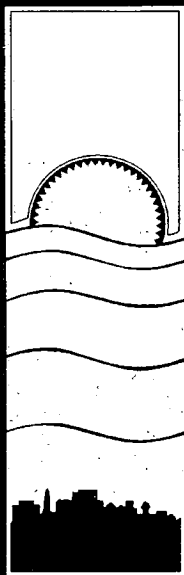




Canadian Council of Ministers of the Environment / Le Conseil canadien des ministres de l'environnement

**A PROGRAM TO REDUCE  
VOLATILE ORGANIC COMPOUND  
EMISSIONS BY 40 PERCENT FROM  
ADHESIVES AND SEALANTS**



CCME MANAGEMENT PLAN  
INITIATIVE V102  
MARCH 1994  
PN 1116

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Prepared by the  
National Work Group on the  
Reduction of VOC Emissions from  
Adhesives and Sealants.

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# Executive Summary

## Recommendations

Ground-level ozone, a major component of urban smog, is caused by two precursor pollutants, nitrogen oxides (NO<sub>x</sub>) and volatile organic compounds (VOC), reacting in the atmosphere in the presence of sunlight. Ozone is one of the more serious air quality problems in Canada today.

In recognition of the seriousness of the problem, the Canadian Council of Ministers of the Environment (CCME) decided, in October 1988, to develop a Management Plan for the control of NO<sub>x</sub> and VOC. Initiative V102 of the Plan is a program to reduce VOC emissions from the use of adhesives and sealants by 40 percent by 1997. The CCME recommended that a guideline defining emission limits be developed for products that would have been identified requiring emission standards.

A Task Force composed of representatives from the adhesives and sealants industry, users, raw material suppliers, and federal, provincial, and regional governments was formed in the fall of 1992 in order to carry out the mandate of Initiative V102. At the first meeting in March 1993, representatives from the Adhesives and Sealants Manufacturers Association of Canada (ASMAC) provided statistics to the Task Force that indicated that the 40 percent reduction goal would be achieved naturally by 1997. It showed that ASMAC solvent use went from 7.2 to 5.4 kilotonnes (kt) from 1985 to 1992 for a reduction of 25 percent. The Association indicated that the value of sales is confidential business information, but their books could be opened to the Government for an audit.

ASMAC prepared a short paper on VOC emission reductions from their sector to substantiate those figures. The report was circulated for review among all the participating members. The final report was submitted to the project leader in June 1993 with the following recommendation:

**RECOMMENDATION: It is recommended that no further action be taken on this initiative, other than to continue to monitor ASMAC data on an annual basis.**

Although no reviewer has disagreed with this recommendation, it was pointed out that there should be an ongoing mechanism to monitor the reported downward trends. As with V101, efforts should be put forth by governments to strengthen both the data base and inventories. Improved data bases are essential to support the fact that reductions have actually occurred and that voluntary actions are promoted.

Inquiries and comments on this report are welcomed and may be sent to:

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# Introduction and Background

Ground-level ozone, a major component of urban smog, is one of the more serious air quality problems in Canada today. In summer, more than half of all Canadians are routinely exposed to ozone levels that are known to have adverse effects on health. Ozone is also known to cause significant damage to agricultural crops and other forms of vegetation in parts of Canada.

Ground-level ozone is caused by two precursor pollutants, nitrogen oxides (NO<sub>x</sub>) and volatile organic compounds (VOC), reacting in the atmosphere in the presence of sunlight. In recognition of the seriousness of the problem, the Canadian Council of Ministers of the Environment (CCME) decided, in October 1988, to develop a Management Plan for the control of NO<sub>x</sub> and VOC. Phase I of the Plan, which started in the fall of 1991, contains both preventive and remedial emission reduction programs.

