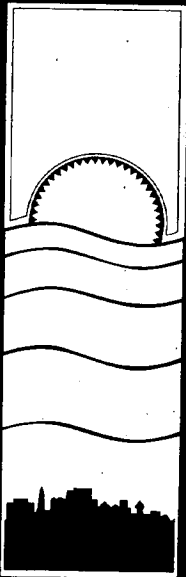


CCME

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

**NATIONAL STANDARDS AND GUIDELINES
FOR THE
REDUCTION OF VOLATILE ORGANIC COMPOUNDS
FROM
CANADIAN COMMERCIAL/INDUSTRIAL
SURFACE COATING OPERATIONS
-
AUTOMOTIVE REFINISHING**



OCTOBER 1998
PN1278

The Canadian Council of Ministers of the Environment (CCME) is the major intergovernmental forum in Canada for discussion and joint action on environmental issues of national, international and global concern. The 13 member governments work as partners in developing nationally consistent environmental standards, practices and legislation.

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from Canadian Automotive Refinish Operations
for the
CCME Working Group for Surface Coating Initiatives

NO_x/VOC Phase I Management Plan
Initiative V307

ISBN: 1-896997-22-8



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1.0 INTRODUCTION

1.1 Background

The standards and guidelines contained in this document are designed to reduce volatile organic compound (VOC) emissions from surface coating operations of Canadian commercial/industrial automotive refinishers or refurbishers. The standards and guidelines are presented in three parts:

- a. Operating standards for new surface coating operations of commercial/industrial automotive refinishers and refurbishers;
- b. Operating guidelines for existing surface coating operations of commercial/industrial automotive refinishers and refurbishers; and
- c. Codes of good practice for both new and existing surface coating operations of commercial/industrial automotive refinishers and refurbishers.

The standards and guidelines were developed by Technical Sub Group (Appendix A) for a multi-stakeholder CCME Working Group (Appendix B) made up of representatives from federal, provincial governments, industry and environment non-government organizations. The contributions of all participants and stakeholders who helped develop these guidelines are gratefully acknowledged.

While these standards and guidelines establish maximum broad national emission limits, it is acknowledged that federal, provincial/territorial or regional environmental authorities may impose more stringent limits in response to regional or local problems.

The CCME Management Plan for Nitrogen Oxides and Volatile Organic Compounds has the objective of reducing ground level ozone to 82 ppb in all parts of Canada by 2005. The CCME Plan comprises three phases.

Under Phase I, interim reduction targets are to be set and implemented. These interim targets are not expected to fully resolve ozone problems or necessarily achieve the final 82 ppb target for ground level ozone. The Plan is to put in place a strong prevention program, the National Prevention Program (NPP), a comprehensive Regional Remedial Program (RRP) for Non-Attainment Areas (NAA) and a series of studies to provide a base to permit establishment of emission caps. Interim targets were to be set for 1995 and 2000. These interim targets are to be negotiated by the federal government and the jurisdiction(s) responsible for the designated NAA. The remedial programs will be determined and implemented by the responsible jurisdiction. The NPP may be viewed as dealing with new sources while the RRP deals with existing sources. The NPP is to be developed jointly by the Federal government and the provinces.

The regions identified as NAA are areas where it was not believed possible to specify final emission caps because of insufficient information on emissions, cause and effect relationships and the effect of trans-border contributions on the ozone levels. For this reason, the interim targets are specified as percentage reductions from a base year. The NAAs are the Lower Fraser Valley (LFV); the Windsor Quebec City Corridor (WQC) and the St. John, NB area (SJA).

Under Phase II the final NO_x/VOC targets for 2000 and 2005 are to be established. The 2005 targets are to yield 82 ppb ozone and can include additional measures to meet targets if required.

Under Phase III, the final adjustments and measures to fully achieve 82 ppb ozone are to be selected and implemented.

1.2 The Automotive Refinish Industry

The automotive refinish market is that subsector of commercial/industrial coatings operations that deals with the repair, refinishing or refurbishing of motor vehicles. Body builders, which manufacture cargo "boxes" and cargo trailers and manufacturers of heavy duty OEM trucks and buses, use processes that are similar, and in some instances identical, to those used by automotive refinish facilities. Standards and guidelines for coating facilities and operations of body builders and OEM manufacturers of heavy duty

trucks and buses, which are considered distinct and separate subsectors in the CCME Plan, are not included in this document.

