ROVER file

Clean Air Strategic Alliance

The Alberta ROVER Project

Summary Report

Prepared by
The ROVER Planning Subgroup of the
Clean Air Strategic Alliance Vehicle Emissions Implementation Design Team

March 1999

For more information:

Clean Air Strategic Alliance
9th Floor, Sterling Place
9940 -106 Street
Edmonton, Alberta, Canada
T5K 2N2

phone: (780) 427-9793
fax: (780) 422-3127
email: casa@casahome.org
website: www.casahome.org

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List of Members of the Vehicle Emissions Implementation Design Team

Larry Begoray*	Alberta Environmental Protection
Herman Schwenk	Alberta Federation of REAs
Lidia Stefaniw	Alberta Health
Jerry Hall	Alberta Lung Association
Dan VanKeeken	Alberta Motor Association
Mahmuda Ali*	Alberta Transportation and Utilities
Jack Thompson	Calgary Motor Dealers' Association
Alan Brownlee*	City of Edmonton
Christa Cruthers*	Clean Air Strategic Alliance
Gerry Ertel*	CPPI / Shell Canada Products Limited
Rod Frith	Environment Canada
Roberta Franchuk	Environmental Resource Centre
Corresponding:	
Goldie Edworthy	Alberta Department of Energy
James Tweedie	Bert Riggall Environmental Foundation
David Reynolds*	City of Calgary
Andre Schutta	Northwestern Utilities Limited
Past Members:	
John Torneby*	Alberta Environmental Protection
Mike Kelly*	Clean Air Strategic Alliance

* *Member of the ROVER Planning Subgroup*

The Alberta ROVER Project

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Executive Summary

The mandate of the Clean Air Strategic Alliance (CASA) is to develop Alberta strategies for solving air quality problems. The CASA Vehicle Emissions Working Group (VEWG) was formed specifically to develop recommendations on an Alberta action plan towards vehicle emissions reductions.

One of the nine recommendations made by the VEWG in its June 1998 report to the CASA board of directors was to develop a profile of provincial vehicle emissions characteristics. Furthermore, another recommendation was to increase public awareness regarding vehicle maintenance and impact of vehicle emissions on air quality. With the approval of the CASA board, the newly formed Vehicle Emissions Implementation Design Team (VEIDT) proceeded to make arrangements to undertake a remote sensing project in four municipalities in Alberta - Calgary, Edmonton, Red Deer, and Canmore. ROVER (Roadside Optical Vehicle Emissions Reporter) equipment was made available through the Ontario Ministry of the Environment.

To this end, the Alberta ROVER Project (ARP) was undertaken in a cost-effective manner by focussing monitoring efforts on a single vehicle emission parameter - carbon monoxide (CO). Carbon monoxide emission levels are considered to be a good indicator of overall vehicle performance; if CO concentrations are high, emissions of other contaminants such as hydrocarbons (HC) are in most cases likely to be high. The ARP was targeted to the classic pollutants (such as CO) as opposed to pollutants such as CO_2 which is related to the climate change issue.

The ROVER was active in Alberta from October 7 to November 3, 1998. In total, 42,295 light duty vehicles were tested in the four municipalities. The standard used for identifying a clean vehicle was any vehicle that tested 1% or less CO emissions, while the standard for a gross emitting vehicle was one that tested above 3%.

The key observations were as follows:

- Remote sensing technology was successfully applied in the four municipality study in Alberta.
- Findings of this project were generally consistent with other jurisdictions who have done similar testing. That is, approximately 10% of vehicles were found to be responsible for 50% of the overall vehicle emissions measured. Furthermore, the results also reflect the 80/20 rule, that 80% of the CO measured comes from 20% of the vehicles tested.
- Alberta results indicated that for the vehicles tested, 7% of gross emitting vehicles were responsible for 54% of CO emissions. In comparison, the 81% clean vehicles produced only 18% of CO emissions.
- Twelve percent of the vehicles tested were not categorized as either clean or gross emitting. This is because there are uncontrolled aspects of remote sensing that make it difficult to determine if the vehicle is actually a gross emitter or whether it is simply other mitigating conditions such as driving habits, road conditions, and meteorology.

- Thirty-seven percent of the vehicles had no measurable amounts of CO (i.e. less than 0.05% CO).
- The median CO emissions in the four-municipality Alberta test was 0.11% CO. This will serve as the best measurement of central tendency and in turn, a baseline for Alberta's in-use vehicle emissions profile.
- The results were very similar among the four municipalities where measurements were taken; any variation between municipalities was not statistically significant.
- The majority of LDVs observed in each municipality had only one occupant.
- A survey of vehicle occupancy that was conducted during the ARP showed that the overall occupancy rate was 1.29 persons per vehicle.
- Public awareness and interest in vehicle emissions was evident. The ARP was very well received by the municipalities, the media, and the public.
- The ROVER technology may have merit as part of a program for monitoring individual vehicle emissions and identifying gross emitters.

As follow up to this project, the VEIDT made recommendations regarding remote sensing to the CASA board on March 18, 1999. These recommendations were approved and are listed in Appendix A.

1. Introduction

In 1996, the Clean Air Strategic Alliance (CASA), which has a mandate to develop Alberta strategies for solving air quality problems, established the Vehicle Emissions Working Group (VEWG) to address air quality issues related to vehicle emissions. The working group included stakeholders from government, industry, and non-government organizations (NGOs). In June 1998, the VEWG presented nine recommendations to the CASA board of directors addressing vehicle emissions. This submission included a recommendation to conduct vehicle emissions testing by remote sensing. The recommendations were approved. The VEWG evolved into the Vehicle Emissions Implementation Design Team (VEIDT) whose role is to implement the VEWG recommendations.

To date, the VEIDT's main focus has been to address issues surrounding classic pollutants such as carbon monoxide (CO), hydrocarbons (HC), nitrous oxides (NO_x), and volatile organic compounds (VOCs), as opposed to carbon dioxide (CO_2) which is related to the climate change issue.

The ROVER, **R**oadside **O**ptical **V**ehicle **E**missions **R**eporter, is a self-contained mobile remote sensing unit that optically measures roadside exhaust emissions (CO and CO_2) from passing light duty vehicles (LDVs)[1]. The VEIDT through a letter of agreement obtained this remote sensing equipment from the Ontario Ministry of the Environment (MOE). The MOE operated the Ontario Smog Rover Program in the summers of 1997 and 1998. More details on the Ontario Smog Rover Program are described in Appendix B.

The impetus for Ontario's program was with respect to air quality issues around smog. In Alberta, the ROVER equipment was used primarily to identify CO emissions as an indicator of vehicle emissions profile. Thus, the purpose of the ARP was to improve the provincial knowledge base of urban vehicle emissions and to increase public awareness regarding vehicle maintenance and impact on air quality.

The ARP ran from October 7 to November 3, 1998 and its itinerary was as follows:

October 7 - 10	Edmonton
October 13 - 17	Calgary
October 20 - 21	Canmore
October 22 - 24	Calgary
October 27 - 28	Red Deer
October 29 - November 3	Edmonton

[1] *Light Duty Vehicles (LDVs)* - Vehicles which, unladen, weigh approximately three (3) tons or less, and are used primarily for the transportation of people and whose tailpipe is located approximately 0.5 metres above the ground. These vehicles include: all two-door, four-door, and hatch-back cars, sport utility vehicles, panel vans (outfitted with seating for multiple passengers) and pick-up trucks (in use as personal vehicles). They are the main focus of the ROVER study and were individually examined for the amount of carbon monoxide (CO) they produced as they passed a specific monitoring site. Some LDVs were randomly selected for the recording of the number of occupants contained within.

This summary report documents the details of the ARP. Section 2 discusses the study design and equipment involved. Section 3 describes how the public was made aware of the project. Section 4 reports the results of the project with municipality summaries that include the following:

- The number of "clean" vehicles and the number of "gross emitters"
- A proportional breakdown of vehicle CO emissions by "clean versus gross emitters"
- A comparison between site type tested (e.g. residential, arterial, etc.)
- A discussion about other emissions
- A discussion about occupancy rates and heavy duty vehicles

Section 5 gives a comparison of the Alberta ROVER Project and the Ontario Smog Rover Program. Section 6 summarizes with the project's conclusions. Appendix A lists the recommendations the VEIDT presented to the CASA board in March 1999. Appendix B gives a review of the 1997 and 1998 Ontario Smog Rover Program. Appendix C contains the communications package used to promote the ARP as well as sample media coverage. Appendix D illustrates the location of testing sites on maps for each of the municipalities. Appendix E consists of a table on the cumulative results of the Alberta 1998 summary findings.

2. Study Design and Equipment

2.1 Technology Background

The ROVER's remote sensing technology was developed by Professor Donald Stedman (University of Denver) in the late 1980s and was demonstrated in Toronto in April 1990. The original test data acquired by this system, was described as the Fuel Efficiency Automobile Test (FEAT), and were compared to other data for clean running well-tuned cars by Professor Stedman and by the Ministry of Transportation for Ontario (MTO).

Before the equipment was transferred to MOE, the MTO owned the equipment and conducted several highway studies. It evaluated the ROVER's system for a number of years and found that the ROVER could reliably identify vehicles that would fail a more complex emission test. For example, a reading of greater than 3.0% CO measured in the optical beam would identify vehicles that would emit more than a federal government's tailpipe CO emission guideline. Furthermore, using this CO benchmark and testing 1000 of its own vehicles, MTO determined that the failed vehicles accounted for 10% of the total number of vehicles studied and that these emissions accounted for 50% of the total CO emitted.

Using this information, the MOE established classification criteria for vehicles that passed through the light beam. If the amount of CO measured in a vehicle's exhaust was 1% or less, the vehicle was deemed to be well-tuned. In the ARP, these vehicles were deemed to be "clean." If the amount was between 1% and 3% CO, the vehicle's emissions fell into a grey area where it was difficult to determine if the engine was a poorly-tuned gross emitter or whether it was simply other variables such as cold engine, road conditions, driving habits, fuel grade, etc. that directly or indirectly affect emissions. If CO levels were greater than 3%, the vehicle was deemed to be poorly-tuned, or as the ARP defined it, a gross emitter of CO. It is generally true that if CO emissions are high, other emissions are also high. One exception is NO_x. If CO emissions are high it is usually because the engine is running "rich," and this suppresses NO_x emissions. Therefore, it is difficult to draw a conclusion between CO and NO_x without actual measurements.

The amount of CO in the exhaust of a vehicle is dependent on many variables, of which some may or may not be independent of each other. These factors include:

- vehicle maintenance practices [exhaust system, tune-ups, air filter replacement, timing, fuel quality or grade, tire pressure, OBD (on-board diagnostics) calibration, fuel injection versus carburetor]
- age of the vehicle
- the driver's driving practice [speeding, driving with a cold engine, load (number of passengers)]
- traffic operating conditions (congestion)
- idling
- time of day (commuting versus non-commuting)
- the road condition (grade, volume and speed of other traffic)
- speed limit
- traffic lights and stop signs
- physical road condition (paved, gravel, etc.)
- weather conditions (season, temperature, precipitation, barometric pressure).

A remote sensing study does not have control over many of these variables, but careful design and choice of site location can provide more consistency in some vehicle operating characteristics. Sites were selected to ensure that vehicles were travelling at a reasonable speed without significant acceleration or deceleration.

