

**CCME**

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

**ENVIRONMENTAL CODE OF  
PRACTICE FOR VAPOUR RECOVERY  
DURING VEHICLE REFUELING  
AT SERVICE STATIONS AND OTHER  
GASOLINE DISPENSING FACILITIES**

**(STAGE II)**



APRIL 1995  
CCME-EPC 88E

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 determining national environmental priorities and developing national guidelines and codes of practice.

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ISBN 1-895925-21-5

Ce document est également publié en français



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# Glossary

Words and phrases that are not included in the list of defined terms in this part shall have the meanings that are commonly assigned to them in the context which they are used in this Code

The following words and terms used in the Code shall have the indicated meaning

**Authority Having Jurisdiction** - the governmental body or the designated officer or officers having authority, under appropriate regulatory instruments, to exercise enforcement functions or powers

**Compliance** - conformance with the terms of legislation and other regulatory instruments developed and promulgated by the authority having jurisdiction

**Gasoline** - a petroleum distillate and/or a mixture of petroleum distillates and oxygenates used as a fuel in spark ignition engines

Two types of gasolines are of special interest

- a Automotive Gasoline - gasoline intended for use in automotive internal combustion engines and having a Reid Vapour Pressure (RVP) greater than 48 kPa (7 psi), and,
- b Aviation Gasoline - gasoline intended for use in aviation spark ignition engines and having a RVP less than 48 kPa (7 psi)

**Marina** - a gasoline fueling point which services water craft

**Operating Procedure** - the written guidelines and recommendations associated with equipment, which enable the person operating a facility to run it according to accepted practices, recommended equipment procedures and regulations

**Operator** - The person who is responsible for the day-to-day operation of a service station, and is normally on the premises during the hours of operation

**Owner** - an institution, corporate entity, government department or agency, or a person who has legal ownership rights, or who has been assigned the custody to control, care for and manage a service station

**Ozone** - an irritating gas which has the triatomic form of oxygen (O<sub>3</sub>)

**Service Station** - any premises at which gasoline is dispensed into the fuel tanks of motor vehicles, watercraft, or aircraft

**Stage II Controls** - the equipment used to recover gasoline vapours emitted during refueling of motor vehicles, watercraft, or aircraft at service stations

**Stage II Vapour Recovery** - recovery of gasoline vapours during refueling of motor vehicles, watercraft, or aircraft at service stations

**Throughput** - the total volume of gasoline dispensed by a service station per unit of time

**Underground Storage Tank (UST)** - a storage tank that is completely buried by or covered with earth, backfill or concrete, or a partially buried tank. A partially buried tank means a storage tank that has 10% or more of its volume below adjacent ground level

**Volatile Organic Compounds (VOC)** - Any organic compound which participates in atmospheric photochemical reactions, that is, any organic compound other than the following which have been excluded because of their negligible photochemical reactivity: methane, ethane, methyl chloroform, methylene chloride, CFC-113 (trichlorotrifluoro-ethane), 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)

## Abbreviations

<b>CARB</b>	California Air Resources Board
<b>CCME</b>	Canadian Council of Ministers of the Environment
<b>CGSB</b>	Canadian General Standards Board
<b>CPPI</b>	Canadian Petroleum Products Institute
<b>EPA</b>	Environmental Protection Agency
<b>GVRD</b>	Greater Vancouver Regional District
<b>LFV</b>	Lower Fraser Valley (British Columbia)
<b>NO<sub>x</sub></b>	Oxides of nitrogen reported as NO <sub>2</sub>
<b>t/yr</b>	Tonnes per year
<b>UST</b>	Underground Storage Tank
<b>VOC</b>	Volatile Organic Compound
<b>WQC</b>	Windsor-Quebec City Corridor

# Preface

The *Environmental Code of Practice for Vapour Recovery During Vehicle Refueling at Service Stations and Other Gasoline Dispensing Facilities* (hereafter referred to as "the Code") is published by the Canadian Council of the Ministers of the Environment (CCME). The Code was developed by the *National Task Force on Stage II Vapour Recovery*, in accordance with directions provided by the CCME.

Gasoline contains Volatile Organic Compounds (VOC), such as butane, pentane, benzene, toluene, and xylene. In combination with Nitrogen Oxides ( $\text{NO}_x$ ), reactive VOC may promote the formation of ozone in the presence of sunlight, a process which takes place by means of photochemical reactions in the atmosphere. Ground-level ozone contributes to "photochemical smog" and is of health and environmental concern. Gasoline vapours also contain compounds that are considered toxic.

Control of gasoline vapour emissions from vehicle refueling at gasoline dispensing facilities is commonly referred to as "Stage II vapour control". This is distinct from Stage I vapour controls which deal with control of gasoline vapour emissions from the distribution of gasoline at terminals and bulk plants through to delivery to service stations. Implementation of gasoline vapour recovery during vehicle refueling could result in a reduction of one percent to two percent of total anthropogenic (human activity) VOC emissions in Canada.

In October 1988, the CCME directed that a Management Plan for  $\text{NO}_x$  and VOC be developed for Canada. *The Management Plan for Nitrogen Oxides ( $\text{NO}_x$ ) and Volatile Organic Compounds (VOC) Phase I*, approved by the CCME in November 1990, included a recommendation that Stage II vapour recovery be required in two specific ozone non-attainment areas identified as the Lower Fraser Valley (LFV) and the Windsor-Quebec City Corridor (WQC). More specifically, initiative V605 of the  $\text{NO}_x$ /VOC Plan contemplates Stage II vapour recovery within these two areas at new service stations by May 1, 1993 and at existing service stations by December 31, 1995. The Plan also made recommendations regarding the implementation of Stage I controls.

This Code is consistent with the basic requirements of the *Management Plan for Nitrogen Oxides ( $\text{NO}_x$ ) and Volatile Organic Compounds (VOC)*. It contains the recommended minimum requirements for implementation of Stage II vapour controls in the two specified ozone non-attainment areas. The Code may also be applied in other areas where implementation of Stage II controls is contemplated by the authority having jurisdiction.

Within the LFV and WQC, the minimum requirements outlined in the Code in no way prohibit jurisdictions from adopting more comprehensive or more stringent requirements.

It is intended that the Canadian General Standards Board (CGSB) develop a companion document to address Stage II vapour control systems and system components. The CGSB standard will provide technical requirements for Stage II vapour control systems and system components and is intended to provide consistency and uniformity of installations across Canada. Until such time as standards are developed to address Canadian requirements for Stage II vapour recovery, the Code allows Stage II systems to be installed in accordance with requirements of the *California Air Resources Board*.

It is intended that the provisions of this Code will be adopted by federal, provincial, regional, or municipal authorities as minimum regulatory requirements or as policy direction. The Code can also be adopted by companies or owners of gasoline dispensing facilities on a voluntary basis to promote consistency with the principle of responsible environmental stewardship and sustainable economic development.

The *National Task Force on Stage II Vapour Recovery* consisted of representatives from various groups who contributed their expertise and perspectives. (A list of task force members is provided in Appendix A.) The Task Force was chaired and coordinated by Environment Canada, and included representatives from various provincial and regional environmental jurisdictions. Industry was represented by the Canadian Petroleum Products Institute and the National Gas Pump Manufacturers Association. Non-government environmental interest groups were represented by a delegate from STOP.

It is recognized that the implementation and performance evaluation of Stage II systems in Canada will provide information for the review and improvement of the Code. It is therefore recommended that Environment Canada initiate a review of the Code during the second year following the date of publication. The Code should then be reviewed every five years thereafter.

The contributions of all participants and stakeholders who helped develop this Code are gratefully acknowledged. Thank you.