The focus of these standards and guidelines is on VOC emissions released by the painting and related operations required for the restoration of damaged or replaced body components. Refinishing required because of deterioration from aging, weathering or rusting is also included although, in Canada, this segment of automotive refinishing operations is comparatively small.

The automotive refinish subsector is composed of over 7000 facilities that are distributed across Canada in approximate agreement with the distribution of population (and vehicles). As might therefore be expected, the VOCs emitted by these facilities are also concentrated in the Canadian non-attainment areas. Automotive refinish facilities range from very small, one man operations to ones having 25 or more employees. Capitalization ranges from a few thousand, or even hundreds of dollars, to several hundred thousand dollars. This is in sharp contrast to some other industrial coating facilities such as the automotive OEM industry that is concentrated in the Windsor-Quebec corridor and consists of 13 operations each of which employs several thousand individuals in highly capitalized and automated facilities costing hundreds of millions of dollars. In addition to the disparity in number, size and distribution of facilities, the two subsectors also differ in the types of products used and application and drying equipment and processes. These differences are dictated by a combination of the nature of the operation, the state of assembly of the vehicle at the time of painting (pre-assembly for OEM, fully assembled for refinishing) and by the very limited capital resources of most automotive refinishers. As a result of these differences, the standards and guidelines that have been developed for this sector focus on coating products, application equipment and codes of practice as opposed to VOC emission performance standards and guidelines that were developed for the automotive OEM coating operations. While the former approach is more proscriptive, it is believed to be the only practical way to effectively reduce VOC emissions from this sector.

The numerous regulations in the USA and Europe, either already on the books or in the process of becoming law, mandate the use of more efficient High Volume Low Pressure (HVLP) or electrostatic spray application equipment. This ensures that the equipment will also be available for use in Canada.

2.0 ABBREVIATIONS AND GLOSSARY

2.1 Abbreviations

AIA	Automobile Industries Association
BACTEA	Best Available Control Technology Economically Achievable
CCME	Canadian Council of Ministers of the Environment
CFC	Chlorofluorocarbon
FC	Fluorocarbon
HCFC	Hydrochlorofluorocarbon
LFV	Lower Fraser Valley, British Columbia
NAA	Non-attainment Area (CCME, Phase I)
NOx	Nitrogen oxides
NPP	National Prevention Program (CCME, Phase I)
OEM	Original equipment manufacturer
RRP	Regional Remedial Program (CCME, Phase I)
SAR	Southern Atlantic Region
SJR	Saint John Region, New Brunswick
TE	Transfer efficiency
VOC	Volatile organic compound
WQC	Windsor-Quebec Corridor

2.2 Glossary

Automotive refinishing	The application of coatings to motor vehicles or their parts that is subsequent to the original coating applied at an original equipment manufacturing plant.
Coating	A film forming material used for the decoration and/or protection of the surfaces of an object. Coatings include, but are not limited to lacquers, enamels, elastomeric materials, primers, primer surfacers, basecoats, midcoats and clearcoats.
Container	An individual receptacle that holds a coating for storage and distribution.
Electrostatic spray	A method of applying a spray coating in which an electrical charge is applied to the coating. The atomized coating is attracted to the object by the electrostatic potential between it and the object being coated.
Existing source	Any commercial/industrial automotive refinish operation that was in use prior to July 1, 1998.
Guideline	A product, process or performance recommendation for existing sources and suggested for implementation by the provincial, territorial or regional authority having jurisdiction.
HVLP gun	A high volume low pressure spray system operated using an atomizing air pressure within the range of 0.1 to 10 lbs./sq. inch as measured at the centre of the air cap and at the centre of the air cap horns. (See section 3.4)
Motor vehicles	All automobiles, light duty trucks, medium duty vehicles, heavy duty vehicles, trailers, equipment or utility vehicles used for the transportation of people or property.
New Source	Any commercial/industrial automotive refinish operation that did not exist prior to July 1st, 1998 or an existing source that is modified after July 1st, 1998 by the installation of an additional spray booth.
Paint overspray	Any paint material as droplets or particles that are produced during spray application and which do not remain on the surface being painted.
Panel repair	A repair in which the entire surface of a component such as a fender is coated, leaving none of the original surface exposed.
Reducer	A solvent or blend of solvents added to a coating to adjust the viscosity of the coating for application. Generally used to describe solvent(s) used to adjust enamels or other coatings.
Spray application	A method of applying coatings by atomizing the coating material and directing the atomized particles toward the part to be coated.
Spray booth	A structure for coating operations by spray application and incorporating the capability of entrapping and capturing particulate matter such as paint overspray.
Standard	A product, process or performance standard for new sources.