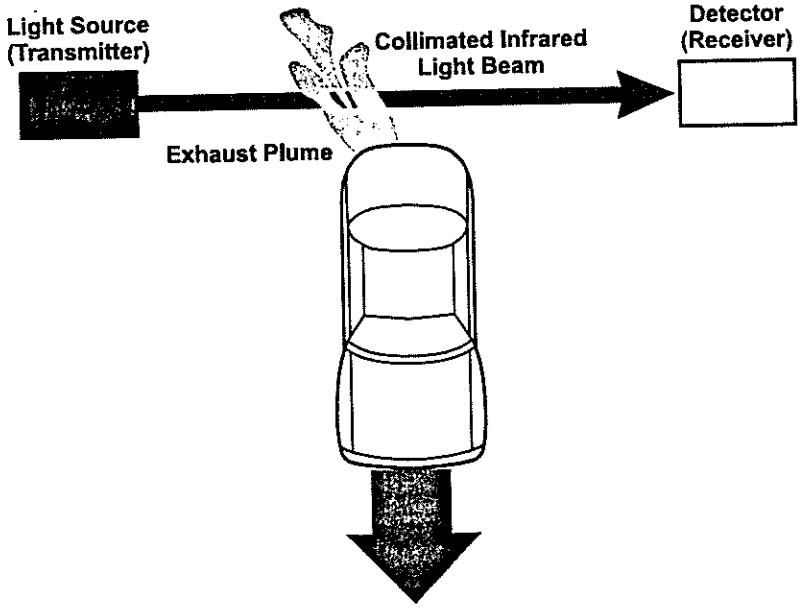
It must be noted that ROVER measurements are momentary "snapshots" of emissions from passing vehicles and that there are many parameters which influence the total amount of emissions from a vehicle during the course of its travels. Results from the ARP cannot be used directly to estimate overall emission amounts.

The primary factors that contribute to excess CO emissions are failure of the vehicle's air/fuel management controls or failure of the vehicle's catalytic converter system, if it is so equipped.

2.2 Monitoring Equipment Description

The ROVER equipment consists of a computer, a light source, and a detector unit tuned to measure concentrations of the exhaust gases carbon monoxide (CO), carbon dioxide (CO_2), hydrocarbons (HC), and oxides of nitrogen (NO_x) of passing light duty vehicles. In the operational mode, a collimated infrared beam of light is shone across a roadway at a height of approximately 0.5 metres. The analysis sequence is initiated when a vehicle passes through the light beam. The tailpipe's exhaust remains in the beam momentarily and during this time, the various exhaust gas concentrations are measured. Figure 1 shows the basic operation of the ROVER technology. Since it is a remote sensing instrument, the driver often does not even realize the vehicle's emissions have been measured. No specific vehicle identification information is recorded during these studies, and therefore, the anonymity of the driver and vehicle is assured.

Figure 1: Operation of ROVER Technology



This equipment can provide reliable and accurate measurements of CO and CO_2. The amount of CO in a vehicle's exhaust is one of the best environmental performance indicators of the automotive engine; CO_2 is a recognized major greenhouse gas. Since the rationale behind the ARP was to remotely assess a vehicle's performance, only the CO data were interpreted and it is this information that will be discussed in this report.

2.3 Monitoring Sites

In total, 40 sites were selected across the province. A site is defined as an occurrence of testing and not as a distinct location; therefore, one physical location could have more than one site identified to it (e.g. Dalhousie Station and Crowchild Trail tested in the peak and off-peak[2] are considered as two separate sites). Distribution of these sites were: 20 in Calgary, 14 in Edmonton, 3 in Red Deer, and 3 in Canmore.

[2] *Peak and off-peak* - Peak hours for the ARP were 7 am to 10 am and 3 pm to 6 pm.

In addition, five distinct road classifications or monitoring site types were selected to be used during the ROVER monitoring days[3]. These classifications, listed below, were based on descriptions and requirements of the municipalities participating in the study:

- *Arterials:* Part of, or the access to, a major freeway or large, multi-lane, high speed traffic route. These sites were controlled access highways. Eighteen of the 40 ARP sites were arterial and at least one was included in each municipality's sites.
- *Residential:* Direct access to individual homes or sub-divisions. Generally these sites had slower-moving traffic, two or four lanes roads with a large number of traffic lights, stop signs, or other traffic control devices restricting the flow and speed of traffic. Nine of the 40 ARP sites were residential and at least one was included in each municipality's sites.
- *Industrial/Commercial:* Similar to residential roads, but had no direct access to homes or sub-divisions. Instead they gave access to companies, stores, and production/manufacturing areas. These sites are also characterized by a greater percentage of "heavy vehicle" traffic. Eight of the 40 ARP sites were industrial/commercial, but one was not included in each municipality's sites.
- *Shopping Malls:* Not necessarily a named road, but a designated entrance into a shopping plaza. These sites had slow moving, single lane, single-directional traffic whose speed was controlled by road design instead of traffic signs. Two of the 40 ARP sites were shopping malls.
- *'Other':* Similar to residential roads but instead of houses, they lead to schools and park-and-rides, or were scenic routes connecting historical or entertainment areas. Three of the 40 ARP sites were 'others.'

2.4 Operating Logistics

During the ARP, the ROVER's itinerary was planned ahead of time but was dependent on weather conditions. The ROVER arrived at its designated site approximately 30 minutes before the scheduled start of monitoring. During this 30 minutes: the source and detector were set up and aligned; the computer acquisition system was initiated; a span gas containing certified amounts of CO and CO_2 was entered into the optical beam and a calibration was performed; new response factors were entered into the computer for these gases; and the site log book was updated. Field measurements commenced after completion of the calibration procedures. As each vehicle passed through the optical beam, the time of its passage and its CO and CO_2 exhaust concentrations were measured, recorded, and displayed. No other information regarding the vehicle was collected nor recorded by the computer acquisition system.

Apart from the actual exhaust measurements, visual surveys pertaining to occupancy and types of vehicles (LDVs, HDVs[4], etc.) were also made at each site. This set consisted of 10 surveys of 18 observations each randomly spaced throughout the entire monitoring period at each site. By

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[3] *Monitoring Day(s)* - Individual days during which the ROVER monitored traffic for at least one three (3) hour period between 7:00 am and 6:00 pm.

[4] *Heavy Duty Vehicles (HDVs)* - Vehicles that, unladen, weigh in excess of three (3) tons and are used primarily for commercial use: transit/school buses, transport/delivery trucks, mobile construction equipment, and panel vans/pick-up trucks used for business purposes. Motorcycles were also included.

interpreting the 10 visual surveys collected at each site, a statistical comment about vehicle occupancy could be made.

3. Public Awareness

Increasing public awareness was one of the main objectives of the ARP. This was accomplished in a number of ways. Prior to the commencement of the ARP, CASA provided media releases and established a web site for the public. This web site included a driver checklist for the proper maintenance and operation of vehicles. In addition, each municipality hosted a launch on the first day of testing which involved government officials, the media, and the public. CASA continued to post preliminary results on its web site as testing was completed in each municipality. Copies of the ARP report will be made publicly available. A sampling of media coverage is contained in Appendix C of this report.

4. Discussion of Results

This section describes the results of the ARP. Section 4.1 gives an overall summary of results for the four municipalities. Section 4.2 provides results on a municipality-by-municipality basis. Section 4.3 provides details by site category. Section 4.4 includes a discussion on emissions other than CO. Section 4.5 details a comparison of vehicle occupancy and HDVs.

4.1 Overall Summary for CO Emissions

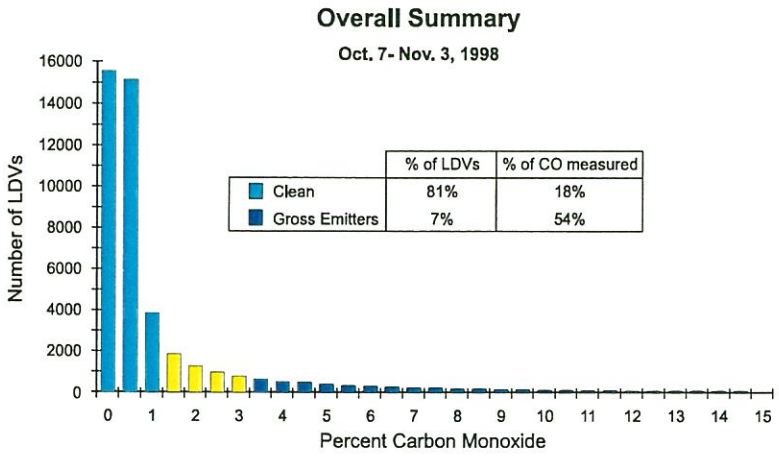
During the ARP, the ROVER was at 40 different sites located throughout Calgary, Edmonton, Red Deer, and Canmore. Of the 44,635 vehicles that passed through the optical beam of the ROVER, 42,295 were LDVs.

The overall results showed that of all the 42,295 vehicles tested, 34,423 (or 81%) of these LDVs were considered to be clean, as they had CO exhaust emissions of 1% or less, whereas 3,196 (7%) were considered gross emitters with CO readings greater than 3%.

It is estimated that the 7% gross emitters contribute 54% of the total CO emissions measured during this study; by comparison 81% of the clean vehicle population contributed only 18% of the total observed CO emissions. This estimate was based on CO concentration data only and does not consider the impact of other variances in CO mass emission rates due to differences in vehicle engine displacement sizes. Therefore, two vehicles could contain the same concentration level of CO but the one with the larger engine displacement size would emit proportionately larger volumes of exhaust gases.

The overall summary results are illustrated in Figure 2.

Figure 2: Overall Summary



Number of Monitoring Sites	40
Total Number of Vehicles Observed	44,635
Number of Light Duty Vehicles (LDVs)	42,295 (95%)
Number of Other Vehicles (Trucks, Motorcycles, etc.)	2,340 (5%)
For Carbon Monoxide Emissions from LDVs	
Median CO Concentration	0.11%
Maximum CO Concentration	14.36%
Average Mean CO Concentration	0.68%
Number of LDVs with 1% or Less CO Emissions	34,423 (81%)
These Vehicles Contributed 18% of the Total CO Measured.	
Number of LDVs with Greater Than 3% CO Emissions	3,196 (7%)
These Vehicles Contributed 54% of the Total CO Measured	

4.2 Municipality Comparison

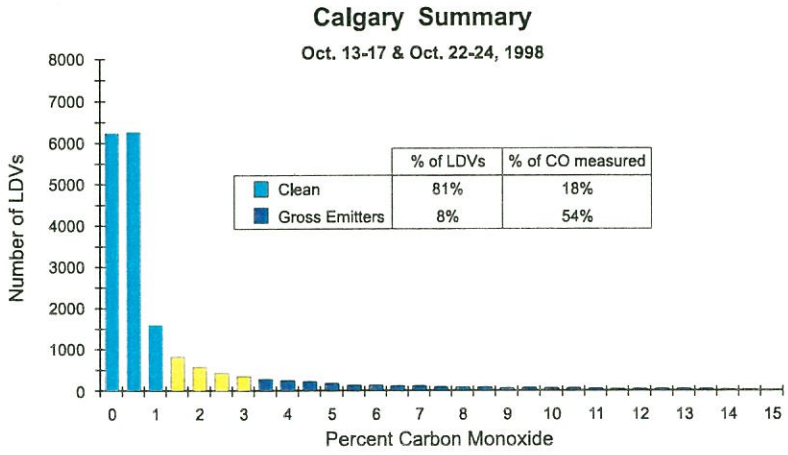
Below are the ROVER testing results for each of the four municipalities. Tables 1 through 4 provide a summary for each individual testing site in the respective municipality. The results in the tables show some difference between individual sites. Not enough is known from the overall measurements to explain why there are such differences. Section 2.1 discusses other possible reasons for this variation. A site location map for each municipality is in Appendix D. It should be noted, as in Section 2.3, that a site is defined as an occurrence of testing and not as a distinct location.

