highlight from the data in Table 3 are:

- An estimated CAN$758 million of personal care products that contain D4, D5 and D6 were sold in Canadian shops in 2007.
- The sale of D4, D5 and D6 based personal care products are estimated to support 3,282 retail jobs. Staff working in the retail sector earn an average salary of CAN$23,328, so this would be a loss of CAN$77 million in total wage income.

The figures presented above are based on the assumption that consumers do not switch from purchasing D4, D5 and D6 based personal care products to those that do not include D4 or D5 or D6 – instead they simply stop purchasing these items. While it is likely that many of these consumers will switch to purchasing non D4, D5 and D6 based products (it is very unlikely that people will stop washing their hair, or brushing their teeth), the change in purchasing habit does imply a potential loss of consumer welfare.

The loss of consumer welfare is driven by the reduction in consumer choice. The wide use of D4, D5 and D6 is largely due to the unique properties that they impart (e.g. viscosity and feel in shampoos). No alternate product is available at present that effectively duplicates all the specific product enhancements that D4, D5 and D6 can give to a product.[5] Accordingly, there is the potential for deterioration in product performance and quality. Given that the consumer had been willing and able to pay a premium to gain the specific product enhancements if that choice is no longer available then the impact is a loss of consumer welfare.

5 Industrial sector

As outlined in Section 2 (and Table 1), the other industrial sectors in Canada which purchase cyclic siloxanes from SEHSC members in quantity are dry-cleaning, industrial (defoaming) and industrial (cleaning, polishing, paints, coatings, sealants and adhesives). Section 5 tries to quantify the impact of 'CEPA-toxic' designation on these uses (which we label 'industrial' for want of a better term).

5.1 How are cyclic siloxanes (D4, D5 and D6) used in the industrial sector?

Cyclic siloxanes (D4, D5 and D6) are used in a wide range of products across the industrial sector, including:

- ***Dry cleaning*** - odorless, colorless, non-oily cleaning agent used in dry cleaning (e.g. the brand GreenEarth).
- ***Industrial (defoaming)*** – controls excessive foaming caused by polymers and surfactants in detergents and industrial cleaners. Widely used in the oilfield and petrochemicals industry to improve productivity both when drilling, extracting, producing and during purification and

[5] Potential socio-economic implications: Proposed findings from draft assessment report: Canadian Cosmetic, Toiletry & Fragrance Association (CCTFA), October 2007

separation process.

- ***Industrial*** – e.g. cleaners and polishes (to improve surface protection, cleanability and shine) and paints, coatings and adhesives (decorative paints, water/heat-resistance coatings, sealants, etc).

5.2 Potential socio-economic impacts of designating D4, D5 and D6 'CEPA-toxic 'on the industrial sector

As in Section 4 for personal care products, this section tries to investigate the output, employment, trade and retail activity at risk from designation for products in the industrial sector.

As the sector is not particularly homogenous, we need to be explicit about our statistical definitions. In what follows, we use the NAICS code 32561 'Soap and cleaning compound manufacturing' to capture the manufacture of cleaning agents, polishes, and defoaming agents and NAICS code 3255 'Paints, Coatings and Adhesives'. We ignore NAICS code 325998 'All other miscellaneous chemical product and preparation manufacturing' which does include dry-cleaning agent manufacturing, but also covers too many other disparate items to accurately report on the activities of the dry-cleaning sector.

5.2.1 Impact on manufacturers of industrial goods in Canada

In 2007, gross value added from the manufacture of NAICS 32561 and 3255 in Canada was CAN$2,168 million (Table 4). A total of 17,321 people were employed in these industries, receiving wage income of CAN$752 million, at an average annual wage of CAN$43,442.[6]

While D4, D5 and D6 is widely used in the preparation of cleaning agents, polishes, paints, adhesives and defoaming agents, not all products use it. Among those that do use cyclic siloxanes, not all products use them to the same extent. So in estimating what is potentially at risk in NAICS 32561 and 3255 from the proposed CEPA-toxic ruling, we need to measure D4, D5 and D6 usage. Unfortunately, publically available information contains little detail about which products within the industrial sector, or within polishes and defoaming agents more specifically, contain D4 or D5 or D6. However, they are estimated to be used in up to 25 per cent of the 30,000 dry cleaners operating in the United States.[7]

In order to provide an indicative estimate of the impact on the industrial sector in Canada from the proposed ruling, we assume that 10% of cleaning agents, polishes, paints, adhesives and defoaming agents contain D4 or D5 or D6. We believe this to be a conservative estimate based on the usage data available.