Substrate	The surface to which the coating is applied. May be metal, plastic or previously applied coatings.
Thinner	Effectively the same as reducer. Generally used to describe solvent(s) used to adjust lacquers or other coatings.
Transfer efficiency	The ratio of the amount of coating solids transferred to the surface of the body or part to the total amount of coating solids used in the operation.
VOC	<p>For the purpose of this standard any organic compound that participates in atmospheric photochemical reactions; that is any organic compound other than those listed below which have been excluded because of their negligible photochemical reactivity:</p> <p>Acetone, Methane, Ethane, Methyl chloroform, Methylene chloride, Parachlorobenzotrifluoride, CFC-113 (trichlorotrifluoroethane), CFC-114 (dichlorotetrafluoroethane), CFC-115 (chloropentafluoroethane), CFC-11 (trichlorofluoromethane), CFC-12 (dichlorodifluoromethane), CFC-22 (chlorodifluoromethane), FC-23 (trifluoromethane), HCFC-123 (dichlorotrifluoroethane), HCFC-141b (dichlorofluoroethane), HCFC-142b (chlorodifluoroethane), and HFC-134a (tetrafluoroethane).</p>

3.0 OPERATING STANDARDS AND GUIDELINES

3.1 Principles

New source operating standards and guidelines for existing sources are based on the following principles.

1. The standards and guidelines achieve reductions in VOC consistent with the targets of the CCME Management Plan for NO_x and VOCs for commercial/industrial coatings application facilities.
2. The standards and guidelines are based on the Best Available Control Technology Economically Achievable (BACTEA).
3. The standards and guidelines are expressed in the simplest possible form while remaining effective.
4. The standards and guidelines are clearly defined.
5. The standards and guidelines are applied to new and existing sources uniformly.
6. Implementation of the standards and guidelines is compatible with and supportive of the objectives and concept of pollution prevention.
7. Implementation of the standards and guidelines will not contribute significantly to the generation of greenhouse gases and other pollutants such as NO_x and are therefore compatible with government commitments in this regard.
8. The standards and guidelines are comparable in terms of standards with those of the USA.

3.2 New Source Operating Standards

3.2.1 Definition of New Source

A new source is defined as any commercial/industrial automotive refinish operation that did not exist prior to July 1, 1998 or any existing source (3.3.1) which is modified after July 1, 1998 by the installation of an additional spray booth.

3.2.2 Operating Standards

All new sources as defined in 3.2.1 shall:

1) Effective July 1, 1998:

- a. Use only application equipment which meets the standards defined in section 3.4;
- b. Have a test cap to determine compliance with 3.2.2 (1a); and
- c. Follow the codes of practice as contained in Section 4.0.

2) Effective July 1, 2003 use only automotive refinish coatings that comply with the VOC contents limits defined by Section 3.2.1, National Standards for the Volatile Organic Compound Content of Canadian Commercial/Industrial Surface Coating Products -- Automotive Refinish, PN 1288, October, 1998.

Note: Refinish coatings may be used with VOC containing reducers, thinners and additives from a component supplier in place of those specified by the manufacturer of the primary product. It is the

refinisher's responsibility to ensure that the use of alternative components does not result in the modified product, as applied, exceeding the VOC contents set out in Section 3.2.2(2). The component supplier must provide to the refinisher, on request, documentation supporting this compliance.

3.3 Existing Source Operating Guidelines

3.3.1 Definition of Existing Source

An existing source is defined as any commercial/industrial automotive refinish operation that was in use prior to July 1, 1998.