Inquiries and comments on the Code are welcome and may be sent to

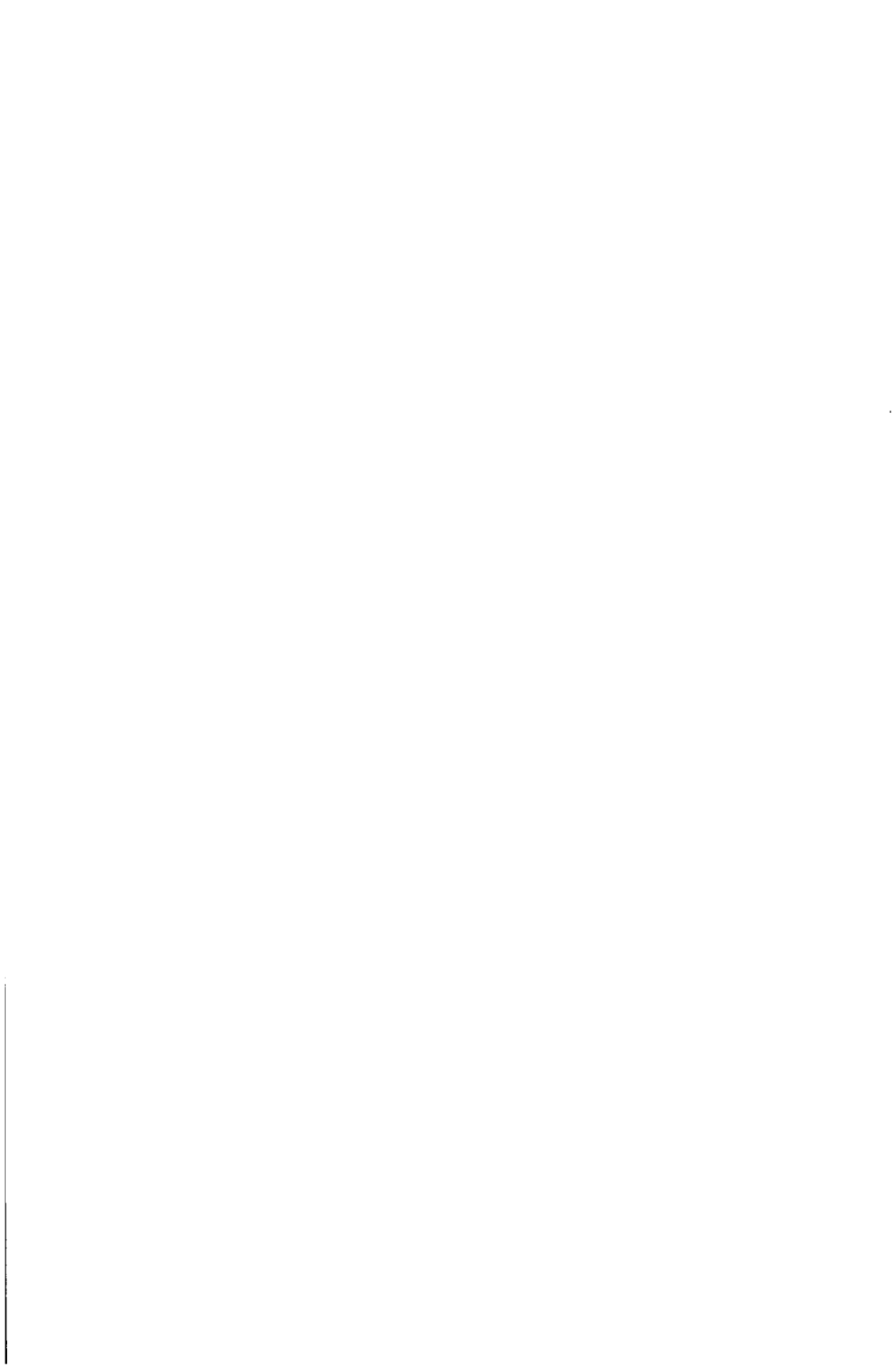
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# Part 1

## Description of Stage I and Stage II Vapour Control

- 1 1 As shown in Figure 1 of Appendix B, typically gasoline is transported from refineries to terminals by pipelines, ships and barges, or unit trains. The gasoline is then transported either to bulk plants by cargo tank trucks or rail cars, or to service stations by cargo tank trucks. At service stations, the gasoline is transferred from cargo tanks into storage tanks. The gasoline is then dispensed into vehicle fuel tanks.
- 1 2 As indicated in Figure 1, vapour losses occur when gasoline liquid displaces vapour from storage, cargo, or vehicle fuel tanks, resulting in emissions of gasoline vapour into the atmosphere.
- 1 3 Vapour losses in gasoline distribution networks can be greatly reduced by the application of vapour control systems as shown in Figure 2 of Appendix B.
- 1 4 Control of gasoline vapours during bulk transfers in the gasoline distribution network is commonly known as 'Stage I vapour recovery'. The requirements for Stage I controls are not part of this Code, but are addressed by the CCME's *Environmental Code of Practice for Vapour Recovery in Gasoline Distribution Networks* (CCME-EPC/TRE-30E, March 1991).
- 1 5 Control of gasoline vapours during refueling of vehicles at service stations is commonly known as 'Stage II vapour recovery'. Without Stage II controls, vapours that are displaced from the vehicle tank by the refueling process are released into the atmosphere. With Stage II controls, a significant portion of vapours are recovered at the vehicle fillpipe by a vapour recovery nozzle and are returned to the service station's underground storage tank. About one to two litres of gasoline are recovered per 1,000 litres dispensed.
- 1 6 Stage I and Stage II gasoline vapour recovery are complementary processes to recycle and reuse gasoline vapours that would otherwise be emitted into the atmosphere.
- 1 7 Implementation of Stage II vapour controls will also reduce emissions to the atmosphere of certain compounds present in gasoline vapours that are considered toxic.

# Part 2

## Statistics on the Canadian Gasoline Distribution Network and Associated Emissions of VOC

- 2 1 In Canada in 1992 there were approximately 180 terminals, 1,900 bulk plants and 18,000 retail outlets. These were serviced by about 8,000 cargo tank trucks and 500 rail cars.

- 2 2 According to *Statistics Canada Catalogue 45-004 Monthly*, 'Refined Petroleum Products', approximately 33 billion litres of gasoline were distributed in Canada in 1992
- 2 3 The estimated VOC emissions in Canada in 1989 from all anthropogenic sources were roughly 1,730 kilotonnes
- 2 4 The contribution from gasoline distribution in 1989 was approximately 110 kilotonnes (six percent) of VOC for the whole of Canada (Figure 3, Appendix B)
- 2 5 The contribution from gasoline distribution in 1989 in the LFV and WQC regions was about 57 kilotonnes of VOC or 52 percent of the total gasoline distribution emissions for Canada
- 2 6 VOC emissions from vehicle refueling were estimated to be 24 kilotonnes in the LFV and WQC regions in 1989. These vapour losses are volume equivalent to approximately 30 million litres of gasoline, on the basis of the emission factors contained in the *Management Plan for Nitrogen Oxides (NO<sub>x</sub>) and Volatile Organic Compounds (VOC)*
- 2 7 Gasoline vapour/VOC emissions during refueling occur when gasoline from the underground storage tank at a service station is dispensed into a vehicle fuel tank. These emissions result from vapours being displaced from the vehicle fuel tank, vapours being pushed out of the service station underground storage tank through a vent (breathing losses), and spillage of gasoline due to overfilling
- 2 8 The full application of Stage II vapour controls in the LFV and WQC regions would reduce VOC emissions by about 19 kilotonnes per year, based on 1989 throughput