Using this assumption, we estimate designation could lower Canadian output of industrial manufactures by CAN$217 million each year (Table 4). We estimate the loss of this output would lower employment by

[6] Based on all employee gross weekly earnings for NAICS code 3256 ' Soap, cleaning compound and toilet preparation manufacturing'. Assumes a 48 week working year.

[7] The D5 based solvent (GreenEarth) is one if the two most popular alternatives to perc in the dry-cleaning industry. www.naturalnews.com/023365.html states that perc is used by 3 out of 4 dry cleaners nationwide. www.azstarnet.com/metro/214336 states that perc remains the cleaning agent of choice for about 85 per cent of dry cleaning businesses in the US.

a little over 1,700 people and lead to a loss of CAN$75 million in wages.

Table 4: Output of industrial sector industrial goods in Canada in 2007

	2007
Output of industry - CAN$ million	$2,168 million
% of products containing D4 or D5 or D6	10%
Impacted output of industry – CAN$ million	$217 million
Impacted employment	1,732
Impacted wage income	$75 million

Source: Survey of Employment, Payrolls and Hours (SEPH) and Statistics Canada.

The full impacts on the economy will be much wider if we consider the multiplier effects. The indirect (supply-chain) effect is the impact on the economy that will occur as the manufacturers of cleaning agents, polishes, paints, adhesives and defoaming agents (i.e. industrial sector) purchase fewer goods and services from their suppliers, while the induced (consumer spending) effect is the impact of the loss of spending in the economy by those no longer employed in the industrial sector or along its supply-chain.

So how would manufacturers' respond to the ruling? Companies will look to develop new products or reformulate existing products that can be introduced into the marketplace to compensate for the loss of revenue from no longer being able to produce D4, D5 and D6 based products. This re-formulating and re-design of processes will impose costs on the manufacturer. If these costs are not passed onto consumers and are absorbed within the industry then profits and corporation tax receipts will be reduced. If the increased cost is passed on in full to the consumer then sales, profits and corporations tax receipts will be reduced.

At the same time there could be an increase in the regulatory burden on the producers of goods that contain D4, D5 and D6. As well as product integrity considerations, the development of product substitutes presents additional challenges from both a safety and regulatory perspective. New products will need to be re-tested to meet safety controls and could face additional emission and waste controls.

5.2.2 Impact on international trade

In 2007, Canadian firms exported CAN$1,425 million of industrial manufactured goods (NAICS 3255 and 32561). Most (91 per cent) went to the US. These goods will no longer be able to be produced and thus exported if they contain D4 or D5 or D6. This will have two impacts: (i) lower Canadian exports which will damage the trade account for Canada and subsequently lower GDP, and (ii) make it unattractive for international companies to continue to produce products in Canada for the international market place as they will be stopped from using the key ingredients that give many industrial manufactured products their converted attributes (e.g. improve the shine and effectiveness of detergents, polishes and cleaners, or facilitate the heat/water resistant properties in paints and coatings).

5.2.3 Impact on retail spending

Wholesalers, retailers and consumers of industrial goods that currently incorporate D4, D5 and D6 are

also likely to be adversely affected by the decision to designate the cyclics CEPA-toxic. We can get an idea of the size of the retail market for industrial goods using Statistics Canada's retail sales data (Table 5).[8] In 2007, sales of paint, wallpaper and related supplies were worth CAN$967 million (having excluded timber from the appropriate NAICS code). Sales of household cleaning supplies amounted to CAN$3,786 million. This results in a total of CAN$4,753 million sales in the Industrial sector as defined.

