



2017

PROGRESS REPORT

ON THE CODE OF PRACTICE FOR
THE REDUCTION OF VOLATILE ORGANIC
COMPOUND (VOC) EMISSIONS FROM
CUTBACK AND EMULSIFIED ASPHALT

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INTRODUCTION

The objective of this report is to provide a summary of the data submitted by industry from February to June 2018, following the publication in 2017 of the *Code of Practice for the Reduction of Volatile Organic Compound (VOC) Emissions from Cutback and Emulsified Asphalt* (the Code).

WHAT ARE VOCs AND WHY PREVENT THEIR POLLUTION?

VOCs are volatile organic compounds that participate in the formation of ground-level ozone through complex reactions with nitrogen oxides (NO_x), in the presence of sunlight. They also contribute to the formation of particulate matter via complex chemical reactions involving emissions of other smog precursors, including sulphur dioxide (SO₂), NO_x and ammonia (NH₃).

Particulate matter and ground-level ozone are the two principal components of smog. Smog is an air quality issue that poses serious health and environmental concerns in Canada. Particulate matter and ozone can be transported by prevailing winds over long distances, making them not only a local urban issue but also one that extends regionally in Canada into many smaller communities and rural areas.

The 2012 Canadian Smog Science Assessment (co-authored by Environment and Climate Change Canada and Health Canada) concluded that both particulate matter and ground-level ozone (two of the main components of smog) need to be treated as having no safe level.

VOCS AND ASPHALT

Emulsified asphalt and cutback asphalt are products used in various road construction, maintenance and repair applications, such as plant mix, road mix, prime and tack coats, and full-depth reclamation.

These products are prepared by mixing asphalt cement with a petroleum solvent to produce cutback asphalt, or with emulsifiers and water (and sometimes a small amount of petroleum solvent) to produce emulsified asphalt. Once the liquefied asphalt cement is applied to the road surface, the petroleum solvent or the water evaporates, leaving the asphalt cement behind. This evaporation of petroleum solvent causes the emission of VOCs. The use of cutback asphalt yields the greatest amount of VOC emissions as it contains larger quantities of petroleum solvents than emulsified asphalt.

As of 2016, many jurisdictions in Canada and the United States have adopted practices to reduce VOC emissions from this sector. In each case, this involves either restrictions on the use of cutback asphalt during the ozone season (typically the summer months), or a prohibition of the use of cutback asphalt throughout the year. In addition, many jurisdictions restrict VOC content in the manufacturing of cutback and emulsified asphalt.

CODE OF PRACTICE OBJECTIVES

On February 25, 2017, a Notice of the issuance and publication of 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. The objective of the Code is to protect the environment by reducing VOC emissions from the asphalt sector by at least 40 percent over a 6-year period. Specifically, general compliance with this Code is expected to reduce yearly VOC emissions from the use of asphalt by 3 to 5 kilotonnes. The Code includes reporting provisions for cutback and emulsified asphalt manufacturers every two years to measure the industry's progress in meeting the objective.

The Code describes recommended practices for cutback and emulsified asphalt during and outside of the ozone season in terms of maximum VOC content by volume which evaporates at 260 °C or less (Table 1). The ground-level ozone season in Canada runs from May 1 through September 30. There are no recommended practices in the Code for emulsified asphalt products used outside of the ozone season.

Table 1: Recommended practices

TYPE OF LIQUEFIED ASPHALT	TIME OF YEAR	VOC CONTENT BY VOLUME WHICH EVAPORATES AT 260 °C OR LESS (%)
Cutback asphalt (CA)	During the ozone season	≤ 0.5
Cutback asphalt (CA)	Outside of the ozone season	≤ 5
Emulsified asphalt (EA)	During the ozone season	≤ 3
Emulsified asphalt (EA)	Outside of the ozone season	N/A

Additionally, the Code recommends that manufacturers, sellers and procurement enablers promote the use of alternative formulations of asphalt containing low VOC-emitting products during contracting discussions. A commitment to follow the Code should also be included in contracts that are issued for paving or maintenance operations in Canada.