3.3.2 Operating Guidelines

All existing sources as defined in 3.3.1 shall:

- 1) Effective July 1, 2000:
 - a. Use only application equipment which meets the standards defined in section 3.4;
 - b. Have a test cap to determine compliance with 3.3.2 (1) (a); and
 - c. Follow the codes of practice as contained in Section 4.0.
- 2) Effective July 1, 2003 use only automotive refinish coatings that comply with the VOC contents limits defined by Section 3.2.1, National Standards for the Volatile Organic Compound Content of Canadian Commercial/Industrial Surface Coating Products -- Automotive Refinish, PN 1288, October 1998.

Note: Refinish coatings may be used with VOC containing reducers, thinners and additives from a component supplier in place of those specified by the manufacturer of the primary product. It is the refinisher's responsibility to ensure that the use of alternative components does not result in the modified product, as applied, exceeding the VOC contents set out in Section 3.2.2(2). The component supplier must provide to the refinisher, on request, documentation supporting this compliance.

3.4 Application Equipment

Equipment used for the application of automotive refinish coatings shall be limited to:

- a. HVLP (high volume low pressure) spray systems operated using an atomizing air pressure within the range of 0.1 to 10 lbs./sq. inch as measured at the centre of the air cap and at the centre of the air cap horns;
- b. HVLP systems permanently marked by the manufacturer with accurate information on the maximum inlet air pressure that provides a maximum of 10lbs./ sq. inch at the air cap; or
- c. alternative application systems that have been reasonably demonstrated to the satisfaction of the appropriate jurisdiction to achieve emission reductions equivalent to HVLP.

3.5 Review of Operating Standards and Guidelines

The operating standards and guidelines are to be reviewed in the year 2003 for possible revision in the light of advances in technology.

4.0 CODES OF GOOD PRACTICE

4.1 Introduction

The Codes of Good Practice are intended to complement the VOC emission reduction standards and guidelines which relate specifically to product and process controls for the reduction of VOC emissions generated by the operation of Canadian automotive refinish coating operations. The Codes of Good Practice are applicable to the minimization of VOC emissions that occur during ancillary operations such as materials handling and maintenance. Maintenance and equipment cleaning have been determined to be a significant source of VOCs, generating about 20% of the total VOC emissions.

Information developed during the course of this project suggests that significant reductions may be possible in this area through the application of good practices. The Codes of Good Practice, therefore, are more general in nature and are in the form of guiding principles rather than specific limits. Nevertheless, proper regard for effective practices can make an appreciable contribution to the reduction of VOC emissions and the consumption of the solvents that give rise to them.

4.2 Elements of the Codes of Good Practice

The Codes of Good Practice are composed of four distinct elements:

1. Training;
2. Solvent Management;
3. Materials Handling; and
4. Equipment Operation and Maintenance.

Each of these four elements is an important and integral part of the Codes of Good Practice. An effective program to minimize fugitive VOC emissions cannot be achieved if any one is ignored.

4.3 Training

The VOC emissions generated outside the primary operations of automotive refinish coating facilities arise from a variety of sources and operations, some of which may not be recognized for their contribution to the VOC emission pool. It is important, therefore, that all personnel involved in these operations be made aware of these contributions and the need to reduce or eliminate them to the maximum possible extent. This can be accomplished by comprehensively and effectively training both supervisory and operating personnel.

The training program must provide clear information on pollution prevention objectives and the financial benefits achievable by adhering to the standards and guidelines. In addition, it must ensure it provides the skills necessary to successfully use the mandated products and equipment.

Training shall be provided in the following areas, commensurate with an individual's specific responsibilities:

- The theory, characteristics and value of solvent management systems;

- Applicable health, safety and environmental regulations including labeling, spills, emergencies, waste handling and disposal and reporting;
- All applicable aspects of these Codes of Good Practice including:
 - Proper equipment and operating methods,
 - Solvent storage and handling,
 - Waste handling and disposal,
 - Record keeping; and
- All applicable operating procedures and standards including:
 - Normal operations including check lists,
 - Routine maintenance,
 - Solvent conservation and maintenance,
 - Cleaning and maintaining equipment including safety,
 - Record keeping procedures and requirements,
 - Containment and recovery of spills,
 - Handling and disposal of wastes,
 - Emergency responses, and
 - Use of personal protective and monitoring equipment.