## Part 3

### Application and Timing

#### 3 1 General

- 3 1 1 This Code applies to premises at which gasoline is dispensed into fuel tanks of motor vehicles, watercraft, or aircraft (see definition of 'service station' provided in the *Glossary*). The Code is in accordance with the *Management Plan for Nitrogen Oxides (NO<sub>x</sub>) and Volatile Organic Compounds (VOC)* and specifies the minimum geographical areas and provisions for the application of Stage II gasoline vapour control systems at service stations
- 3 1 2 In addition to the minimum requirements specified in Sections 3 2 and 3 3, the authority having jurisdiction may choose to apply additional or more stringent requirements
- 3 1 3 If Stage II vapour recovery equipment is to be installed in areas other than the LFV and WQC (identified in Appendix B, Figures 4 and 5), this code applies

## 3 2 Geographic Areas

3 2 1 Initiative V605 of the *Management Plan for Nitrogen Oxides (NO<sub>x</sub>) and Volatile Organic Compounds (VOC)* requires Stage II vapour recovery in the LFV and the WQC Appendix B, Figures 4 and 5, identifies these regions

3 2 2 The boundaries shown by Figures 4 and 5 are for descriptive purposes only The authority having jurisdiction will determine the service stations in its area to which this Code applies

## 3 3 Timing

3 3 1 *New Service Stations* Stage II vapour recovery is required at all service stations with total gasoline storage capacity in excess of 40,000 litres which start dispensing gasoline after the jurisdiction in which they are located has adopted the provisions of this code

3 3 2 *Modified Service Stations* Stage II vapour recovery is required at any service station with an annual throughput greater than one million litres upon

(a) replacement of an existing gasoline storage tank, or

(b) installation of a new gasoline storage tank, either of which occurs after the jurisdiction in which the service station is located has adopted the provisions of this code

3 3 3 *Existing Service Stations* Stage II vapour recovery will be required at all service stations with annual throughput greater than one million litres Illustrative timing for implementation of Stage II vapour recovery at existing service stations is shown in Table I

## Table I

### Illustrative Timing for Implementation of Stage II Vapour Recovery at Existing Service Stations

TIMING	TOTAL NUMBER OF SERVICE STATIONS HAVING THE SAME OWNERSHIP WHERE STAGE II IS REQUIRED									
	Number of stations with annual throughput > 1 million litres and having the same ownership									
	1	2	3	4	5	6	7	8	9	≥10
End of year 1	-	-	-	-	1	1	1	1	1	20%
End of year 2	-	-	1	1	2	2	2	3	3	40%
End of year 3	-	1	2	2	3	4	5	5	6	70%
End of year 4	1	2	3	4	5	6	7	8	9	100%

**Note** If the number of service stations determined using the percentages in the last column of Table I is not a whole number, then the number of stations may be rounded down

**3 3 4** Among service stations having the same ownership, Stage II vapour recovery shall be implemented on the basis of throughput (i.e. Stage II vapour recovery shall be implemented at service stations with the largest throughput first)

**3 4** **Marinas**

At this time, there is no requirement for Stage II vapour recovery during refueling of watercraft

**3 5** **Aviation Gasoline Facilities**

At this time, there is no requirement for Stage II vapour recovery during refueling of aircraft

## **Part 4**

### **Applicable Equipment and Systems Requirements**

**Note** The *National Task Force on Stage II Vapour Recovery* will request the CGSB to develop a standard for Stage II vapour recovery systems and system components (CAN/CGSB\*\*3 1001)

**4 1** Until standards are developed to address Canadian requirements for Stage II vapour recovery, all Stage II systems and system components that are installed shall be in accordance with CARB requirements

**4 2** Once standards are in place addressing Canadian requirements for Stage II vapour recovery, all subsequent Stage II systems and system components that are installed shall be in accordance with those standards

**4 3** The authority having jurisdiction may impose additional requirements to those of 4 1 and 4 2 regarding permissible Stage II systems and system components

**4 4** Retrofitting Stage II equipment with rebuilt parts, or aftermarket non-original equipment manufacturer parts is prohibited, unless such parts or equipment are certified as providing equivalent performance

## **Part 5**

### **Performance Criteria and Certification of Stage II Systems**

**5 1** Stage II vapour control systems shall be designed and installed to recover at least 95 percent of the gasoline vapours emitted during vehicle refueling operations

**5 2** Until such time as a Certification Organization accredited by the Standards Council of Canada may develop certification procedures to ensure that Stage II systems meet Canadian requirements, compliance with 5 1 shall be demonstrated by Stage II systems being approved by a CARB Executive Order to recover at least 95 percent of the gasoline vapours emitted during vehicle refueling operations

- 5 3 Should certification procedures to ensure that Stage II systems meet Canadian requirements be developed by a Certification Organization accredited by the Standards Council of Canada, compliance with 5 1 shall be demonstrated by Stage II systems being certified by that Certification Organization to meet the requirements of CAN/CGSB\*\*3 1001

## **Part 6**

### **System Commissioning**

- 6 1 The authority having jurisdiction shall specify the testing requirements for Stage II systems Appendix C provides references to documents outlining procedures for testing Stage II systems
- 6 2 The owner shall ensure that the Stage II vapour recovery system is inspected and tested during construction and installation, in accordance with the requirements of the authority having jurisdiction
- 6 3 The operator shall notify the authority having jurisdiction, at least two days in advance of the testing, when the testing will occur and what party will conduct the testing

## **Part 7**

### **Operating Practices**

- 7 1 The owner and operator shall ensure that the vapour control equipment is maintained leak free, vapour tight and is operating at all times in accordance with the criteria set out in this Code and with the manufacturers' directions
- 7 2 The operator shall check daily to ensure that all Stage II equipment (including, as applicable, nozzles, bellows, faceplates, hoses, breakaways and swivels) is in good working order to avoid release of vapour Appendix D provides a sample daily check list for inspection of Stage II vapour control equipment
- 7 3 The operator shall ensure that refueling instructions are posted in plain view of the person dispensing gasoline The instructions shall clearly describe how to fuel vehicles correctly with the vapour recovery nozzles utilized at that station The instructions shall also include a warning that any attempt to continue dispensing gasoline after a nozzle has shut off automatically is prohibited and may result in spillage or recirculation of gasoline
- 7 4 The operator shall ensure that the service station personnel and the general public use the Stage II gasoline vapour recovery equipment in accordance with standard refueling procedures
- 7 5 Instructions for the operation of the Stage II system and system components shall be kept at each service station in a location readily accessible to employees This may take the form of manufacturers' directions and recommended practices, or may be incorporated into a company's operating manual

- 76 Because ground-level ozone problems are most severe during the summer, discretionary maintenance shall not be planned for the period May 1st to September 15th
- 77 Stage I equipment must be functional and operating at all times to ensure that the vapours returned to the UST are recovered or destroyed in accordance with the Stage I Code of Practice

## **Part 8**

### **Training**

- 81 The operator shall ensure that employees receive training on
- a an overview of Stage II vapour recovery (see Appendix E), and
  - b the specific vapour control equipment installed at the service station where they work
- 82 The operator shall ensure that employees are familiar with
- a the instructions for operation of the Stage II system and equipment installed at the service station where they work, and
  - b the requirements of Part 7 of this Code

## **Part 9**

### **Compliance**

- 91 The owner and operator shall ensure that the compliance requirements as defined in the applicable regulations are met
- 92 The authority having jurisdiction should ensure regular annual inspection of service stations with Stage II equipment. Inspections should include the following
- a verification that Stage I and Stage II equipment is installed and operating properly,
  - b visual inspection of the Stage I and Stage II equipment (including, as applicable, nozzles, bellows, faceplates, hoses, breakaways and swivels),
  - c inspection of all Stage II signs and refueling instructions as required by 7.3,
  - d review of the operating procedures required by subsection 7.5 and verification that employees are familiar with the procedures,
  - e review of the service stations' records of inspections of Stage II equipment, and
  - f review of the repair and maintenance records of the Stage II equipment