4.2.1 Calgary

The ROVER was in Calgary on two separate occasions. During its eight days of monitoring (total of both occasions), the ROVER monitored vehicles at 20 sites. These results are presented in Figure 3.

It is estimated that the 81% clean vehicles contributed 18% of the total CO measured while the 8% gross emitters contributed 54%.

Figure 3: Calgary Summary



Number of Monitoring Sites	20
Total Number of Vehicles Observed	18,046
Number of Light Duty Vehicles (LDVs)	17,529 (97%)
Number of Other Vehicles (Trucks, Motorcycles, etc.)	517 (3%)
For Carbon Monoxide Emissions from LDVs	
Median CO Concentration	0.12%
Maximum CO Concentration	14.11%
Average Mean CO Concentration	0.74%
Number of LDVs with 1% or Less CO Emissions	14,029 (81%)
These Vehicles Contributed 18% of the Total CO Measured.	
Number of LDVs with Greater Than 3% CO Emissions	1,427 (8%)
These Vehicles Contributed 54% of the Total CO Measured	

Table 1: Summary for Individual Testing Sites in Calgary

#	Site Type	Site (could be the same location)	# of LDVs	Median CO Concent'n	% Clean LDVs (CO≤1%)	Clean LDVs % CO Contrib'n	% Gross Emitter LDVs (CO>3%)	Gross Emitter LDVs % CO Contrib'n	% LDVs < MDL (CO≤0.05%)
1	A	Bow Tr @ Nat Christie Prk	762	0.10	86.9	26.3	5.9	49.6	32.5
2	A	Bow Tr @ Nat Christie Prk	875	0.07	86.5	30.0	2.7	28.4	40.5
3	A	Bow Tr @ Nat Christie Prk	2,707	< MDL	72.8	7.7	13.7	71.1	51.5
4	O	Research Rd near LRT Stn	455	0.05	82.6	17.5	6.6	55.0	45.9
5	R	Bisebois Ave to N Crowchild Tr	784	0.15	83.0	26.2	5.6	41.6	22.1
6	R	Bisebois Ave to N Crowchild Tr	1,125	0.18	79.6	24.0	5.6	36.4	18.8
7	A	16th Ave NE on-ramp to Deerfoot Tr	168	0.25	70.8	14.8	12.5	57.8	23.2
8	A	16th Ave NE on-ramp to Deerfoot Tr	1,617	0.18	77.2	16.6	10.6	59.2	24.1
9	A	16th Ave NE on-ramp to Deerfoot Tr	2,220	0.25	77.7	20.8	8.3	50.3	23.9
10	R	8th Ave NE near Deerfoot Tr	779	0.38	66.9	9.3	17.5	71.6	31.3
11	S	Dalhousie St'n & Crowchild Tr	407	0.03	89.9	33.1	2.7	32.2	46.2
12	S	Dalhousie St'n & Crowchild Tr	524	0.05	88.2	29.7	2.5	30.8	41.2
13	A	McKnight Blvd on-ramp to S Deerfoot Tr	581	0.24	72.6	10.8	15.8	74.3	33.4
14	A	McKnight Blvd on-ramp to S Deerfoot Tr	1,295	0.11	80.9	19.3	7.0	47.8	35.7
15	R	Stoney Tr to Senic Acres Link	513	0.04	89.7	31.2	2.9	36.0	44.1
16	O	University Dr	1,013	0.14	82.1	23.0	7.0	49.2	32.2
17	A	John Laurie Blvd to Saree Tr	289	0.08	86.9	26.4	5.2	46.2	30.8
18	A	John Laurie Blvd to Saree Tr	737	0.04	86.8	22.4	4.3	42.4	37.4
19	IC	Barlow Tr at 54th Ave	117	0.27	68.4	14.8	6.0	33.4	12.8
20	A	Macleod Tr at Hwy 22x	400	< MDL	91.3	36.6	1.3	20.4	51.7

Legend:

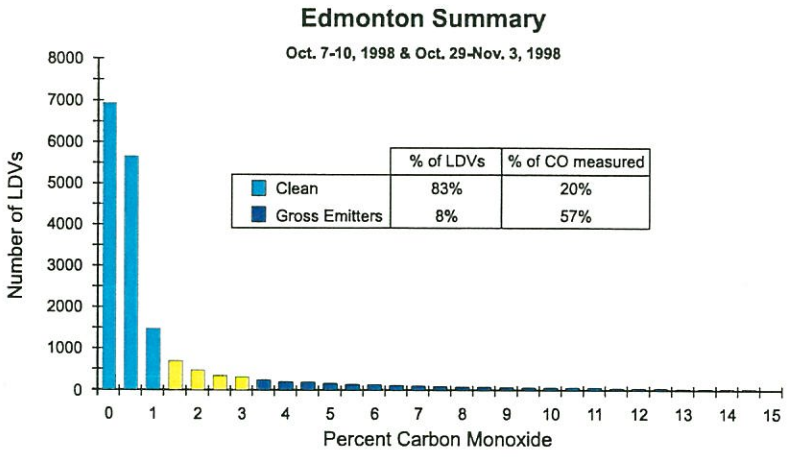
A - arterial IC - industrial/commercial O - other
R - residential S - shopping mall
MDL - minimum detection limit of 0.05% CO

4.2.2 Edmonton

The ROVER was in Edmonton on two separate occasions. During its eight days of monitoring (total of both occasions), the ROVER monitored vehicles at 14 testing sites. These results are presented in Figure 4.

It is estimated that the 83% clean vehicles contributed 20% of the total CO measured while the 8% gross emitters contributed 57%.

Figure 4: Edmonton Summary



Number of Monitoring Sites	14
Total Number of Vehicles Observed	18,439
Number of Light Duty Vehicles (LDVs)	16,971 (92%)
Number of Other Vehicles (Trucks, Motorcycles, etc.)	1,468 (8%)
For Carbon Monoxide Emissions from LDVs	
Median CO Concentration	0.09%
Maximum CO Concentration	14.36%
Average Mean CO Concentration	0.65%
Number of LDVs with 1% or Less CO Emissions	14,003 (83%)
These Vehicles Contributed 20% of the Total CO Measured.	
Number of LDVs with Greater Than 3% CO Emissions	1,268 (8%)
These Vehicles Contributed 57% of the Total CO Measured	

Table 2: Summary for Individual Testing Sites in Edmonton

#	Site Type	Site (could be the same location)	# of LDVs	Median CO Concent'n	% Clean LDVs (CO≤1%)	Clean LDVs % CO Contrib'n	% Gross Emitter LDVs (CO>3%)	Gross Emitter LDVs % CO Contrib'n	% LDVs < MDL (CO≤0.05%)
1	O	River Rd near Victoria Park	1,348	0.10	87.3	30.8	4.3	39.6	36.2
2	A	Whitemud Fwy near Terwillager Rd	2781	< MDL	85.1	14.1	6.0	55.7	60.4
3	A	Terwillager Rd from Whitemud Fwy	1,661	0.06	90.4	31.7	4.0	45.5	41.0
4	IC	94th St. S of 23rd Ave	475	0.10	86.1	23.4	4.4	46.7	34.3
5	R	111 St S of 40th Ave	716	< MDL	87.3	10.5	5.6	57.7	75.6
6	IC	99th St. S of 22nd Ave	1,365	0.10	85.9	27.1	5.1	44.3	39.5
7	IC	149th St S of 131 Ave	321	0.15	76.6	12.3	13.1	70.2	28.0
8	IC	Neil Crawford Ctr (66th Ave & 113 St)	631	0.20	75.9	13.3	11.1	64.8	28.2
9	A	149th St from Whitemud W	2,483	0.17	79.0	17.6	8.7	56.8	30.6
10	R	50th St N of 103rd Ave	1,011	0.09	77.3	10.7	12.5	72.0	44.8
11	R	84th Ave E of 34th St	705	0.23	70.1	9.2	18.0	75.4	32.6
12	R	132nd Ave E of 83rd St	580	0.34	67.9	10.7	15.7	67.8	29.5
13	A	Yellowhead Tr & St. Albert Tr	1,088	0.15	82.4	25.1	5.3	41.7	33.4
14	A	Yellowhead Tr & St. Albert Tr	1,856	0.13	83.0	21.6	6.5	51.0	32.1

Legend:

Site Type:

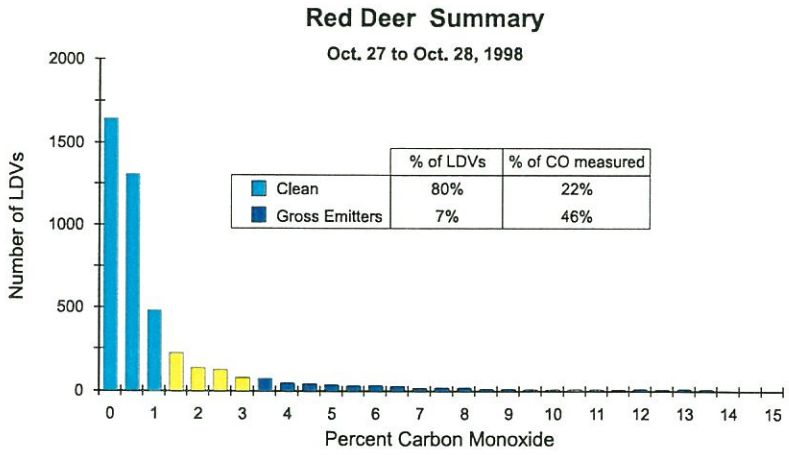
A - arterial IC - industrial/commercial O - other
R - residential S - shopping mall
MDL - minimum detection limit of 0.05% CO

4.2.3 Red Deer

The ROVER was in Red Deer for two days and during this time the ROVER monitored vehicles at 3 testing sites. These results are presented in Figure 5.

It is estimated that the 80% clean vehicles contributed 22% of the total CO measured while the 7% gross emitters contributed 46%.