4.4 Solvent Management

The Canadian Standards Association has recently published a document, Z750 - 94 A Voluntary Environmental Management System, intended to provide general guidance to business, industry and other organizations on the development and implementation of environmental management systems. It includes environmental management system definitions, principles and important elements.

The application of well thought out health, safety and environmental management systems is an integral part of a program to achieve VOC reduction objectives in an effective and efficient way. These management systems should have a specified scope and be capable of demonstrating that:

- the system is understood, effective and implemented;
- the performance criteria satisfy all applicable legal requirements as well as the health and environmental policies of the organization;
- the system is based primarily on prevention rather than correction after an incident; and
- the system is flexible and capable of modification and evolutionary change.

Approaches and management systems will vary from one company to another depending on local circumstances and specific product lines and operations. There are, however, certain characteristics of any management system that should be in place to ensure that the program is carried out efficiently and effectively. The following characteristics are sufficiently generic so as to apply to systems for managing virtually any technical activity and in particular to solvent management systems:

- Planning
 - Explicit goals and objectives
 - Clear-cut desired outputs
 - Well defined inputs and resource requirements
 - Identification of needed tools and training
- Organization
 - Clear lines of authority
 - Explicit assignment of roles, responsibilities
 - Variance procedures

Audit mechanisms
Corrective action mechanisms
Formal procedures

- Implementation
 - Detailed work plans
 - Specific milestones for accomplishments
 - Initiating mechanisms
- Control
 - Performance standards and measurement methods
 - Internal reviews

The above list is not necessarily definitive. Not all features or characteristics may be needed in every specific situation. Exceptions and departures based on local circumstances are acceptable and suggested changes and additions based on actual experience are to be encouraged.

4.5 Materials handling

4.5.1 Record Keeping

A requirement of jurisdictions having a VOC reduction program is the keeping of detailed records of the acquisition, use and disposition of VOC-containing products. The following common principles must be considered in establishing the appropriate record requirements:

1. Acquisition of VOC-containing products;
2. Quantity of VOC-containing waste sent for recycling or disposal; and
3. Method and route for disposal or recycling.

The main thrust of the VOC reduction options contained in these standards and guidelines focus on lowering the volume of product used through the use of high efficiency application equipment, the reduction of VOC released from waste by containment and removal by means of effective recycling and/or waste disposal methods. The first component of the program is effectively be taken out of the control of the facility since low VOC products and high efficiency equipment are mandated. It seems appropriate, therefore, that record keeping by the refinish facility focus on waste disposal, those elements on which the facility has the most immediate and direct bearing. The quantities of VOC-containing waste, mainly cleaning solvents and excess, thinned paint, should be recorded along with the details of the waste disposal and/or recycling company and the method of disposal or recovery.

The following are guidelines for automotive refinish facilities. Not all are appropriate for every facility. Each facility should review the guidelines and implement those appropriate for its specific situation.

4.5.2 Containers

- All full and part-full containers should be shipped and stored with lids and other openings sealed air tight;
- If thinning is required, and the container has been emptied, a portion of the required solvent should be added to the just emptied container to assist in minimizing any residual material. The solvent/paint mixture should then be added to the material just removed;
- After emptying, non-returnable container should immediately be processed by approved methods as waste or hazardous waste as appropriate to the residues, if any, in the container;
- If the container is to be used to accumulate material for recycling or waste disposal, it must be stored with lids and other openings tightly sealed between additions; and

- Containers containing waste or recyclable materials must be shipped with lids and other openings sealed air tight.

4.5.3 Bulk-Storage Tanks

Although bulk storage tanks are not common in the refinish industry, some of the larger facilities may have such tanks, particularly for larger volume coatings such as primers, solvents, recyclable materials and wastes. In these cases:

- Bulk-storage tanks containing paint, solvents, and holding tanks for recyclable materials and wastes should be totally enclosed systems;
- Ventilation should be through flame arrestor/conservation vents. Vent pipes from each tank should be independent of those from other tanks. Interconnected vents are not recommended;
- Fill lines should enter tanks from the top only to prevent accidental leakage and spills; and
- Transfer pumps, filters, metering devices, valves, etc. should be periodically inspected under regularly scheduled maintenance. Any devices found to be defective or suspect should be repaired immediately.