**Notes** Figure 6 in Appendix B illustrates the relationship of inspection frequency to program in-use efficiency and should be considered by authorities having jurisdiction in developing inspection programs

**9 3** In addition to the testing requirements of Part 6, the authority having jurisdiction may require that additional testing of Stage II systems or system components be carried out in order to ensure continued performance

**Note** The Environmental Protection Agency's (EPA) *Enforcement Guidance for Stage II Vehicle Refueling Control Programs* requires

a testing, including a dynamic backpressure test, during annual inspections by the authority having jurisdiction (EPA, 8 4 2 b), and

b additional testing of Stage II systems at least every five years, or upon major system replacements or modifications, to verify continued performance (EPA, 8 2 1)

**9 4** The authority having jurisdiction shall be notified of shutdowns of the Stage II vapour recovery system lasting more than 24 hours within two days of the commencement thereof

**9 5** The authority having jurisdiction shall ensure that its inspectors receive adequate training

**Notes**

a The CARB offers training courses for inspectors

b Section 6 1 of the EPA's *Enforcement Guidance for Stage II Vehicle Refueling Control Programs* requires at least 40 hours of training with a written and practical test

**9 6** The authority having jurisdiction should make available to the public on request, and may publish on a regular basis, information on progress towards implementing Stage II vapour recovery

## **Part 10**

### **Record Keeping**

**10 1** Records should be kept in a manner which facilitates review and meets the requirements of the authority having jurisdiction

**10 2** Unless otherwise authorized by the authority having jurisdiction, records shall be kept at the service station for two years

**10 3** Records not kept at the service station shall be made available within 72 hours of a request by the authority having jurisdiction

- 10 4** All service stations shall keep records of
- a daily volume throughputs, for a minimum of two years,
  - b Stage II vapour control equipment downtime, repair, maintenance, inspections and training, for a minimum of two years,
  - c the Stage II vapour recovery system commissioning inspection and testing, for the life of the vapour recovery system, and
  - d all inspection reports and compliance documents (including warnings and notices of violations) issued by the authority having jurisdiction, for the life of the service station
- 10 5** The authority having jurisdiction shall have access to records as required by subsection 10 4, as well as to all supporting documentation
- 10 6** The authority having jurisdiction may require the owner or operator to submit regular reports summarizing the records required by 10 4
- 10 7** When the ownership of a service station is transferred, all records related to the Stage II vapour recovery system should be transferred to the new owner

## **Part 11**

### **Public Education**

- 11 1** The authority having jurisdiction should prepare, and make available to the general public, information on its Stage II vapour control program. The information should be easily understood by the general public and include, but not be limited to the following
- a the purposes and benefits (environmental, health and safety) of the Stage II vapour control program,
  - b a general explanation of how Stage II systems function,
  - c a general description of procedures for operation of Stage II equipment, and
  - d information on the authority having jurisdiction, including office address, phone number and other pertinent information for public inquiry, comments and complaints
- 11 2** Provisions for other public education should also be considered. Television, radio, newspapers and other media sources are effective in providing basic program information to the public, especially during initial program implementation

# Appendix A

## List of Task Force Members

B Burkinsher	Automotive Aftermarket Retailers of Ontario
R Davey	National Pump Manufacturers Association (Gilbarco Canada)
B Gill	Ontario Fuel Safety Branch
J C Leblanc	Irving Oil Limited
B McCarthy	Energy, Environment and Marketing Consulting
B McEwen	Environment Canada (Task Force Coordinator)
M Mennell	Greater Vancouver Regional District
D Richard	Ministere de l'Energie et des Ressources du Quebec
J Sabourin	National Pump Manufacturers Association (Tokheim)
G R Stewart	Lethbridge Fish and Game Association
W Trussler	Canadian Petroleum Products Institute (Shell Canada)
C Turgeon	Ministere de l'Energie et des Ressources du Quebec
T Wakelin	B C Environment
B Walker	STOP
R White	Environment Canada (Task Force Chairperson)
M Young	Ontario Ministry of the Environment

## Corresponding Members

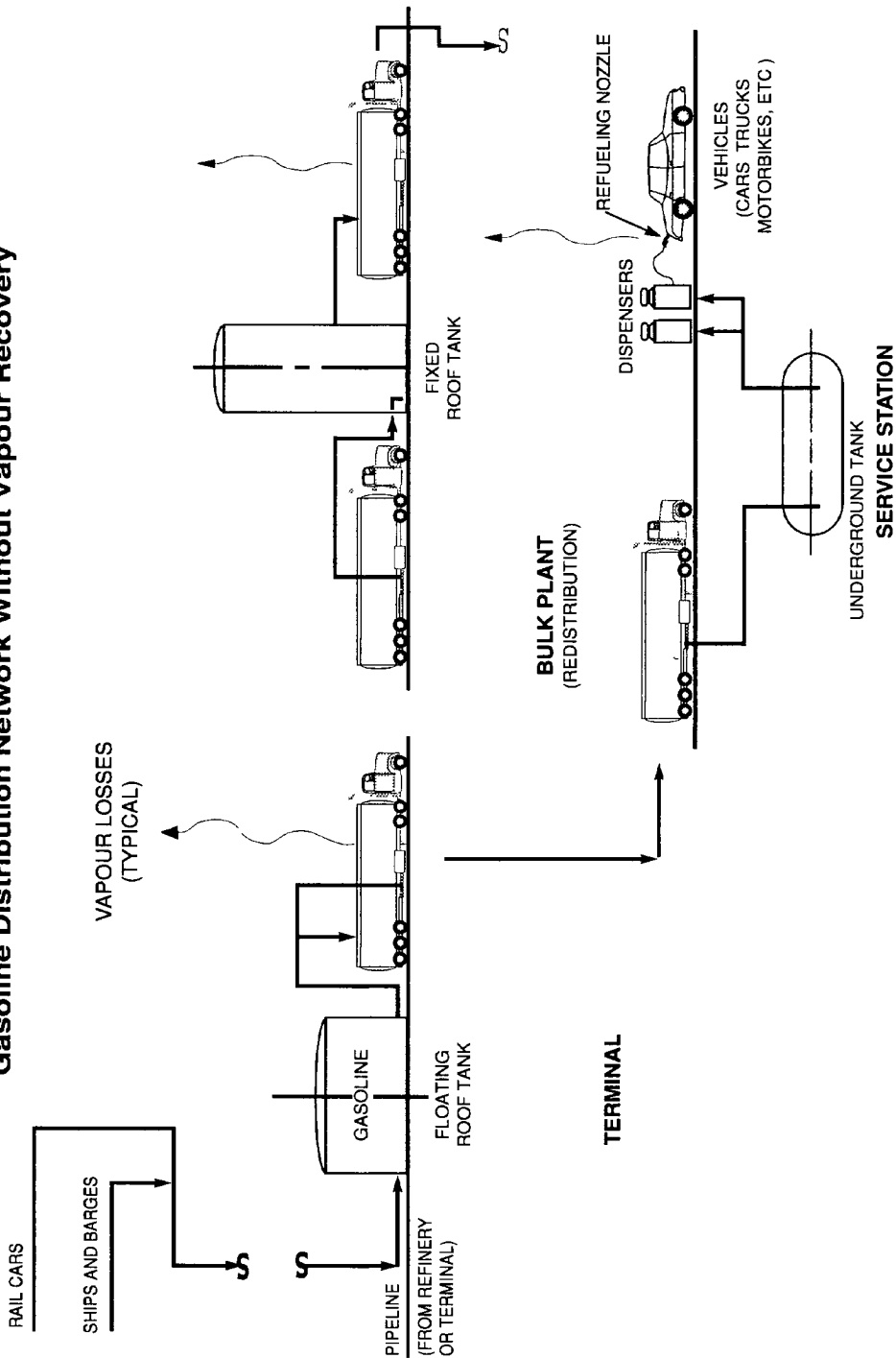
E Baar	Vancouver, British Colombia
J Baguzis	Ford Motor Company
E Bobet	Environment Canada, Ontario Region
Y Bourassa	Communauté urbaine de Montreal
R Brulotte	Ministere de l'Environnement et de la Faune du Quebec
R Byrtus	Consumer and Corporate Affairs Canada
C Caruanna	Canadian Standards Association
B Charest	Canadian General Standards Board
R Chartier	Propane Gas Association of Canada
C Dempsey	Propane Gas Association of Canada
M Dender Heyden	RWDI
J Donald	Parkland Industry Ltd
D Foley	SPEC
A Gosselin	Environment Canada, Quebec Region
S Graham	Grocery Products Manufacturers of Canada
J P Kallungal	Ontario Fire Marshall's Office
B Kelso	Environment Canada, Pacific and Yukon Region
J F L Knight	New Brunswick Department of Environment
G Lemont	Canadian Tire Corporation
D Mahar	Northwest Air Pollution Authority, Washington State
V Marwaha	Environment Canada, Western and Northern Region
J McTaggart-Cowan	B C Environment
B Mersereau	Canadian Turbo Inc