VOC emissions from adhesives and sealants have been estimated at 35 kilotonnes (kt) in the 1985 inventory (2 percent of total emissions); however ASMAC has always disputed these estimates. Initiative V102, which is one of the 31 specific VOC reduction initiatives included in Phase I, addresses the adhesives and sealants subsector. Its objective is: "to reduce VOC emissions by 40 percent by 1997". The CCME recommendation with respect to this initiative states:

"Environment Canada coordinate a task force composed of representatives of all stakeholders to (i) review these issues (need to control imported products, evaluate uses where add-on controls could be used) and, (..) identify products, if any, which will require the development of emissions standards, and (ii) prepare a CCME guideline defining emission limits for these products... The guideline limits should be readily convertible into product standards by an appropriate standard setting body or to VOC emission regulations under the *Canadian Environmental Protection Act* (CEPA). The task force may also recommend other measures, such as economic incentives, that could replace regulations."

In order to carry out the mandate of Initiative V102, a task force composed of representatives from the adhesives and sealants manufacturing industry, users, raw material suppliers, and federal, provincial, and regional governments was formed in the fall of 1992, holding its first meeting in March 1993 (the membership of the task force can be found in Appendix I). Presentations were made on various issues concerning reduction of VOC emissions. Topics covered included an overview of the CCME Management Plan and Initiative V102, the VOC control measures in the city of Montreal, and the Canadian General Standard Board (CGSB) standard setting process.

ASMAC expressed the opinion that there was no need for Initiative V102 because of the naturally occurring decline in solvent use in adhesives. ASMAC's cost-benefit analysis in its April 27, 1990, submission to Environment Canada concluded that it was not likely that benefits from implementation of V102 would exceed its costs. ASMAC suggested that the working group be dismantled in order to save money for both the Federal Government and the industry.

The Adhesives and Sealants Manufacturers Association of Canada provided statistics to the Task Force that indicated that the 40 percent reduction goal would be achieved naturally by 1997. It showed that ASMAC solvent use went from 7.2 to 5.4 kt from 1985 to 1992 for a reduction of 25 percent, citing market driven factors such as:

- Δ pressures from environmental authorities;
- Δ employers determination to reduce employee exposures to solvents;
- Δ insurance and solvent costs; and
- Δ customer demand

to explain the reductions. The Association indicated that the value of sales were confidential business information, however, their books could be opened to the Government for an audit.

The suggestions to have an independent consultant study and hold a second meeting were both rejected by ASMAC. To these suggestions ASMAC replied that many ASMAC members had already switched some of their products to water-based and were ahead of schedule, but much work remained to be done. It was emphasized that there was no need for consultants, as industry is self-regulating. It was pointed out that it will be a waste of time and money. Industry is reacting to users' pressure to produce adhesives with less solvents (VOC).

It was proposed and accepted that ASMAC would prepare a short paper on VOC emission reductions from their sector to substantiate the reduction figures cited at the meeting. The report was circulated for review among all the participating members. The final report was submitted to the project leader in June 1993.

# Technical Findings

The content of this chapter is made from the report submitted by ASMAC. The data have not been validated by any independent consultant, however, ASMAC states that it is prepared to have the data audited by Environment Canada providing that confidentiality can be maintained.

The Adhesives and Sealants Manufacturers Association has provided the V102 Working Group with annual estimated solvent use calculated from sales data, supplied by its 16 members individually to Anderson, Quick and Short, chartered accountants. Individual member's sales are not divulged to the other members by this firm, but aggregate or total sales figures are reported to each Association member. This data is confidential, for use only by individual members within the Association.

The sales data includes imports by member firms, as well as sales of some adhesives and sealants for the consumer market. ASMAC considers that the data is probably representative of the entire adhesives and sealants markets in Canada, although no data exists as to what percentage of the total market is represented by ASMAC members.