Table 5: Impact on retail sales, retail jobs and GDP in 2007

	2007
Retail sale of paint, wallpaper and related supplies (33% share)[9] - CAN$ million	$967
Retail sale of household cleaning supplies/chemicals - CAN$ million	$3,786
Retail value of industrial products that potentially contain D4, D5 and D6 - CAN$ million	$4,753
Approximate % of industrial products containing D4 or D5 or D6	10%
Retail value of industrial products containing D4 or D5 or D6 - CAN$ million	$474
Retail sales per employee - CAN$ 000s	$231
Impacted retail jobs	2,050
Impacted wages income - CAN$ million	$48

Source: Oxford Economics and Statistics Canada.

If 10% of the paints and household cleaning supplies/chemicals include D4 or D5 or D6 in their preparation, retailers are likely to lose CAN$474 million in sales. On average, the retail sector in Canada employs one member of staff for each CAN$231,000 worth of sales. A loss of CAN$474 million in revenue would suggest, retailers would lower employment by 2,050. At an average annual retail salary of CAN$23,328, total wage income in the Canadian economy would decline by a further CAN$48 million.

The figures presented above are based on the assumption that consumers do not switch from purchasing D4, D5 and D6 based products to those that do not include D4, D5 and D6 – instead they simply stop purchasing these items in their entirety. While it is likely that many of these consumers will switch to purchasing non D4, D5 and D6 based products, the change in purchasing habit does imply a potential loss of consumer welfare.

The loss of consumer welfare is driven by the reduction in consumer choice. The wide use of D4, D5 and D6 is largely due to the unique properties that they impart. If no alternate product is available that effectively duplicates all the specific product enhancements that D4, D5 and D6 can bring to a product, then there is the potential for deterioration in product performance and quality. Given the consumer was willing and able to pay a premium to gain the specific product enhancements that are now simply no longer available, then removal of those products from the market will bring a loss of consumer welfare.

[8] The retail sales estimates are taken from Statistics Canada's Quarterly Retail Commodity Survey.

[9] As this retail spending category includes spending on wallpaper and timber as well as paint, we only include a one-third share of this category

Annex 1: Lists of product in various NAICS codes

Soap, cleaning compound and toilet preparation manufacturing industry (NAICS 3256)

After-shave preparations manufacturing
Antiperspirants, personal, manufacturing
Baby powder and baby oil manufacturing
Bath salts manufacturing
Blending and compounding perfume bases
Blushes, face, manufacturing
Bubble bath preparations manufacturing
Colognes manufacturing
Cosmetic creams, lotions, and oils manufacturing
Dental floss manufacturing
Denture adhesives manufacturing
Denture cleaners, effervescent, manufacturing
Deodorants, personal, manufacturing
Depilatory preparations manufacturing
Eye make-up (e.g., eye shadow, eyebrow pencil, mascara) manufacturing
Face creams (e.g., cleansing, moisturizing) manufacturing
Foundations (i.e., make-up) manufacturing
Hair coloring preparations manufacturing
Hair preparations (e.g., conditioners, dyes, rinses, shampoos) manufacturing
Hair sprays manufacturing
Hand lotions manufacturing
Lipsticks manufacturing
Lotions (e.g., body, face, hand) manufacturing
Make-up (i.e., cosmetics) manufacturing
Manicure preparations manufacturing
Mouthwashes (except medicinal) manufacturing
Nail polish remover manufacturing
Nail polishes manufacturing
Perfumes manufacturing
Permanent wave preparations manufacturing
Powders (e.g., baby, body, face, talcum, toilet) manufacturing
Rouge, cosmetic, manufacturing
Sachet, scented, manufacturing
Shampoos and conditioners, hair, manufacturing
Shaving preparations (e.g., creams, gels, lotions, powders) manufacturing
Sunscreen lotions and oils manufacturing
Suntan lotions and oils manufacturing
Talcum powders manufacturing
Tints, dyes, and rinses, hair, manufacturing
Toilet preparations (e.g., cosmetics, deodorants, perfumes) manufacturing
Toilet water manufacturing
Towelettes, premoistened, manufacturing