Figure 5: Red Deer Summary



Number of Monitoring Sites	3
Total Number of Vehicles Observed	4,423
Number of Light Duty Vehicles (LDVs)	4,245 (96%)
Number of Other Vehicles (Trucks, Motorcycles, etc.)	178 (4%)
For Carbon Monoxide Emissions from LDVs	
Median CO Concentration	0.14%
Maximum CO Concentration	13.64%
Average Mean CO Concentration	0.65%
Number of LDVs with 1% or Less CO Emissions	3,415 (80%)
These Vehicles Contributed 22% of the Total CO Measured.	
Number of LDVs with Greater Than 3% CO Emissions	282 (7%)
These Vehicles Contributed 46% of the Total CO Measured	

Table 3: Summary for Individual Testing Sites in Red Deer

#	Site Type	Site (could be the same location)	# of LDVs	Median CO Concent'n	% Clean LDVs (CO≤1%)	Clean LDVs % CO Contrib'n	% Gross Emitter LDVa (CO>3%)	Gross Emitter LDVs % CO Contrib'n	% LDVs < MDL (CO≤0.05%)
1	A	Taylor Drive and 49th St	1,216	0.24	76.1	19.7	8.9	48.8	23.5
2	IC	49th Ave turnabout at 60th St	356	0.20	75.5	17.5	9.6	53.8	30.0
3	IC	67th St W of 30th Ave	2,673	0.06	83.1	22.1	5.2	43.9	46.5

Legend:

Site Type:

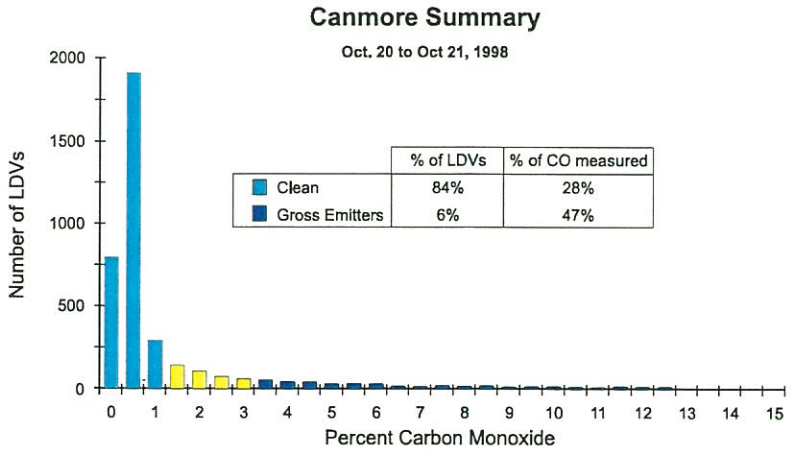
A - arterial IC - industrial/commercial O - other
R - residential S - shopping mall
MDL - minimum detection limit of 0.05% CO

4.2.4 Canmore

The ROVER was in Canmore for two days and during this time the ROVER monitored vehicles at 3 testing sites. The results are presented in Figure 6.

It is estimated that the 84% clean vehicles contributed 28% of the total CO measured while the 6% gross emitters contributed 47%.

Figure 6: Canmore Summary



Number of Monitoring Sites	3	
Total Number of Vehicles Observed	3,727	
Number of Light Duty Vehicles (LDVs)	3,550 (95%)	
Number of Other Vehicles (Trucks, Motorcycles, etc.)	177 (5%)	
For Carbon Monoxide Emissions from LDVs		
Median CO Concentration	0.14%	
Maximum CO Concentration	12.03%	
Average Mean CO Concentration	0.62%	
Number of LDVs with 1% or Less CO Emissions		2,976 (84%)
These Vehicles Contributed 28% of the Total CO Measured.		
Number of LDVs with Greater Than 3% CO Emissions		221 (6%)
These Vehicles Contributed 47% of the Total CO Measured		

Table 4: Summary for Individual Testing Sites in Canmore

#	Site Type	Site (could be the same location)	# of LDVs	Median CO Concent'n	% Clean LDVs (CO≤1%)	Clean LDVs % CO Contrib'n	% Gross Emitter LDVs (CO>3%)	Gross Emitter LDVs % CO Contrib'n	% LDVs < MDL (CO≤0.05%)
1	IC	Railway Ave near Towncentre	777	0.11	80.6	15.4	8.8	61.6	31.5
2	A	Benchland Tr to Hwy 1	259	0.11	80.7	15.5	9.7	61.9	24.7
3	R	Benchland Tr E of Hwy 1	2514	0.10	85.0	27.9	5.0	42.3	18.8

Legend:

Site Type:

A - arterial IC - industrial/commercial O - other
R - residential S - shopping mall
MDL - minimum detection limit of 0.05% CO

4.2.5 *Observations*

The surveys conducted in the four municipalities showed that while there is slight variation in the results, the findings were very similar, and any variations observed were not statistically significant.

As noted previously there is a "grey area" that is defined as those vehicles whose emissions are tested at greater than 1% and less than 3% CO. Essentially, the results have focussed on the clean versus gross emitters, however, this grey area should not be overlooked. In the Overall Summary for Alberta, this grey area accounted for 12% of the total vehicles tested. In Calgary, Edmonton, Red Deer, and Canmore, these figures are 11%, 9%, 13%, and 10%, respectively.

The table in Appendix E represents a cumulative interpretation of all the data collected at the sites tested in Alberta.

4.3 Summary by Site Type

Table 5 provides information by site type. Data are presented by the following categories: arterial, residential, industrial/commercial, shopping malls, and "other." For example, with respect to arterial roads, this represents a grouping of all arterial sites in the four municipalities.

Table 5: Site Type Summary

	Arterial	Residential	Industrial/ Commercial	Shopping Malls	"Other"
No. sites	18	9	8	2	3
No. LDVs	22994	8022	7420	931	2816
No. LDVs ≤ 1%	18,741 (81%)	6,473 (81%)	5,996 (81%)	828 (89%)	2,385 (85%)
Contribution of total CO measured from Clean Vehicles	20%	21%	20%	35%	28%
No. LDVs > 3%	1,797 (8%)	640 (8%)	578 (8%)	24 (3%)	159 (6%)
Contribution of total CO measured from Gross Emitting Vehicles	54%	54%	55%	29%	45%
Median CO concentration	0.11%	0.13%	0.12%	0.04%	0.11%
Average CO concentration	0.70%	0.74%	0.71%	0.31%	0.53%

This table shows that there is not much variation between the arterial, residential, and industrial sites. Shopping malls and "other" showed the most variation from the other three categories, but this could be due to the small number of shopping sites tested.

4.4 Other Emissions

ROVER attempted some collection of NO_x and HC data; however, the equipment capability (i.e. lack of ultraviolet spectrum) precluded NO_x information. It is possible that new versions of the ROVER equipment might be able to measure this. Some HC measurements were acquired but the sensitivity threshold for data acceptance was set very high. This rendered the data almost non-applicable except for extreme gross emitters.

4.5 Vehicle Occupancy and Heavy Duty Vehicles (HDVs)

This section describes results obtained for observations made for light duty vehicle occupancy, and the percentage of heavy duty vehicles in the traffic flow. These data were obtained at each site by visual observations of vehicles passing each location - 10 surveys of 18 observations each randomly spaced through the monitoring period at each site.

4.5.1 Light Duty Vehicle Occupancy

Table 6 gives average LDV occupancy results obtained for each municipality. The vehicle occupancy rates observed in each municipality are generally similar to those found in other urban areas in Canada. For example, the average value found in the ROVER surveys done in Ontario in 1998, in the Greater Toronto and Hamilton - Wentworth regions was 1.30.

The results also give an indication of how average vehicle occupancy varies in each municipality. It is noticeable that the City of Edmonton has lower vehicle occupancies compared to the other municipalities. This may partly result from the more diverse location of employment opportunities in Edmonton, with less opportunity for work-related trip car-pooling.

Table 6: Summary of Municipality LDV Occupancy Results

Municipality	Light Duty Vehicle Occupancy	% Driver Only
Calgary	1.32	73%
Edmonton	1.19	82%
Red Deer	1.28	76%
Canmore	1.38	70%

However, the results found may not be totally representative of the actual overall vehicle occupancy in each community. In urban areas it is well known that vehicle occupancy varies with trip purpose.

Occupancies for work trips and business-related trips are generally lower than for trips made for other purposes such as shopping or personal recreation. These type of trips are made at specific times of day, and are generally concentrated on commuter routes and roads serving commercial/industrial areas. Each municipality had different combinations of site types and time of day of survey, which will lead to differences in observed average occupancy.

The caution about the representativeness of the vehicle occupancy data found during the ROVER project is illustrated by comparing these results with those from other sources. For example, data collected in the Edmonton 1994 Household Travel Survey shows that the overall Edmonton average daily light duty vehicle occupancy is around 1.4. This contrasts with the 1.19 average vehicle occupancy figure found from the ROVER site surveys in Edmonton.

4.5.2 Percentage of Heavy Duty Vehicles

Table 7 gives a municipal summary of heavy duty vehicles observed. As noted previously, for the ARP, Heavy Duty Vehicles (HDVs) were defined as: "Vehicles, that unladen, weigh in excess of three (3) tons and are used primarily for commercial use. Among this type of vehicle are transit and school buses, transport and delivery trucks, mobile construction equipment, and panel vans and pick-up trucks being used for business purposes. Motorcycles were also placed in this category."

Table 7: Municipal Summary of HDVs Observed

Municipality	Total No. of Vehicles Observed	No. of HDVs/Other	%HDVs
Calgary	18046	517	3%
Edmonton	18439	1468	8%
Red Deer	4423	178	4%
Canmore	3727	177	5%
Total	**44635**	**2340**	**5%**

The results show that the average percentage of heavy duty and other vehicles in the traffic flow varied from 3 - 8%.

These percentages are again consistent with those found in other urban jurisdictions. It is difficult to make direct comparisons with data from other surveys because definitions of what constitutes a heavy duty vehicle often vary. In Edmonton, for example, an unladen weight limit of 4.5 tons has traditionally been used in traffic monitoring surveys to define truck movements.

Edmonton is seen to have a higher average of heavy duty vehicles in its traffic flow, than the other municipalities. Variations in results between municipalities may well reflect the differing types of sites surveyed, as discussed below.

In urban areas, the percentage of heavy duty vehicles in the traffic flow is site-specific; dependent on the nature of the traffic served by the particular roadway being surveyed. Roadways serving commercial / industrial areas will have greater use by trucks than roadways serving residential areas. In addition, a key consideration is whether the roadway is designated as a truck route as part of the truck route system for the municipality. On designated truck routes, unrestricted truck movements are allowed. If the roadway is designated as a "non-truck" route, trucks are only allowed to use the roadway for delivery purposes in the immediate vicinity.

5. Comparison with Ontario

A comparison between Alberta and Ontario results shows that for both jurisdictions, a majority of the vehicles are running clean and that a small percentage of the vehicles are responsible for the majority of the emissions tested. In Alberta, the overall results showed that 81% of LDVs can be considered clean with 7% considered gross emitters. Using the same benchmarks, Ontario tested 85% of LDVs as clean with 5% testing as gross emitters.

Ontario's results show that it has a slightly higher percentage of clean vehicles than Alberta. However, within the category of clean vehicles, Alberta results show that the clean vehicles are "really clean" with over 1/3 showing no measurable amount of CO (i.e. CO<0.05%). In comparison, with the clean car category, only 1/4 of Ontario's vehicles tested show no measurable amount of CO.

Another difference between Alberta and Ontario is revealed in a comparison of gross emitting vehicles where 7% of Alberta's LDVs are responsible for 54% of CO emissions measured while in Ontario approximately 5% of the LDVs tested contributed 40% of the CO emissions measured.