SUMMARY OF RESULTS FOR 2017

The Code includes reporting provisions targeting asphalt manufacturers. The first reporting period covered activities from the 2017 calendar year. Nine reporters provided 2017 data as suggested by the Code. One manufacturer submitted incomplete data and another indicated that they had not manufactured any cutback or emulsified asphalts. As such, the data presented in this section is representative of seven Canadian manufacturers of cutback asphalt (CA) and emulsified asphalt (EA).

There were 264.5 kilotonnes (kt) of liquefied asphalt sold in Canada in 2017. The large majority was emulsified asphalt (89.6%). Although cutback asphalt represented only 10.4 percent of the liquefied asphalt sold, it was responsible for 60.8 percent of the VOC emissions (3.1 kt). Moreover, cutback and emulsified asphalts sold during the ozone season were the largest contributors of VOC emissions from the asphalt industry throughout the year, yielding 2.1 kt and 1.9 kt respectively.

Table 2: Quantities of liquefied asphalt sold and resulting VOC emissions

TYPE OF LIQUEFIED ASPHALT	TIME OF YEAR	QUANTITY SOLD		RESULTING VOC EMISSIONS	
		(kt)	(%)	(kt)	(%)
CA	During ozone season	23.0	8.7	2.1	41.2
	Outside ozone season	4.5	1.7	1.0	19.6
EA	During ozone season	222.4	84.1	1.9	37.2
	Outside ozone season	14.6	5.5	0.1	2.0
Annual total		264.5	100.0	5.1	100.0

Manufacturers also provided quantities sold for specific products. Of the 181 liquefied asphalt products reported, 30 products had a VOC content exceeding the Code's recommended practices, which represents 9.9 percent (26.2 kt) of the total quantity of liquefied asphalt sold and is responsible for 62.7 percent (3.2 kt) of the resulting VOC emissions.

Table 3: Quantities of products exceeding the Code sold and resulting VOC emissions

TYPE OF LIQUEFIED ASPHALT AND TIME OF YEAR	CODE'S RECOMMENDED VOC CONTENT BY VOLUME WHICH EVAPORATES AT 260 °C OR LESS (%)	NUMBER OF PRODUCTS REPORTED WITH A VOC CONTENT:		QUANTITY SOLD OF PRODUCTS EXCEEDING THE CODE (kt)	RESULTING VOC EMISSIONS FROM PRODUCTS EXCEEDING THE CODE (kt)
		RESPECTING THE CODE	EXCEEDING THE CODE		
CA during ozone season	≤ 0.5	5	18	17.9	2.1
CA outside ozone season	≤ 5	6	6	3.5	0.9
EA during ozone season	≤ 3	90	6	4.8	0.2
EA outside ozone season	N/A	50	N/A	N/A	N/A
Annual total		151	30	26.2	3.2

CONCLUSION

The total quantity of VOC emissions from cutback and emulsified asphalt sold in Canada in 2017 was 5.1 kt. Cutback asphalt was responsible for the majority of VOC emissions (3.1 kt, or 60.8% of emissions).

About 17 percent of the 181 liquefied asphalt products reported had a VOC content exceeding the Code's recommended limits. Cutback asphalt products showed the greatest gaps between their actual VOC content and the Code's recommended practices. Based on these findings, it seems that an alignment with the Code for cutback asphalt products during and outside of the ozone season could result in significant reductions of VOC emissions for the asphalt sector.

NEXT STEPS

Environment and Climate Change Canada will schedule a number of compliance promotion campaigns specifically for the Code. In 2018-2019, compliance promotion efforts are focussed on delivering information on the Code (i.e. factsheet) to all known stakeholders. In addition, an information-gathering survey campaign to municipalities across Canada is currently underway in an effort to promote the Code for inclusion in procurement documents and contracting. In 2019-2020, the campaigns will focus on manufacturers, importers, sellers and users of liquefied asphalt in Canada. The purpose will be to raise awareness and knowledge of the Code, to promote the use of liquefied asphalts that follow the Code's recommended practices, and to encourage all manufacturers of cutback and emulsified asphalt in Canada to report data as requested by the Code.

These activities will promote awareness of the Code and support the Code's VOC emissions reduction objective.

Environment and Climate Change Canada will publish a second progress report following the submittal of voluntary reports covering the 2019 calendar year.

CONTACT

If you have any questions regarding this report, please contact the Products Division at 1-888-391-3426 or by email at ec.produits-products.ec@canada.ca.