This aggregate data shows total adhesives sales for the industry, broken out into 14 product categories. Six of these categories contain solvents, at the following estimated levels:

**TABLE I**

Adhesive Category	Percent of Tonnage Containing Solvents	Percentage of Solvent Where Present
Contact Cements	100	80
SBR Solvent-based	100	75
Other Solvent-based	100	60
Latex-based	50	5
Emulsion-based	10	10
Sealant/mastics	100	25

Based on the estimated solvent levels from Table I for each product category and based on total ASMAC sales tonnages developed by Anderson, Quick and Short, the following annual solvent uses have been calculated by ASMAC from 1985 on:

**TABLE II**

Year	Adhesives Solids Sales (Kilotonnes)	Calculated Solvent Use (Kilotonnes)	Average Solvent Percentage of Solids
1985	32.3	7.2	22.2
1986	34.0	7.5	21.9
1987	32.0	7.6	23.6
1988	32.3	7.2	22.3
1989	32.1	6.6	20.5
1990	30.7	5.6	18.1
1991	29.7	5.7	18.9
1992	29.8	5.4	18.0

The second column of Table II shows total adhesives sales, in kilotonnes (kt), on an active solids basis, for all 14 ASMAC product categories. This shows a decline of about 8 percent over the eight-year period, due to market conditions and possibly due to movement of some of Canada's manufacturing industry to the USA. ASMAC does not expect to see this business return to Canada.

The third column of Table II shows that calculated total solvent use by the 16 ASMAC members has declined by 25 percent since 1985. Note that this is a very conservative calculation, based solely on users switching to solvent-free adhesives instead of purchasing solvent-containing formulations. Such a calculation makes no allowance for reductions in solvent percentages within product categories, and assumes that these would have remained constant during all of this period. Industry data is not available to permit such a less conservative but more realistic calculation of solvent use.

The calculated solvent use of 5.4 kt, for 1992, can be compared to a total of 4.1 kt of solvents reported as purchased by ASMAC members for that year. ASMAC expects the reported figure to be lower than the calculated one because the latter figure is based on sales that include imported adhesives whereas purchased data exclude imports.

ASMAC believes that the data in Table II reflects a switch from solvent-based adhesives and sealants to water-based or hot melt adhesives that contain no solvents.

ASMAC states that reductions in solvent use have been caused by a number of "market driven" factors that have encouraged adhesives users to switch to non-solvent products. Some of these are:

- △ Increased pressure from environmental authorities to minimize solvent emissions;
- △ Increased determination by employers to reduce employee exposure to solvents in the workplace, encouraged by greater employee awareness, through WHMIS training, labelling, and MSDS availability;
- △ Increased pressure from fire insurers for higher sprinkler densities for flammable solvents storage, with restrictions on quantities stored, and on the use of storage racking for solvent products; and
- △ Higher prices for solvents, based on more stringent requirements for transportation and for monitoring of underground storage tanks.

It is expected that these "market driven" trends will continue and will intensify, caused by such additional factors as:

- △ Ontario is now drafting legislation, expected in 1994, to lower workplace exposure limits, and to make these limits much more enforceable than at present. British Columbia is expected to follow with similar legislation;

- Δ Environment Canada's Environmental Choice Program has released two guidelines: **ECP-44-92 Adhesives** and **ECP-45-92 Sealants & Caulkings** that will encourage consumers to use water-based or hot melt adhesives;
- Δ British Columbia has introduced a system of emission fees that include solvent emissions;
- Δ Quebec has instituted "depollution attestation" legislation that requires solvent emissions to be licensed, for a fee;
- Δ Environment Canada is drafting an initiative for a "National Pollutant Release Inventory" that will require public disclosure of solvent emissions; and
- Δ Ontario is resurrecting its "Clean Air Program".

Based on these factors, ASMAC expects that solvent use in adhesives will continue to decline for the balance of this decade, probably at an accelerating rate.

All factors considered, ASMAC believes that there will be a reduction in solvent use in adhesives and sealants of 40 percent by 1997, from 1985 levels, and that this will occur naturally, through market forces, without the need for regulatory intervention. For that reason ASMAC has recommended that no further action be taken on this initiative, other than to continue to monitor ASMAC data on an annual basis. This recommendation was circulated to all the participating members and none has indicated its opposition.

# Appendix I

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