There are a number of possible explanations for the difference between Ontario and Alberta. With respect to gross emitting vehicles, Alberta has a higher percentage than Ontario (7% versus 5%). Possible explanations for this difference could be due to differences between the provinces in vehicle fleet age, level of tampering with vehicle emission control systems, and driving conditions. For example, a comparison of vehicle fleet age between Ontario and Alberta shows that the Alberta fleet is on average a year older than the Ontario fleet (see Appendix B).

6. Conclusions

The findings of the four week Alberta ROVER Project are summarized as follows:

a) Remote sensing technology was successfully applied in the four municipality study in Alberta.

b) Findings of this project were generally consistent with other jurisdictions who have done similar testing. That is, approximately 10% of vehicles were found to be responsible for 50% of the overall vehicle emissions measured. Furthermore, the results also reflect the 80/20 rule, that 80% of the CO measured comes from 20% of the vehicles tested.

c) Alberta results indicated that for the vehicles tested, 7% of gross emitting vehicles were responsible for 54% of CO emissions. In comparison, the 81% clean vehicles produced only 18% of CO emissions.

d) Twelve percent of the vehicles tested were not categorized as either clean or gross emitting. This is because there are uncontrolled aspects of remote sensing that make it difficult to determine if the vehicle is actually a gross emitter or whether it is simply other mitigating conditions such as driving habits, road conditions, and meteorology.

e) Thirty-seven percent of the vehicles had no measurable amounts of CO (i.e. less than 0.05% CO).

f) The median CO emissions in the four-municipality Alberta test was 0.11% CO. This will serve as the best measurement of central tendency and in turn, a baseline for Alberta's in-use vehicle emissions profile.

g) The results were very similar among the four municipalities where measurements were taken; any variation between municipalities was not statistically significant.

h) The majority of LDVs observed in each municipality had only one occupant.

i) A survey of vehicle occupancy that was conducted during the ARP showed that the overall occupancy rate was 1.29 persons per vehicle.

j) Public awareness and interest in vehicle emissions was evident. The ARP was very well received by the municipalities, the media, and the public.

k) The ROVER technology may have merit as part of a program for monitoring individual vehicle emissions and identifying gross emitters.

Appendix A: VEIDT Recommendations to the CASA Board of Directors March 18, 1999 - APPROVED

As illustrated in the findings of the Alberta ROVER Project report, a majority of Alberta vehicles tested clean. However, there is a minority percentage of vehicles that is responsible for a disproportionate amount of vehicle emissions. The findings of this project have lead the Vehicle Emissions Implementation Design Team to make the following recommendations:

1. A snapshot of vehicle CO emission characteristics has been established. Remote sensing has proven to be an effective method of collecting this data. Therefore, CASA should continue to look into this method of testing and repeat it in three to four years to assess changes to the base profile. In addition, CASA should look at testing for additional pollutants (e.g. NO_x, total hydrocarbons) at that time.

2. While this report defines gross emitters (i.e. greater than 3% CO emissions) it is unknown as to exactly why they are emitting at high levels. Possible reasons are lack of maintenance, tampering with vehicle control system, or equipment failure. Identifying route causes for gross emitters should be considered in future work.

3. The evidence shows that there is potential for reducing emissions by targeting the gross emitter, and initially, programs that focus in this area may be more cost-effective than a program that targets all vehicles. On the basis of targeting the worst offenders, the following actions are recommended:

    a) Investigate mechanisms for eliminating visible gross emitters.
    b) Investigate the legislative option to address tampering of vehicle emission systems; which in many instances will convert a clean vehicle into a gross emitter.
    c) Promote programs that remove older vehicles from the road (Scrappage), or that encourage regular maintenance (Smog Free), and smart vehicle purchase and operations (Auto$mart).

Appendix B: Ontario Smog Rover Program - Summers of 1997 and 1998

During the summer of 1997, only vehicles along the 400 Series Highways in southcentral Ontario were examined by the Smog Rover. From information acquired during 27 different monitoring periods, valid CO data were acquired from 20,666 LDVs that had passed through the optical beam of the Smog Rover. Of these vehicles, 22% had CO emissions that were below the Smog Rover's detection limit of 0.05% (or 500 ppm_v (parts per million by volume)) Furthermore, almost 85% of these vehicles had CO emissions less than or equal to 1%. For the remaining LDVs, 5.5% were considered poorly-tuned gross emitters with CO exhaust emissions greater than 3%. It is estimated that the LDVs whose emissions were less than or equal to 1% CO contributed an estimated 25% of the total CO measured during these periods and the poorly-tuned vehicles contributed 46%. From visual surveys that were conducted concurrently with the emission gathering, only the driver was present in 7 out of every 10 light duty vehicles travelling along the 400 Series Highways.

In 1998, the Smog Rover investigated vehicles in a variety of different settings randomly chosen within the Greater Toronto and the Hamilton-Wentworth region. These sites were classified as being either a shopping mall, a quiet residential street, a rural road, a company parking lot, a special event, or an on-ramp to a 400 Series Highway. During 70 different monitoring periods, valid CO data were acquired from 43,637 LDVs which had passed through the Smog Rover's optical beam. Of these LDVs, 24% had CO emissions that were below the Smog Rover's detection limit. Furthermore, an estimated 86% of these LDVs had emissions less than or equal to 1% CO and these vehicles contributed approximately 29% of the total CO measured during this time. For the remaining LDVs, an estimated 4.5% were deemed to be poorly-tuned and these contributed an estimated 41% of the total CO measured. From the visual surveys, 75% of the LDVs contained only the driver.

In summary, for the estimated 64,300 LDVs measured during the past two summers in Ontario, 20% to 25% of the vehicles were very well tuned with no measurable amounts of CO being recorded. These emissions were less than the minimal detection limit (0.05% CO) of the Rover's remote sensor. Furthermore, an estimated 85% of these vehicles had emissions less than or equal to 1% CO and 5% were found to emit more than 3% CO. For the LDVs that emitted more than 3% CO, these poorly-tuned vehicles contributed an estimated 40% to 45% of the total CO measured during these studies. This observation is in-line with the original Ontario Ministry of Transportation work of the early 1990s in which they found that 10% of their vehicles contributed 50% of the total CO emissions.

Upon examining the cumulative effects of the number of light duty vehicles monitored and the resulting percentage of carbon monoxide measured, it was found that 80% of the light duty vehicles contributed approximately 20% of the measured CO or conversely, 20% of these vehicles contributed 80% of the CO emissions.

For clarity, these results are presented in the following table.

Light Duty Vehicles (LDVs)						
Year	Number of LDVs	%LDVs <MDL (0.05%CO)	Less than or equal to 1.0% CO		Greater than 3.0% CO	
			% LDVs	% CO Contrib'n	% LDVs	% CO Contrib'n
1997	20666	22%	85%	25%	5.5%	46%
1998	43637	24%	86%	29%	4.5%	41%
Summary		≈20 to 25%	≈85%	≈25 to 30%	≈5%	≈40 to 45%

Some other Ontario observations:

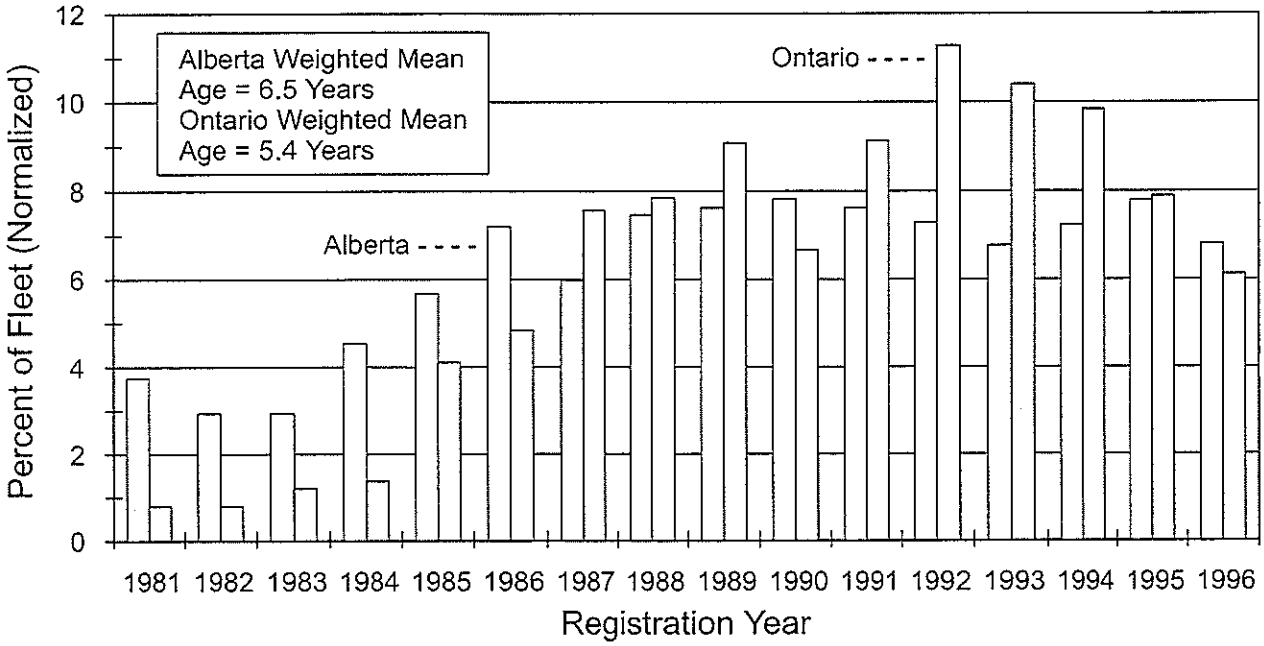
- For poorly-tuned light duty vehicles, there is a significant difference in the percentage found on rural roads and those on on-ramps; and between special events and those at shopping malls, rural roads or quiet residential streets.
- One statistically significant observation made was that company employees like to drive to work by themselves. Their occupancy rate of 1.16 people per vehicle was significantly different from the norm of 1.30 people per vehicle. However in general, people on the Ontario highways like to travel alone as 70 to 80% of all observed passenger cars contained only the driver.

The Smog Rover program is part of the Ontario Ministry of the Environment's anti-smog communications campaign.

The following graph illustrates the comparison of light duty vehicle fleet age between Alberta and Ontario. This information was provided by the Ontario Clear Air Pilot Program Age Distribution.

Light Duty Vehicles - Fleet Age

Alberta versus Ontario - 15 years



Appendix C: Communications (Media Kit and Articles)

Clean Air Strategic Alliance

Event Notice

What: Provincial launch ceremonies for Clean Air Strategic Alliance ROVER (Roadside Optical Vehicle Emissions Reporter) program

Where: City Room, Edmonton City Hall,
Main Floor, 1 Sir Winston Churchill Square (103A Avenue and 100 Street)

When: 9:00 a.m. to 9:30 a.m.
Wednesday, October 7, 1998

Who: Program supported by Alberta's Clean Air Strategic Alliance, Alberta Environmental Protection, Alberta Transportation and Utilities, Canadian National Railways, The City of Calgary, and The City of Edmonton

Officials: Honorable Ty Lund, Minister, Alberta Environmental Protection
His Worship Bill Smith, Mayor, City of Edmonton

Notes: The ROVER will begin its Edmonton emissions testing on October 7. An announcement of the first testing location will be made at the launch event

A news release will be sent to this fax number by 9:00 a.m., October 7. It will also be available, with background material, at the event site.