S Munro	Lambton Industrial Society
S Owen	Industry, Science and Technology Canada
R Quan	Greater Vancouver Regional District
P Rielly-Row	Natural Resources Canada
L Robertson	Chrysler Canada
D Rogoza	B C Ministry of Energy, Mines & Petroleum Resources
P Rother	Regional District of Fraser-Chean, B C
S Rutherford	Canadian Federation of Agriculture
E Schwartzel	Pollution Probe
F Smith	National Defense
G Ternan	Environment Canada, Atlantic Region
R D Tharby	Tharby & Associates
S Wilson	Equipment Sales Co Inc
R Wright	Underwriters' Laboratories of Canada

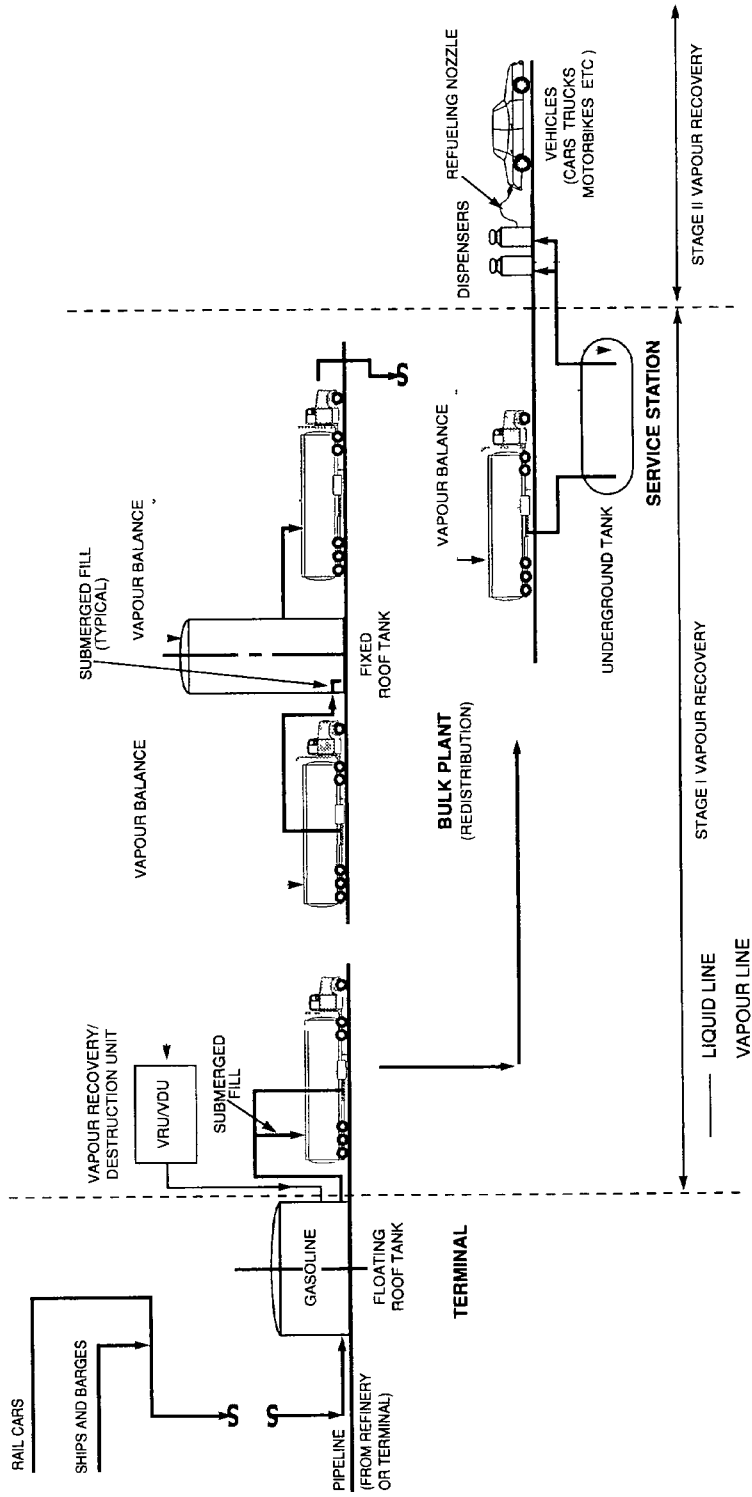
## **Non-Member Task Force Participants (Provided Technical Expertise)**

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C F Cotton	Esso Petroleum Canada
P Griffiths	Emco Wheaton
B Kitchen	Pioneer Petroleum
K Madsen	Canadian Turbo Inc
L McKinney	California Air Resources Board
B Millet	EBW Canada
J Montgomery	Good Year Canada
K Morphet	Metro Fuel Co
E Newell	GP Service Station Maintenance
K Nicklin	P E S Sales Ltd
D O'Carroll	Imperial Oil
D Parrish	Emco Wheaton
J Raymond	Department of Ecology, Washington State
J Rumble	Emco Wheaton
K W Sanderson	Petro-Canada
S Shedd	U S Environmental Protection Agency
D K Smith	Gates Canada
R I Stephenson	Chevron Canada Limited
J Walton	Dover Corporation
R Warland	New York State Department of Environmental Conservation
T Whalen	Links Canada (Hirt Combustion Engineers)
C Yundt	P E S Sales Ltd

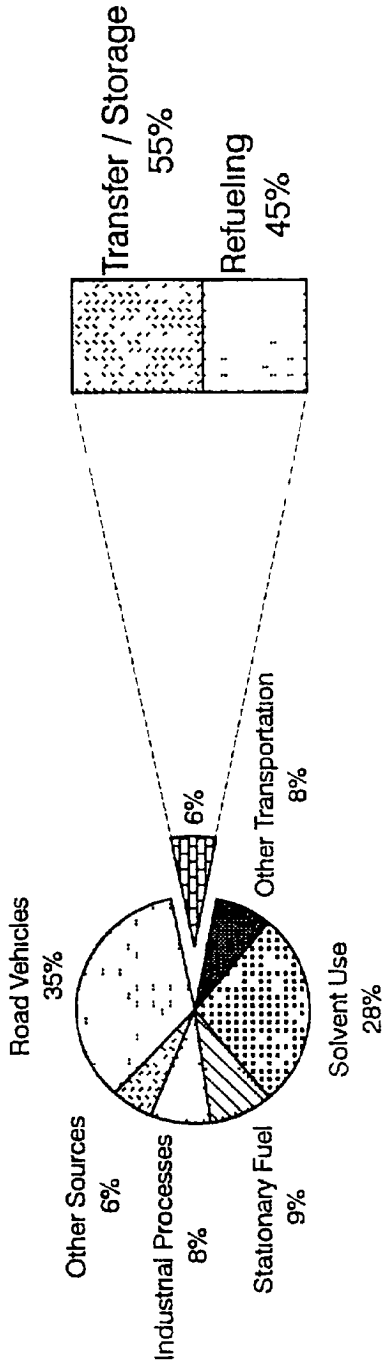
## Figure 1 Gasoline Distribution Network Without Vapour Recovery