4.6 Equipment

4.6.1 Spray Equipment

- Spray guns should be set up for the optimum operating conditions, particularly air pressures, to return the maximum in operating efficiency. For HVLP guns this will be a maximum of 10 lbs/sq. in. at the centre and at the horns of the air cap. A test air cap should be used for this purpose;
- Spray guns should be cleaned between coating applications in cleaning stations;
- Periodic cleaning of other spray gun parts and surfaces should be done using only limited and measured quantities of VOC creating solvents;
- Other equipment such as pumps, filters, regulators, valves, metering devices, etc., if present, should also be cleaned using only limited and measured amounts of VOC-creating solvents;
- Parts should be manually scrubbed, applying small amounts of strippers if necessary;
- When soaking is required, containers with air tight lids should be used to fully enclose the part and the cleaning material; and
- Used solvents should be returned to sealed containers of a waste collection system for recycling and reuse.

4.6.2 Spray Booths

- The cleaning of spray booths is a difficult job, costly in both labour materials and productivity. Effective spray booth cleaning procedures can therefore prove both cost and VOC reduction effective. This can best be accomplished with specific written procedures for cleaning;
- In down draft spray booths, used in some larger refinish coating facilities, air supply and exhaust volumes should be maintained at optimum design parameters;
- Overspray, the main element requiring removal, should be kept at minimum levels for conventional or HVLP/high efficiency air atomized spray guns by fine tuning spray patterns and minimizing air atomizing pressures;
- Carefully planned cleaning schedules will also contribute to fewer cleaning cycles without sacrificing quality;
- Spray booth walls may be coated with strippable compounds, preferably low VOC types that can be removed by hot, high pressure water streams. Flat surfaces may be cleaned by scraping;

- Booth cleaning equipment, including solvents should be stored in closed cabinets, preferably with limited access;
- Solvents used in cleaning operations should be closely monitored with volumes and access controlled. The use of non-VOC strippers and/or hot high pressure water should be used as the preferred option wherever feasible; and
- Used cleaning materials and equipment should be stored and sent for disposal in tightly sealed containers.

5.0 CHECK LIST FOR GOOD PRACTICES FOR AUTOMOTIVE REFINISH FACILITIES

5.1 Training

Training has been provided in the following areas:

No.	Suggested Practice	Currently Done? (Y/N)	Comments - Plans, Actions
1	VOC reduction/control plan, principles and objectives		
2	Applicable health, safety and environmental regulations		
3	Solvent conservation		
4	Equipment and operating standards and procedures		
5	Use of personal protective and monitoring equipment		
6	Solvent storage and handling		
7	Spill prevention		
8	Containment and recovery of spills and leaks		
9	Equipment operation and emergency responses		
10	Cleaning and maintenance of equipment		
11	Waste handling and disposal		
12	Record keeping		

5.2 Materials Handling

5.2.1 Containers

No.	Suggested Practice	Currently Done? (Y/N)	Comments - Plans, Actions
1	Use of non-returnable containers reduced to minimum possible		
2	Containers shipped and stored with lids and openings tightly sealed		
3	Handling as for returnable containers to minimize loss		
4	Portion of thinner, if any, added to emptied container to minimize residual material		
5	Empty container to be promptly processed as hazardous waste		

5.2.2 Bulk Storage Tanks

No.	Suggested Practice	Currently Done? (Y/N)	Comments - Plans, Actions
1	All bulk-storage tanks are totally enclosed systems		
2	Ventilation of tanks is through flame arrestor/conservation vents		
3	Each tank has independent vent system. Tank vents are not inter-connected		
4	Fill lines enter tank from the top to prevent spills		
5	Pumps, filters valves, metering devices and vents inspected under regularly scheduled maintenance		
6	Repairs are promptly made		

5.3 Equipment Cleaning

5.3.1 Spray Equipment Operation and Cleaning

No.	Suggested Practice	Currently Done? (Y/N)	Comments - Plans, Actions
1	Test air cap used to set up operating parameters		
2	Operating and set up instructions for spray gun posted at spray booth		
3	Guns cleaned using spray gun cleaning equipment between coats		
4	Instructions for use of gun cleaning equipment posted at gun cleaning station		
5	Proper use of gun cleaning equipment monitored		
6	Cleaning solvents kept in sealed containers between use		
7	Gun cleaning solvents sent for recycling		
8	Other areas and parts cleaned by low VOC release methods (brushes, wipers, etc.)		
9	Solvents used for cleaning have controlled access with closely monitored usage		
10	Non-VOC strippers & cleaners used where feasible		
11	Used cleaning equipment & fluids stored and sent for disposal in sealed containers		