NAICS 32561 - Soap and Cleaning Compound Manufacturing

Corresponding Index Entries
Bar soaps manufacturing
Dentifrices manufacturing
Detergents (e.g., dishwashing, industrial, laundry) manufacturing
Dishwasher detergents manufacturing
Glycerin (i.e., glycerol), natural, manufacturing
Hand soaps (e.g., hard, liquid, soft) manufacturing
Laundry soap, chips, and powder manufacturing
Mechanic's hand soaps and pastes manufacturing
Presoaks manufacturing
Scouring cleansers (e.g., pastes, powders) manufacturing
Soaps (e.g., bar, chip, powder) manufacturing
Toilet soaps manufacturing
Toothpastes, gels, and tooth powders manufacturing
Waterless hand soaps manufacturing
Airfreshners manufacturing
Ammonia, household-type, manufacturing
Automobile polishes and cleaners manufacturing
Beeswax polishes and waxes manufacturing
Bleaches, formulated for household use, manufacturing
Brass polishes manufacturing
Buffing compounds manufacturing
Cloths, dusting and polishing, chemically treated, manufacturing
Copper cleaners manufacturing
Degreasing preparations, household-type, manufacturing
Deodorants (except personal) manufacturing
Disinfectants, household-type and industrial, manufacturing
Drain pipe cleaners manufacturing
Drycleaning preparations manufacturing
Fabric softeners manufacturing
Floor polishes and waxes manufacturing
Furniture polishes and waxes manufacturing
Glass and tile cleaning preparations manufacturing
Ink eradicators manufacturing
Kitchen degreasing and cleaning preparations manufacturing
Lye, household-type, manufacturing
Metal polishes (i.e., tarnish removers) manufacturing
Oven cleaners manufacturing
Polishes (e.g., automobile, furniture, metal, shoe) manufacturing
Polishing preparations manufacturing
Recycling drycleaning fluids

Rug cleaning preparations manufacturing
Rust removers manufacturing
Saddle soaps manufacturing
Shoe polishes and cleaners manufacturing
Silver polishes manufacturing
Soot removing chemicals manufacturing
Spot removers (except laundry presoaks) manufacturing
Starches, laundry, manufacturing
Sweeping compounds, absorbent, manufacturing
Toilet bowl cleaners manufacturing
Tub and tile cleaning preparations manufacturing
Wallpaper cleaners manufacturing
Wax removers manufacturing
Waxes, polishing (e.g., floor, furniture), manufacturing
Window cleaning preparations manufacturing

NAICS 3255 - Soap and Cleaning Compound Manufacturing

Architectural coatings (i.e., paint) manufacturing
Calcimines manufacturing
Dispersions, pigment, manufacturing
Dopes, paint, and laquer, manufacturing
Driers, paint, and varnish, manufacturing
Enamel paints manufacturing
Epoxy coatings made from purchased resins
Fillers, wood (e.g., dry, liquid, paste), manufacturing
Frit manufacturing
Glaziers' putty manufacturing
Industrial product finishes and coatings (i.e., paint) manufacturing
Lacquers manufacturing
Latex paint (i.e., water based) manufacturing
Marine paints manufacturing
Motor vehicle paints manufacturing
Paint and varnish removers manufacturing
Paint thinner and reducer preparations manufacturing
Paintbrush cleaners manufacturing
Paints (except artist's) manufacturing
Paints, emulsion (i.e., latex paint), manufacturing
Paints, oil and alkyd vehicle, manufacturing
Plastic wood fillers manufacturing
Plastisol coating compounds manufacturing
Polyurethane coatings manufacturing
Powder coatings manufacturing
Primers, paint, manufacturing
Shellac manufacturing
Stains (except biological) manufacturing
Varnishes manufacturing

Water repellant coatings for wood, concrete and masonry manufacturing
Wood fillers manufacturing
Adhesives (except asphalt, dental, gypsum base) manufacturing
Caulking compounds (except gypsum base) manufacturing
Cement, rubber, manufacturing
Construction adhesives (except asphalt, gypsum base) manufacturing
Dextrin glues manufacturing
Epoxy adhesives manufacturing
Glues (except dental) manufacturing
Joint compounds (except gypsum base) manufacturing
Mucilage adhesives manufacturing
Pastes, adhesive, manufacturing
Pipe sealing compounds manufacturing
plumbers' putty manufacturing
Rubber cements manufacturing
Sealing compounds for pipe threads and joints manufacturing
Starch glues manufacturing
Tile adhesives manufacturing