**Figure 2**  
Gasoline Distribution Network With Vapour Control Systems



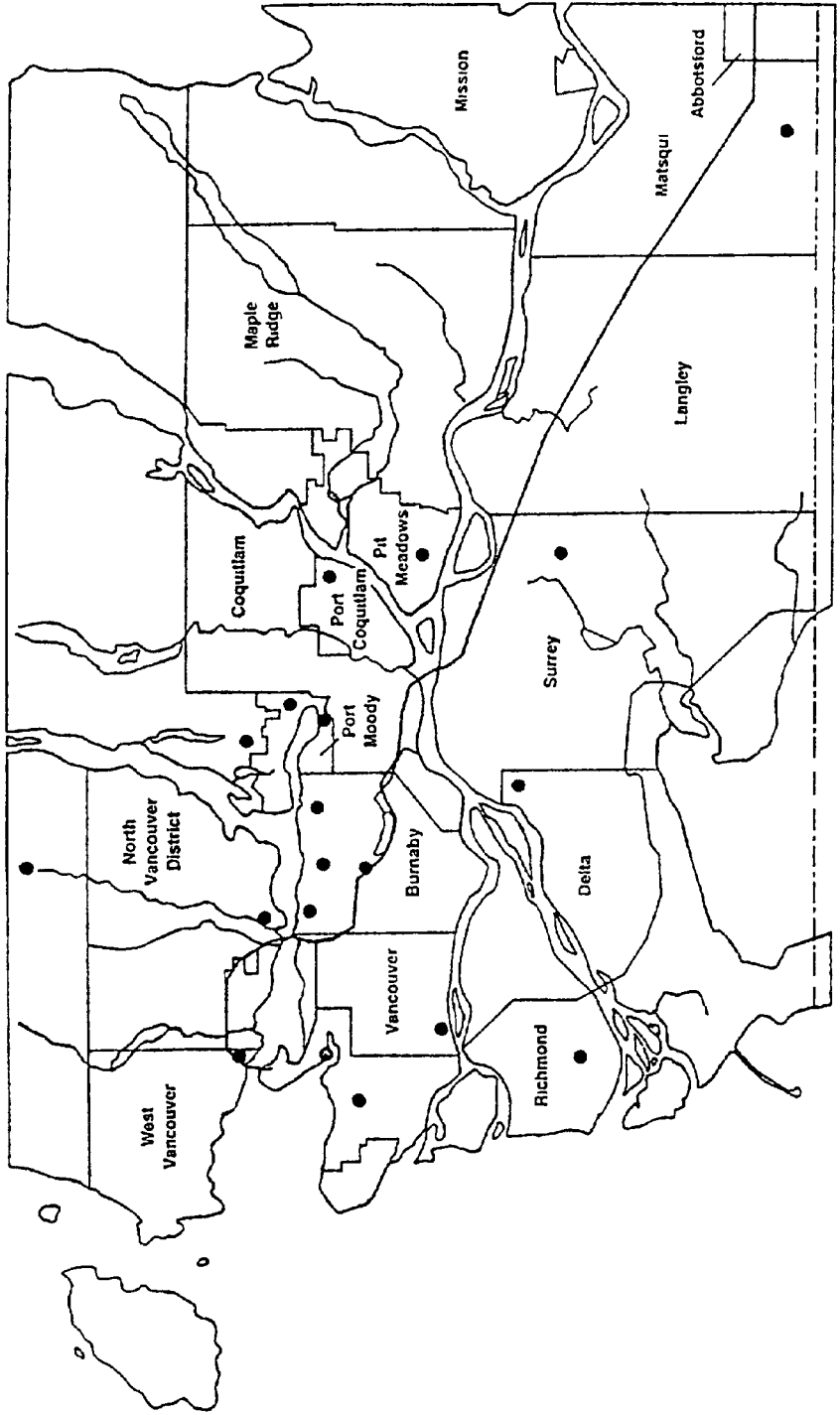
**Figure 3**  
**VOC Emissions in Canada –**  
**Contribution from Gasoline Distribution Network**



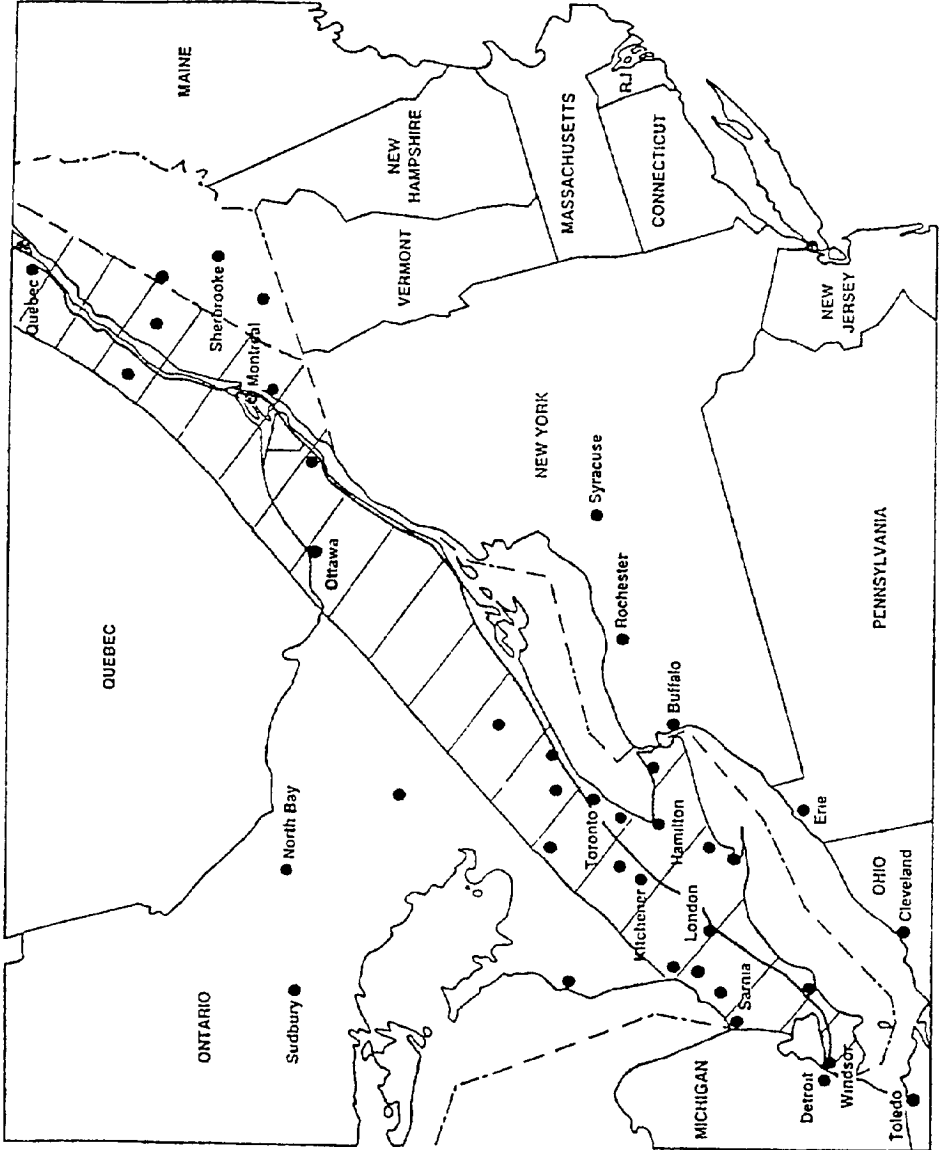
**TOTAL EMISSIONS**  
**Various Sources**