Clean Air Strategic Alliance, 9th Floor, 9940 - 106 Street, Edmonton, Alberta T5K 2N2
Phone: (403) 427-9793 Fax: (403) 422-3127 E-mail: casa@incentre.net

News Release

Clean Air Strategic Alliance

October 7, 1998

For Immediate Release

ALBERTA WELCOMES ONTARIO ROADSIDE VEHICLE EMISSIONS "ROVER" MONITOR

EDMONTON – East will meet West this fall, along roadsides across Alberta. As part of a joint venture between the Ontario Ministry of the Environment and Alberta's Clean Air Strategic Alliance, vehicle emission measurements will be collected from major thoroughfares in Calgary, Canmore, Edmonton, and Red Deer. The monitoring equipment is operated from a specially designed van called a ROVER (Roadside Optical Vehicle Emissions Reporter), capable of determining total daily vehicle output, as well as output per vehicle.

"This ROVER van allows us to collect *in-use vehicle-specific* carbon monoxide and carbon dioxide data," says John Torneby, Operations Manager for Alberta Environmental Protection's Air Issues & Monitoring Branch. "The infra-red beam and digital recorder it uses will give us a great snapshot of the vehicle emissions profile of our city roads."

The van will arrive in Edmonton, via Canadian National (CN) Railways from Ontario, on Wednesday, October 7, and a provincial launch and testing will take place that day. It will then commence testing in Calgary on October 13, in Canmore on October 20, and in Red Deer on October 27. It will complete its testing, and return to Ontario, on November 5.

– more –

Clean Air Strategic Alliance, 9th Floor, 9940 - 106 Street, Edmonton, Alberta T5K 2N2
Phone: (403) 427-9793 Fax: (403) 422-3127 E-mail: casa@incentre.net

ROVER program, ADD ONE

"This initiative will improve our knowledge of urban vehicle emission levels," Alberta Environmental Protection Minister Ty Lund says. "By understanding the contribution of specific sources, such as vehicles, we can design programs that efficiently *target* those sources that significantly contribute to air quality issues. These actions, in turn, can help Alberta cities avoid the problems related to poor air quality that have developed in other parts of the world."

The results of the ROVER can be used to test statistics found elsewhere, that state 10 per cent of vehicles create 50 per cent of vehicle emissions. If similar results are found in Alberta, the need to support programs that offer tune-up or scrappage incentives will be clearer for the stakeholders considering those options. Supporters for the program include Alberta Environmental Protection, Alberta Transportation and Utilities, CN Railways, The City of Calgary, and The City of Edmonton.

"The Ontario Ministry of the Environment is pleased to share the ROVER with Albertans," Norman W. Sterling, Ontario Minister of the Environment says. "Air quality is an important health issue, and one that knows no boundaries. Information sharing across provincial borders is vital to ensuring clean air for all of us."

###

For more information, please contact: Mike Kelly, CASA, 427-9793; Dave Reynolds, Calgary, 268-4699; Don Kochan, Canmore, 678-1504; Wayne Wood, Edmonton, 496-2812; Bryon Jeffers, Red Deer, 342-8162

Clean Air Strategic Alliance

ROVER Schedule

Location of the ROVER on the first day of testing at each municipality:

Edmonton:

Provincial and Edmonton Launch:
Date: Wednesday, October 7, 1998
Time: 9:00 am
Place: City Room, Edmonton City Hall
Main Floor, 1 Sir Winston Churchill Square

First Testing Site: To be announced at launch
Testing Period: October 7 - October 10, and October 29 - November 2 (weather permitting)
Contact: Wayne Wood, The City of Edmonton, 496-2812; Mike Kelly, CASA, 427-9793

Calgary:

Calgary Launch:
Date: Tuesday, October 13, 1998
Time: 10:30 am
Place: Nat Christie Park on 4th Avenue Southwest, across from Mewata Stadium (weather permitting)
(alternate location: Calgary Science Centre, 701 - 11 Street SW in the Gulf Theatre)

First Testing Site: same as launch
Testing Period: October 13 - 17, and October 22 - 24 (weather permitting)
Contact: Dave Reynolds, The City of Calgary, 268-4699

Canmore:

Canmore Launch:
Date: Tuesday, October 20, 1998
Time: 9:00 am
Place: Railway Avenue and approximately 6th Street

First Testing Site: same as launch
Testing Period: October 20 and 21 (weather permitting)
Contact: Don Kochan, Town of Canmore, 678-1504

Red Deer:

Red Deer Launch:
Date: Tuesday, October 27, 1998
Time: 11:00 am
Place: A5016 - 51 Avenue (Superstore parking lot)

First Testing Site: Near the Ross Street and Taylor Drive intersection
Testing Period: October 27 and 28 (weather permitting)
Contact: Bryon Jeffers, The City of Red Deer, 342-8162

Contact for general information on the ROVER and Clean Air Strategic Alliance: Mike Kelly, phone: 427-9793

Clean Air Strategic Alliance, 9th Floor, 9940 - 106 Street, Edmonton, Alberta T5K 2N2
Phone: (403) 427-9793 Fax: (403) 422-3127 E-mail: casa@incentre.net

Backgrounder

Clean Air Strategic Alliance

ONTARIO/ALBERTA "ROVER" VEHICLE EMISSIONS MONITOR

What is the ROVER project?
The Clean Air Strategic Alliance (CASA), including its stakeholders, is welcoming the Ontario Ministry of the Environment's ROVER to Alberta to raise public awareness around the importance of driving well-maintained vehicles. The ROVER – Roadside Optical Vehicle Emissions Reporter – contains equipment that measures carbon monoxide (CO) and carbon dioxide (CO_2) emissions from vehicles. Its function – besides measuring these levels – is to help educate and inform the public about the social, environmental and financial benefits of driving well-tuned vehicles. There will be no punitive action taken against drivers during the monitoring.

Who is CASA?
CASA, the Clean Air Strategic Alliance, is a multi-stakeholder organization consisting of government, industry, and environmental non-government organizations, who address Alberta's air quality issues through consensus decision-making. CASA stakeholders supported the creation of the Vehicle Emissions Working Group, who made recommendations to the CASA board of directors about ways to address vehicle emissions in Alberta. One of these recommendations was to develop a baseline of provincial emission levels and to see if these levels were a concern for Albertans. The ROVER will be used both to develop some of this baseline information and to promote public awareness of vehicle emissions.

How does ROVER technology work?
The emissions data is collected and analyzed in two stages. The first stage involves an infra-red beam sent across the lanes of traffic on a road. As the tailpipes from passing cars move through the beam, CO and CO_2 in the exhaust change the wavelength of the beam. The amount of change to the beam is determined by the concentrations of the two substances in each vehicle's exhaust "sample." Each sample reading is collected by an analyzer on the far side of the road, and sent back as an electronic signal to a van located several metres away from the beam source. In the second stage of the ROVER process, the signals from the analyzers are recorded and separated according to total daily levels and individual vehicle levels. Each level provides an important measure of the road's total vehicle emissions profile.

Why is Alberta using the ROVER?
CASA and its stakeholders would like to see how Alberta relates to current remote sensing statistics for vehicle emissions: Are 10 per cent of the vehicles really causing 50 per cent of the vehicle emissions? This knowledge can then be applied to support programs that target these specific sources of emission concerns; the need to get poorly-maintained vehicles tuned-up or off the road will be clearer once their individual contributions to emission levels are "proven."

-more-

Clean Air Strategic Alliance, 9th Floor, 9940 - 106 Street, Edmonton, Alberta T5K 2N2
Phone: (403) 427-9793 Fax: (403) 422-3127 E-mail: casa@incentre.net

Keep your vehicle tuned up - a poorly tuned engine can use an average of 10 per cent more fuel:

Ten common reasons vehicles fail emissions testing:

- incorrect idle mixture
- other carburetor/injector problems
- defective exhaust gas recirculation (EGR) valve
- faulty spark plugs
- defective positive crankcase ventilation (PCV) valve
- incorrect idle speed
- incorrect spark timing
- dirty air filter
- defective ignition wires
- inoperative catalytic converter

Follow this general maintenance guide:

- ☐ Bi-weekly: Check engine oil, brake fluid, radiator fluid
- ☐ Monthly: Inspect tires for wear, and check the pressure
- ☐ Every 3 months (or every 4,000 to 6,000 km): Change oil and filter - premium, multi-grade oil can improve your fuel economy by up to six per cent.
- ☐ Every 6 months (in addition to the 3-month items):
  - Minor tune-up
  - Check belts and hoses
  - Check all fluid levels
  - Replace air filter
  - Check tires for wear; rotate if needed
- ☐ Annually:
  - Inspect brakes and exhaust system
  - Tune engine fully (spark plugs, ignition wires and cap, etc.)
  - Replace fuel filter and PCV valve
  - Lubricate throttle assembly
  - Pressure-test cooling system
  - Clean battery terminals
  - Test potency of anti-freeze (-40 degrees Celsius)
  - Test battery, alternator, and charging system
- ☐ Every 2 years (or 50,000 km)
  - Flush cooling system
  - Check shocks and struts
  - Change transmission fluid and filter
  - Check tire tread depth

Sources:
Alberta Motor Association, Environment Code of Practice for Motorists
Natural Resources Canada, Auto$mart Program, Ottawa, Ontario
Ontario Ministry of the Environment
Energy Matters Hotline

NATIONAL REPORT

of the press and freedom of
n, the Leader-Post treated
wens's paid advertisement
ently than any other ad,
Lean, the newspaper's gen-
ıager, said yesterday. "We
utting our signature on any-
e. We are just providing the
of expression."
ers of the lesbian and gay
ity said Saturday's ad,
ıoted from the Bible, was
g. Mr. Owens said he placed
ı response to the homosex-
nunity's attempt to get Re-
council to proclaim July
y and Lesbian Pride Week.

WFOUNDLAND

ating gets boost

J'S. For the first time in 25
:wfoundland's credit rating
upgraded.
Dominion Bond Rating
ıas moved the province's
ı debt issues from triple-B-
› triple-B. The short-term
been upgraded from R-2
› R-2 high.
ion's latest report notes
:nt economic performance
eded expectations and that
s for improvement look
emier Brian Tobin said the
are looking at the prov-
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TISH COLUMBIA

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PM reaches out to Romanow

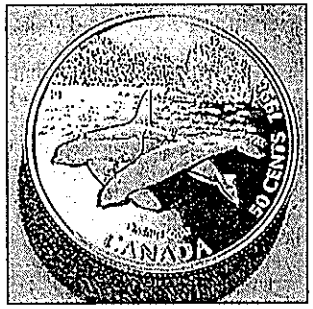
OTTAWA. Prime Minister Jean Chrétien, bearing an olive branch in a long-running dispute over social-program spending, will head for Saskatchewan this week to confer with Roy Romanow, the chairman of the provincial premiers conference.

"It's an important signal that we're open to finding solutions on some of these outstanding issues with the provinces," a federal official said, insisting on anonymity. "We're approaching it with an open mind."