5.3.2

Other Equipment Cleaning

No.	Suggested Practice	Currently Done? (Y/N)	Comments - Plans, Actions
1	Approved cleaning practices posted		
2	Non-VOC content cleaners used where possible		
3	Non-spray cleaner application used to maximum possible extent		
4	Parts requiring soaking in cleaners placed in sealed container for soaking		
5	Used cleaners stored in sealed containers until recycled or disposed of		
6	Used cleaners recycled where possible		

APPENDIX A - TECHNICAL SUBGROUP MEMBERS

Chair

Rick Loughlin - Environment Canada

Refinishers

John Norris - Hamilton District Autobody Repair Association (HARA)
Alex Szabo - HARA
Tony Nigro - HARA

Coating Suppliers

Tim Loden - Akzo Canada Inc.
Jennifer Hackney - American Standox
Herb Morrison - BASF Canada Inc.
Bradley Richards - BASF Corporation
Richard Murry - Canadian Paint and Coatings Association (CPCA)
Elizabeth Thompson - DuPont Canada Inc.
George Esterer - Endura Manufacturing Company Limited
Ken Hine - ICI Autocolor
Jim Kantola - ICI Autocolor
Jim Slosnerick - PPG Canada Inc.
Marc Kruzer - The Sherwin-Williams Company

Equipment Suppliers

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Robert Derby - Caruk & Associates Limited
Frank Wagner - Safety-Kleen
Michael Callahan - Safety-Kleen
Jeff Parker - ITW DeVilbiss
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Mark Miller - ITW DeVilbiss
Victor Hawes - Uni-Ram Corporation
Christian Bunk - SATA, Farbespritztechnik GmbH
Bob Rivard - Eurotech Spray Products Limited

Others

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Keith McGrone - I-CAR
Brian LeClair - Ministry of Environment & Energy Ontario (MOEE)
Michael Giannotti - MOEE
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Charles Kaufmann - Shapiro & Associates
Douglas Thiermann - Shapiro & Associates

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Gillian Clarke - ICI Autocolor
Jay Clyde - Corrosion Service Co. Limited
Peter Corbyn - Automotive Parts Manufacturers Association (APMA)
Tass Eilert - General Motors of Canada Limited
Raye Fraser - Railway Association of Canada
Paul Hansen - Chrysler Canada
Ken Hine - ICI Autocolor
William (Bill) Hockett - General Motors of Canada Limited
John Irwin - Sico Inc.
James Klys - Pierce & Stevens Canada
Brian LeClair - Ontario Ministry of Environment & Energy (MOEE)
Patricia Mason - Honda of Canada Mfg., Inc.
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John Norris - Hamilton District Autobody Repair Association (HARA)
Jean Patry - Kremlin Canada Limited
James Slosnerick - PPG Canada Inc.
Andrew Studley - Esso Chemicals Canada
Carol Taillon - Les Peintures Acralum Inc.
R. Taylor - Baycoat
Elizabeth Thompson - DuPont Canada Inc.

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Ron Carter - ITW DeVilbiss
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Bill Crocker - Bovar Environmental
Ralph D'Alessandro - 427 Auto Collision
Robert Dagleish - Trafalgar Collision
Robert Derby - Caruk & Associates Limited
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George Esterer	-	Endura Mfg. Co. Ltd.
Marty Exon	-	BASF Canada Ltd.
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Michael Giannotti	-	MOEE
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Brian Harper	-	Bodyshop Magazine
Patrick Hasse	-	Wagner Systems Inc.
Victor Hawes	-	Uni-ram Corporation
Peter Hernandez	-	US Consulate
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Larry Kelly	-	Kelly Auto Body
Eduard Kemenoff	-	Summit Collision - Carstar
Roy Kennedy	-	BASF Canada Inc.
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Jeff Parker	-	ITW DeVilbiss
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