**GASOLINE**  
**DISTRIBUTION**  
**Stage I and Stage II**

**Figure 4**  
Lower Fraser Valley Region, British Columbia

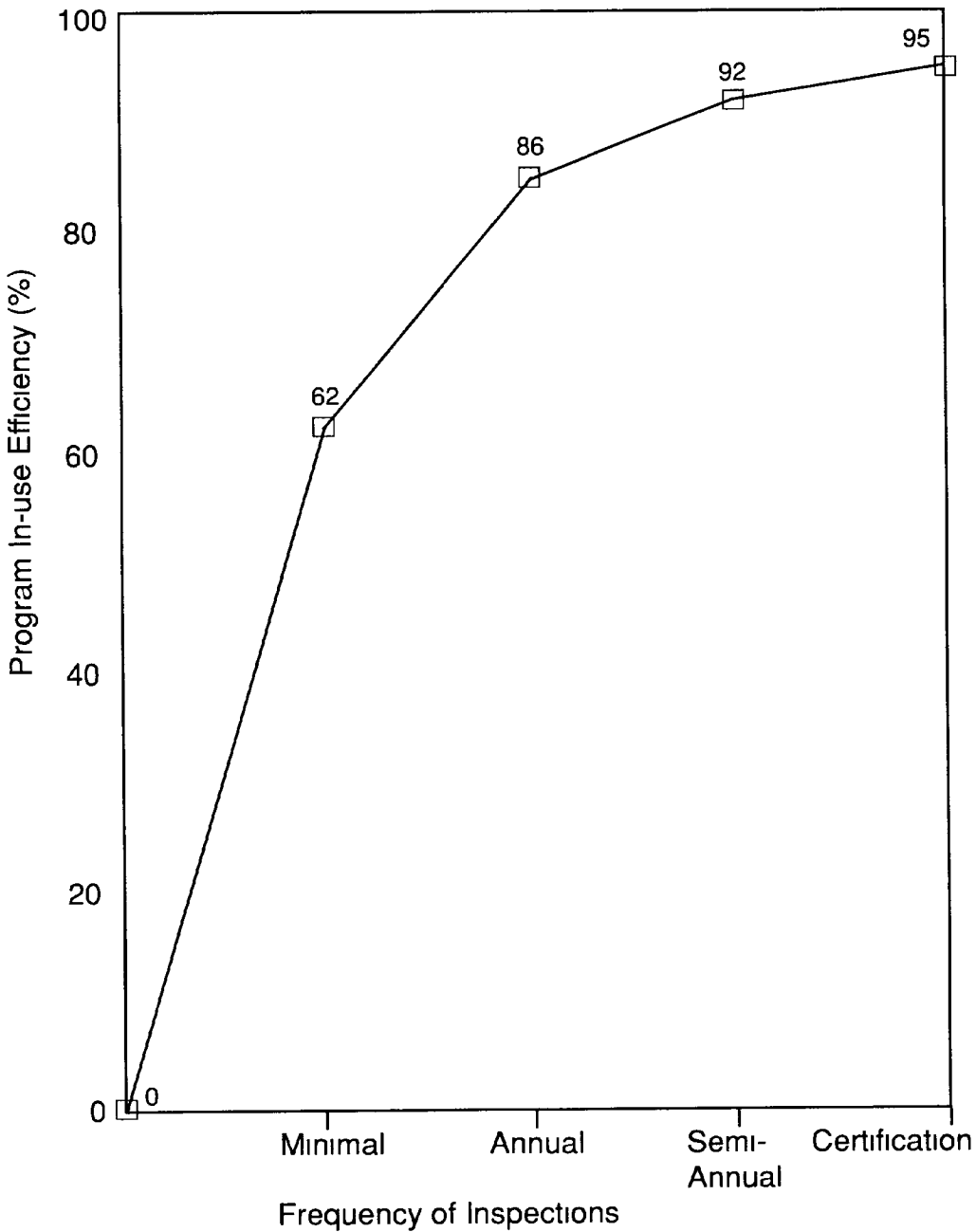


**Figure 5**  
Windsor-Quebec City Corridor Region



# Figure 6

## Relationship Between Inspection Frequency by the Regulating Authority and Program In-use Efficiency



**Source** Technical Guidance - Stage II Vapour Recovery Systems for Control of Vehicle Refueling Emissions at Gasoline Dispensing Facilities, U S EPA, November 1991

# Appendix C

## References for Procedures for Testing Stage II Vapor Recovery Systems

1 ***Recommended Practices for Installation and Testing of Vapor Recovery Systems at Vehicle Fueling Sites (PEI/RP300-93)***

- includes chapters covering testing during construction, pressure decay and dynamic backpressure testing, and blockage testing

Petroleum Equipment Institute  
P O Box 2380  
Tulsa, Oklahoma 74101  
Phone (918) 494-9696

2 ***CARB Vapour Recovery Test Procedures***

TP-201 3 Determination of Static Performance of Vapor Recovery Systems of Dispensing Facilities

TP-201 3A Determination of Static Performance of Vapor Recovery Systems of Dispensing Facilities with Above-ground Storage Tanks

TP-201 4 Determination of Dynamic Performance of Vapor Recovery Systems of Dispensing Facilities

TP-201 6 Determination of Liquid Blockage of Phase II Vapor Recovery Systems of Dispensing Facilities

California Air Resources Board  
Compliance Assistance Program  
P O Box 2815  
Sacramento, California 95812  
Phone (916) 327-7211

# Appendix D

## Self-Inspection Checklist for Service Stations with Stage II Vapour Recovery

Year/Month	Sun	Mon	Tues	Wed	Thur	Fri	Sat		Comments
Date									
Boots								No tears or slits	
Hoses								No kinks or flat spots	
Nozzles								Certified and operational	
Faceplates								Seals present and functional	
Shut-offs								No malfunctions	
Check-Valves								Properly wired and clamped	
Retractors								Present and functional	
Swivels								Present and functional	
Breakaways								Present and functional	
Powered VRS								Power on, compressor working	
Signs								Required signage in place	
UST's								No missing seals, all valves closed	
Initials									

**Note** Every gasoline dispenser required to comply with Stage II Vapour Recovery regulations needs a scheduled inspection and maintenance program. This inspection form is to be completed on a daily basis at the time of the physical inspection, and retained on site for examination by the authority having jurisdiction.

Location Name \_\_\_\_\_

Location Address \_\_\_\_\_

Date \_\_\_\_/\_\_\_\_/\_\_\_\_ Time \_\_\_\_\_ Conducted By \_\_\_\_\_

**Note** The owner/operator will conduct a physical inspection at least once a week and will acknowledge this, as well as the fact that the inspections conducted by his designates are in accordance with the training provided by signing the above section.