Mr. Chrétien's office announced yesterday that the Prime Minister and Premier would meet over the noon hour tomorrow in Saskatoon, before Mr. Chrétien attends a Liberal Party event. There was no official word on the agenda, but sources said the main topic would be the stalled federal-provincial talks on a "framework agreement for Canada's social union."

Mr. Romanow's office later confirmed that but said other items would be up for discussion. The get-together will give the two a chance to chat before the annual conference of the premiers scheduled for the first week of August, a spokesman in Regina said.

STAMPS & COINS



VANCOUVER. Royal Canadian Mint officials went to the killer-whale pool at the Vancouver Aquarium yesterday to unveil a new series of sterling-silver coins, featuring killer, humpback, beluga and blue whales.

The coins are .925 parts silver and .075 parts copper, and weigh 9.3 grams. "Visitors from around the world come to Canada for whale watching," mint president Danielle Wetherup said. "Our coins show the grace and beauty of these majestic animals."

The whale designs were done by Quebec wildlife artist Pierre Leduc, a biologist who has also been commissioned to create 15 paintings for Canada Post Corp. The coins, with a face value of 50 cents, are on sale for $19.95 each or $59.95 for a set of four.

knife to cut off some of his hair, which baptized Sikhs wear long as a religious requirement. The attackers fled after the victim's friend summoned help.

QUEBEC

Bus-crash victim dies

Consolation Lake, 70 kilometres northeast of Yellowknife.

Meanwhile, strong, shifting winds removed the fire threat from Stewart Crossing, Yukon, yesterday but increased it for the North Klondike Highway.

ALBERTA

Beaming in on polluting cars

RED DEER. Those gas-guzzling polluters that leave hazy clouds of exhaust along Alberta's highways could soon be exposed by infrared technology.

A clean-air group wants to bring a specially designed van to Red Deer this fall that can detect the amount of carbon dioxide and carbon monoxide being emitted by other vehicles.

The van, nicknamed Rover, measures the tail-pipe emissions of cars and light trucks, said Mike Kelly, executive director of the Clean Air Strategic Alliance. Equipment in the van, which is owned by the Ontario government, casts an infrared beam across lanes of traffic. Each time a vehicle drives through the beam, Rover can read "very accurately" certain pollutants, he said.

RCMP look for woman on run

FORT McMURRAY. RCMP are looking for a Gregoire Lake woman after her common-law husband was stabbed in the shoulder blade and buttocks early Sunday.

Police learned of the assault after the man was taken to Northern Lights Regional Health Centre, where he was reported in stable condition. He had been stabbed with a large kitchen knife.

ONTARIO

will "help make the fishing experience for salmon and trout anglers even more satisfying on Lake Ontario," said John Snobelen, Ontario's Natural Resources Minister.

The ministry will monitor the catch through its fisheries-assessment and enforcement programs to make sure the stocks are not overfished.

Charges laid over lumber

ORILLIA. Five men have been charged with operating a lumber scam that defrauded several businesses of more than $7-million.

The men, all from southern Ontario, operated a lumber company in Bancroft and Richmond Hill and purchased large quantities of high-grade hardwood for use in floors and other products but failed to pay for the wood after it was delivered, the Ontario Provincial Police said in a statement yesterday.

Police said at least 35 victim suppliers have been located in Ontario, Quebec and the United States.

ET CETERA

Smack in the line of duty

LONDON, Ont. A provincial police officer was recovering from minor injuries Sunday after he used his cruiser — with him in it — to stop a car travelling the wrong way on Highway 401.

London Constable Randy McNaught nursed a sore finger and a "stiff and achy" body after he stopped the disoriented vehicle by colliding with it head-on. The car was driven by an 82-year-old London woman who was not injured in the crash.

Today

Red Deer Advocate

Van sniffs out polluting vehicles

By LANA MICHELIN
Advocate staff

Those gas-guzzling polluters that leave hazy clouds of exhaust along Alberta's highways could soon be exposed by infrared technology.

A clean air group wants to bring a specially designed van to Red Deer this fall which can read exactly how much carbon dioxide and carbon monoxide is being emitted by other vehicles.

The van, named Rover, measures the tailpipe emissions of cars and light trucks, explains Mike Kelly, executive-director of the non-profit group, CASA (Clean Air Strategic Alliance).

The Rover, to be borrowed from the government of Ontario, will test a theory that presumes 10 per cent of vehicles create half of the traffic pollution.

"I've even heard that it's more like 20 per cent causing 80 per cent (of pollution)," said Kelly, who also plans to do random vehicle exhaust testing in Edmonton, Calgary and Canmore.

The way the van works is relatively simple, (unless its complex technology is analyzed in detail).

The Rover is parked by the side of a road.

Kelly said equipment in the van casts an infrared beam across lanes of traffic.

Each time another vehicle drives through the beam, the Rover can read "very accurately" certain pollutants, said Kelly.

He suspects the biggest four-wheel polluters could be old-model cars, designed before catalytic converters and other emissions-reducing technology was routinely installed.

But newer cars can also be to blame if owners don't get them properly tuned, said Kelly. "The spark plugs might not be clean or the timing's not right" — leading the car to burn gasoline inefficiently.

The point of the research is not to single out certain cars or owners. Kelly stressed that no passing vehicle will be approached, regardless of its pollution readings.

But the results will reveal whether a few cars are causing the bulk of traffic pollution, and whether different sized communities share the same problem.

Through this knowledge, "we hope to raise public awareness," said Kelly.

The project backed by CASA, Alberta Transportation, Alberta Environmental Protection, and the four municipalities involved, shouldn't cost a lot. Kelly said CN Rail is prepared to ship the Rover free of charge.

The biggest problem could be its availability. Kelly said smog is causing so much concern in Southern Ontario this year, that the province's environment department is having a hard time letting the Rover go, even for a short while.

While CASA hopes to start emissions research in Alberta by mid-September, Kelly said it might have to be rescheduled for later in the year.

CHASE

MEDIA MONITORING

Tracking List

TO:

Date: 07/10/98
Time: 5:00 PM
Station: A Channel
Duration: 0:00:41

Program: Live at Five

Information: A Smog rover is on Edmonton streets looking into vehicle emissions. It will leave Saturday and the data collected will be used to show how we measure up to the rest of North America.
Clip Bill Smith
Ron Bell

Date: 07/10/98
Time: 5:30 PM
Station: CITV
Duration: 0:00:38

Program: Live at 5:30

Information: A Smog rover is on Edmonton streets looking into vehicle emissions. The data collected will be used to show how we measure up to the rest of North America.
Clip Ty Lund

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This rover is top dog at sniffing out pollution

ASHLEY GEDDES
CIVIC AFFAIRS WRITER

Edmonton

A new smog buster is monitoring exhaust fumes spewing from the tailpipes of cars and trucks on city streets.

But drivers needn't worry about pollution penalties. There will be no fines, even if your rarely tuned rust-bucket tops the emissions scale.

The so-called Smog Rover is merely gathering information, which may be used to design clean-air and maintenance-education programs sometime in the future.

Rover, which stands for Roadside Optical Vehicle Emissions Reporter, is a white van filled with equipment to measure carbon monoxide and carbon dioxide emissions.

The $20,000 project is funded by the city, the provincial government and the Alberta Clean Air Strategic Alliance, a group of public and private organizations with an interest in the environment.

The Rover was borrowed from the Ontario government to be used on a trial basis. Edmonton was chosen as the first Alberta community to try out the equipment.

Vehicles on River Valley Road were monitored during a three-hour period Wednesday afternoon.

Other major thoroughfares will be monitored over the next two days and again between Oct. 29 and Nov. 2.

The Rover will also visit Calgary, Canmore and Red Deer over the next few weeks.

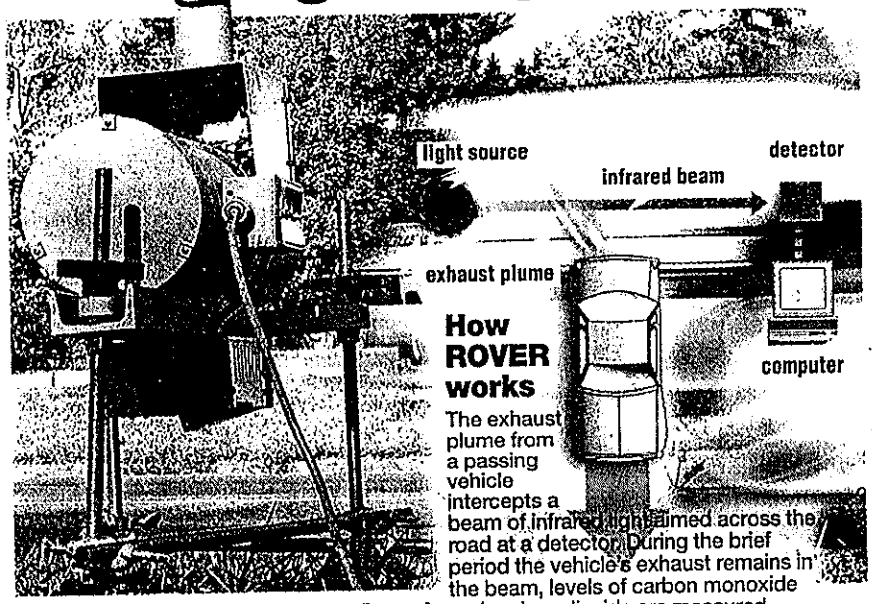
"We don't have a major smog problem in the province," Environment Minister Ty Lund said at Rover's unveiling ceremony Wednesday at city hall. "But we do know that on certain days there is a problem."

A report from the David Suzuki Foundation released Tuesday said 200 to 300 Edmontonians die each year from diseases and conditions caused by air pollution. Fossil fuels were cited as the main culprits.

The Rover sends an infrared beam across the road. As a vehicle's tailpipe moves through the beam, exhaust emissions change the beam's wavelength. The changes are analysed, recorded and displayed on a computer screen.

Mike Kelly, executive director of the clean air alliance, said an estimated 10 per cent of vehicles create 50 to 60 per cent of smog emissions. A badly tuned vehicle can give off up to 60 times the emissions of a well-tuned car or truck.

Results of the Edmonton tests should be made public by the end of the month, he said.



Chris Schwarz, *The* **Journal**

Rover in action Wednesday

Edmonton Journal Oct 8/98

THASE
WS MONITORING
EARCH & ANALYSIS
LICITY SERVICES

Edmonton Sun
Circ: 74,542
Thursday, October 8, 1998
Page: 33

Laser will finger polluting vehicles

The province and a local environmental group will test your tailpipe for unwelcome emissions this month with a new tool borrowed from Ontario.

The Alberta government and the Clean Air Strategic Alliance will test vehicles in Edmonton, Calgary, Red Deer and Canmore with a roadside laser device to see what type of smoke local cars are blowing.

Environmental Protection Minister Ty Lund unveiled the $20,000 pilot project at Edmonton City Hall yesterday, saying it will show Albertans how much pollution their cars create.

"Perhaps out of this, we can convince the public that it pays to keep your engine in tune," he said.

Lund's own Ford Explorer passed the test.

CASA executive director Mike Kelly said similar studies in Ontario and elsewhere suggest that more than 50% of automobile emissions are actually spewed out by 10% of the vehicles on the road. One of the aims of the project is to see if that's the case in Alberta as well, he said.