- Note**
- 1 Any defects or problems should be noted, along with recommendations for repairs
  - 2 Attach copies of any workorders for repairs to the Stage II equipment to this form
  - 3 The authority having jurisdiction shall be notified of shutdowns lasting more than 24 hours

Authority having jurisdiction \_\_\_\_\_

Phone# \_\_\_\_\_

# Appendix E

## Gasoline Vapour Recovery - An Overview for Service Station Employees

### Introduction

The service station at which you work is equipped with special equipment to minimize emissions of gasoline vapours into the air. The reason that your station is equipped with a vapour recovery system is to collect gasoline vapours and return them to the refinery to be reprocessed into gasoline. This process involves your customers, you, the truck which delivers your gasoline and the facility to which the delivery truck returns the vapours. If at any location along this chain, someone fails to use the vapour recovery system properly, or neglects to maintain it in good working order, harmful vapours will escape and contribute to our air pollution problem.

This guide is designed to inform you about vapour control equipment, how it works, and the benefits to you and the environment of maintaining it properly. The guide, along with the *Self Inspection Check List for Service Stations with Stage II Vapour Recovery* and the training supplied by the owner/operator of the location at which you work, cover the basic requirements for maintenance and operation of the vapour recovery system.

### Benefits of Reducing Emissions of Gasoline Vapours

The gasoline vapour recovery systems at your service station will

- Δ reduce the formation of lung damaging smog,
- Δ reduce your health risks by decreasing toxic fumes,
- Δ save a significant amount of gasoline,
- Δ reduce fire hazards, and
- Δ reduce gasoline odours.

### Stage I Recovery Equipment

Your service station is equipped with piping and equipment to recover gasoline vapour that is normally released to the air when tank trucks transfer gasoline into the underground storage tanks. This equipment is called Stage I vapour recovery equipment and is an essential link in the vapour recovery chain. When the underground storage tanks at your station are filled with gasoline, the vapours in the space above the gasoline are returned to the tank truck. Without Stage I equipment, these vapours would be released to the atmosphere.

Check regularly to be sure that the seals of the underground storage tanks are in good operating condition and that the caps are on the tanks. This is especially important after a gasoline delivery is made. Also, be sure the driver of the delivery truck hooks up both the gasoline line and the vapour line before he starts to transfer gasoline into the tanks.

## Stage II Vapour Recovery

Stage II vapour recovery deals with gasoline vapours released as a result of the transfer of gasoline from the service station storage tank to the automobile fuel tank. Normally vapours that are displaced from the vehicle tank by refueling go into the air. With Stage II, vapours are recovered at the vehicle fillpipe by a vapour recovery nozzle with vapour connection bellows or some sort of vacuum system and are returned to the service station's underground storage tank. About one to two litres of gasoline are recovered per 1000 litres sold.

### Inspecting and Maintaining Your Stage II Equipment

Every morning when you begin your shift, or better yet at each shift change, give your vapour recovery system an inspection. Check each piece of vapour recovery equipment for wear and damage, making sure that everything is in good operating condition. Identify any potential problems and take action. Repair or replace defective components immediately. Do your part to help yourself, your customers and the environment.

Since many of you work at self-serve locations you understand that public awareness and education are essential. When a customer has difficulty with the equipment, take the time to check it out. In many cases, demonstrating the proper use of the equipment will solve the problem. Don't forget, by maintaining your equipment in good working order, you will improve customer satisfaction while cleaning up the air. If you do find a problem, remove the equipment from service until it can be repaired or replaced.

One of the most common problems is a blocked vapour line caused by customers topping off their tanks. When a gas tank is overfilled, gasoline travels back down the vapour hose and blocks the line. Unless the line is cleared, the next customer will have trouble preventing the nozzle from automatically shutting off while pumping gas. Please warn your customers and new employees not to top off the tanks.

When a nozzle continually shuts off when trying to fill an empty tank, this indicates a liquid blockage in the vapour line, or a broken or improperly installed nozzle component. You can clear the line by raising and extending the hose. If the nozzle continues to shut off, have it repaired or replaced.

The following is a list of some of the problems that may occur:

- △ Tears or splits in the boots — tears larger than one-half inch and splits greater than one inch — mean that the boot must be replaced
- △ If your system has a flexible cone or a faceplate on the nozzle, at least three quarters of it must be present, or it must be replaced
- △ Hoses that are flattened, kinked or torn will prevent proper functioning of your system and can cause shut-offs, customer frustration and vapour release. Check them daily and replace damaged lines.

- △ Malfunctioning nozzles can cause tank overfilling which results in liquid gas blocking the vapour lines Remove malfunctioning nozzles
- △ If you have a process unit, ensure that it is functioning properly by checking the gauges and listening for the sounds the unit produces
- △ Make sure that all components of your vapour recovery system meet the required standards and certifications required by Canadian law This is usually indicated by a sticker attached to the equipment

If the Stage II vapour control equipment is shut down for more than 24 hours, notify the government agency having jurisdiction in your area (Your station's daily inspection check list will show the agency's phone number )

## **Government Inspections**

A government inspector will visit your station periodically to conduct a complete inspection The inspector will be checking your vapour recovery system to see if it is in good working order This will include checking all components to see that they are certified and defect-free The inspector will also check the station's records to ensure that inspections of the Stage II vapour recovery equipment have been done and that the equipment has operated properly As well, refueling instructions for the Stage II equipment must be placed in plain view of the general public

**Remember** *USE THIS GUIDE TO HELP YOU WITH YOUR DAILY PHYSICAL INSPECTIONS OF THE STAGE II EQUIPMENT KEEPING YOUR EQUIPMENT IN GOOD OPERATING CONDITION PROVIDES A SAFER WORKPLACE AND A HEALTHIER ENVIRONMENT*

# Appendix F

## Referenced and Related Documents

**California Air Resources Board, *Self-Inspection Handbook - Gasoline Facilities - Phase I & II Vapor Recovery* (CAP-90-009), 1990**

- provides information for operators of gasoline dispensing facilities on Stage I and Stage II, proper operating procedures and legal requirements

**California Air Resources Board, *Gasoline Facilities Phase I & II Technical Manual* (CAP-91-201)**

- intended to assist field inspectors conduct and complete efficient compliance inspections of Stage I and Stage II installations

**California Air Resources Board, *Vapor Recovery Test Procedures***

TP-201 3 - *Determination of Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities*

TP-201 3A - *Determination of Static Pressure Performance of Vapor Recovery Systems of Dispensing Facilities with Above-Ground Storage Tanks*

TP-201 4 - *Determination of Dynamic Pressure Performance of Vapor Recovery Systems of Dispensing Facilities*

TP-201 6 - *Determination of Liquid Blockage of Phase II Dynamic Vapor Recovery Systems of Dispensing Facilities*

**Canadian Council of Ministers of the Environment, *Environmental Code of Practice for Vapour Recovery in Gasoline Distribution Networks* (CCME-EPC/TRE-30E), March 1991**

- outlines recommended minimum requirements for Stage I vapour controls implementation in Canada

**Canadian Council of Ministers of the Environment, *Management Plan for Nitrogen Oxides (NO<sub>x</sub>) and Volatile Organic Compounds (VOC), Phase I* (CCME-EPC/TRE-31E), November 1990**

- presents a national preventive program and regional remediation programs to reduce levels of ground-level ozone in Canada

**Petroleum Equipment Institute, *Recommended Practices for Installation and Testing of Vapor Recovery Systems at Vehicle Fueling Sites* (PEI/RP300-92), 1992**

- provides recommended practices for installation and testing of Stage I and Stage II vapour recovery systems at service stations

**United States Environmental Protection Agency, *Technical Guidance - Stage II Vapor Recovery Systems for Control of Vehicle Refueling Emissions at Gasoline Dispensing Facilities* (2 volumes, EPA-450/3-91-022a/b), November 1991**

- provides information and guidance to state and local agencies related to the planning, permitting, and implementation of Stage II vapour recovery programs

**United States Environmental Protection Agency, *Enforcement Guidance for Stage II Vapor Refueling Control Programs*, December 1991**

- provides guidance to agencies to assure that Stage II programs attain intended emissions reductions