The equipment will be on Edmonton streets until Saturday and again from Oct. 29 to Nov. 2 before it's shipped back to Ontario.

Calgary Herald
Circ: 117,291
Tuesday, October 13, 1998
Page: B4

Roadside sniffer in Calgary today

CALGARY HERALD

A high-tech van using infra-red beams to track down pollution will be unveiled in Calgary today.

The Roadside Optical Vehicle Emissions Reporter (ROVER) will be in Calgary through Saturday testing the amount of carbon monoxide and carbon dioxide emitted through tailpipes of passing vehicles.

Results from the ROVER equipment will raise awareness about the amount of vehicle-related air pollution coming from poorly maintained vehicles and help educate Calgarians about the social, environmental and financial benefits of driving well-tuned vehicles.

The preliminary Calgary test results will be issued after Oct. 24.

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Calgary Herald
Circ: 116,267
Wednesday, October 14, 1998
Page: B2

SMOG DETECTOR

Mayor Al Duerr, left, checks out the Roadside Optical Vehicle Emissons Reporter (ROVER) Tuesday with Blair Kidney, senior environmentalist with the Smog Rover team. the vehicle is in the city testing cars for carbon monoxide and carbon dioxide.

Dean Bicknell, Calgary Herald

CHASE
NEWS MONITORING
RESEARCH & ANALYSIS
PUBLICITY SERVICES

Calgary Sun
Circ: 98,775
Wednesday, October 14, 1998
Page: 23

Hi-tech ROVER sniffs smog

Roadside emission reporter smoking out offenders

By MICHAEL PLATT
Calgary Sun

There's something rotten on the streets of Calgary, and the city is using rays of infra-red light to stop it.

Sounding more like science fiction than city planning, Calgary's latest pollution-fighting plan includes a smog-detecting van which measures car exhaust with beams of invisible light.

Called ROVER — Roadside Optical Vehicle Emissions Reporter — the van's infra-red equipment is aimed at passing vehicles, and can instantly tell if the car is spewing pollutants, such as carbon monoxide, into the air.

"We're not just looking at old cars — a '76 Nova tuned-up to run properly is not part of the problem," said Mike Kelly, executive director of Clean Air Strategic Alliance, which co-sponsored the $20,000 ROVER program.

Rented from the Ontario government, it's hoped that ROVER will prove to Albertans that 10% of cars are responsible for up to 60% of pollution.

"We'll attempt to identify the number of vehicles involved and find out just how big a problem this is," said Dave Reynolds, a spokesman with the city's environmental services.

Reynolds said Calgary's booming population has brought the problem to the forefront of environmental issues.

"With more cars coming into the city, it means more junkers and those vehicles are doing the most harm," he said.

No tickets will be issued by ROVER and no licence numbers will be recorded.

The figures compiled by the white van — ROVER is expected to target 20,000 city cars over the next two weeks — will be compared and combined with those gathered in Edmonton, Red Deer and Canmore.

The results will be made public and Reynolds said he hopes certain drivers can take a hint.

Calgary Sun
Circ: 98,775
Tuesday, October 20, 1998
Page: AL 4

Rover sniffs out trouble

By PAUL WELLS
Calgary Sun

Get tuned-up, Calgary — Rover will soon be on the loose.

And this Rover hopes to take a bite out of Calgary's vehicle emission levels.

Or, at the very least, sniff out data on how well Calgarians keep their vehicles tuned-up.

As part of a joint venture between the Ontario Ministry of the Environment and Alberta's Clean Air Strategic Alliance (CASA), vehicle emission measurements will be collected on busy roads and highways throughout the province, including those in and around Calgary, Edmonton and Red Deer.

And the tool of choice in collecting the data will be a specially-designed van called a Rover (Roadside Optical Vehicle Emissions Reporter), which is equipped with technology allowing it to determine total daily vehicle output, as well as output per vehicle.

"This Rover van allows us to collect in-use, vehicle-specific carbon monoxide and carbon dioxide data," said John Torneby, operations manager for Alberta Environmental Protection's air issues and monitoring branch.

"The infrared beam and digital recorder it uses gives us a great snapshot of the vehicle emissions profile of our city roads."

Dave Reynolds, an environmental co-ordinator for the City of Calgary and a representative on CASA, says data collected by Rover will give city officials a better idea on how well Calgarians maintain their vehicles and, conversely, the impact on the environment.

"It will be interesting to see the results of the smog Rover test," Reynolds said.

"It will help give us a rough idea of how many vehicles are out of tune."

And make no mistake, keeping your vehicle in-tune can make a difference to the environment, Reynolds said.

"Vehicle emissions account for not quite half of all emissions which are generated (in Calgary)," he said. "People have to be conscientious enough to keep their vehicles running as clean as possible."

The Rover began its testing in Calgary on Oct. 13. The results will be made public later this month or in early November.

CHASE
NEWS MONITORING
RESEARCH ANALYSIS
PUBLICITY SERVICES

Canmore Leader
Circ.: 3,255
Tuesday, October 27, 1998
Page: A13

Canmore vehicles get clean bill of health

ROVER tests emissions on Railway Avenue, Benchlands Trail

BY DAVE WHITFIELD
REPORTER

By and large, vehicles owned by Canmore residents received a clean bill of health — environmentally speaking — last week.

On Oct. 20-21, a ROVER (Roadside Optical Vehicle Emissions Reporter) tested 3,500 vehicles for levels of carbon monoxide (CO) and carbon dioxide (CO2) as vehicles drove through an infra-red beam.

"Most people think you can go by how a vehicle looks, but that's not the case... the difference is in the maintenance."

— Blair Kidney, ROVER opeator

The ROVER, part of an Alberta-Ontario and Clean Air Strategic Alliance vehicle pollution study, tested vehicles on Railway Avenue, Benchandlands Trail and on the TransCanada Highway off-ramp at Benchlands.

Besides locations in Ontario, the ROVER tested vehicle pollution emissions in Calgary, Edmonton, Canmore and Red Deer.

"CO is probably the best indicator of engine performance," said ROVER operator Blair Kidney of the Ontario Ministry of the Environment. "Generally, an engine giving off less than one per cent CO is a well-maintained one."

Watching vehicles drive up Benchlands Trail, Wednesday (Oct. 21) some surprises were immediately evident. Vehicles under load (uphill) gave a better sampling than those coasting downhill.

For example — a small, four-cylinder Suzuki Samarai 4X4 which would be looked upon by most people as a non-polluter counted .49 per cent, while a full-size Dodge pickup 4X4 with a V-8, generally regarded as a gas-guzzling unit, was .52 per cent.

A motorhome chugging its way up the trail rated 1.07, while a three-ton dairy products delivery truck was a clean. 42 per cent.

"Most people think you can go by how a vehicle looks," said Kidney, "but that's not the case. I've had 18- to 20-year-old vehicles go by that passed and nearly new ones that failed, and failed miserably. The difference is in the maintenance."

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NEWS MONITORING
RESEARCH ANALYSIS
PUBLICITY SERVICES

Canmore Leader
Circ.: 3,255
Tuesday, October 27, 1998
Page: A13

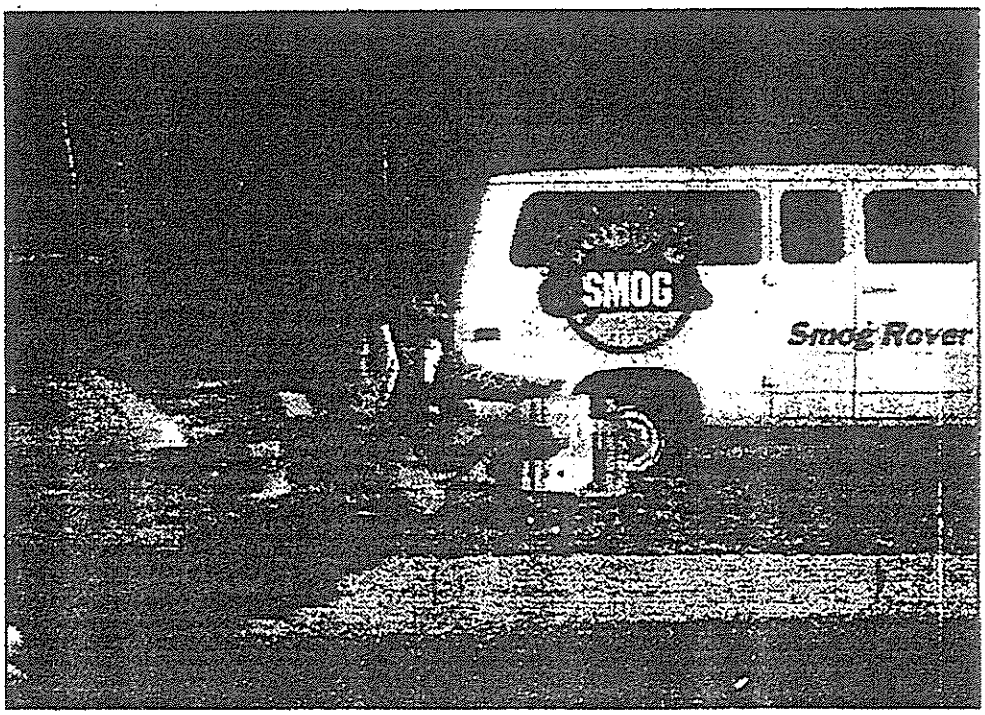


PHOTO BY DAVE WHITFIELD

Ontario Ministry of the Environment ROVER operator Blair Kidney calibrating infra-red unit on Benchlands Trail last Wednesday (Oct. 21).

Red Deer Express
Circ:
Wednesday, October 28, 1998
Page: 15

Air quality to be monitored

BY LEA HILSTROM
Staff writer

A continuous air quality management system in Red Deer may be fully operational by the end of the year if technical staff is found.

"What's basically holding it up is getting people in place," said Ryan Cromb, an information officer with Alberta Environmental Services.

The Red Deer Environmental Advisory Board requested earlier in the year that the system be in place for the purpose of monitoring air quality for pollutants such as dust and smoke, carbon monoxide and dioxide, ammonia, and oxides of nitrogen.

Peter Innes, chairman of the Environmental Advisory Board in Red Deer, said according to the latest REACT plan and survey, Red Deer residents see air quality as a top priority.

"There's not any really major concerns with air quality in Red Deer," Innes said. "Certainly we hear personal complaints about environmental issues like backyard burning, smoke and dust but there's nothing alarming that we know about."

Continuous monitoring equipment provides nearly instantaneous measurements of ambient concentrations of carbon monoxide, carbon dioxide, dust and smoke, nitrogen dioxide, nitric oxide, ammonia, ozone, sulphur dioxide, total hydrocarbons, and inhalable particles.

Currently, continuous monitoring stations are at three locations in Calgary and Edmonton. Red Deer would be the first Central Alberta continuous air quality management system.

Concentrations of each pollutant are averaged over a one-hour time interval, recorded, and archived, said Innes.

The Index of Quality of the Air is a system developed to provide the public with a meaningful measure of the outdoor air quality. It determines whether the air quality is good, fair, poor, or very poor.

With a system in Red Deer, residents will have access to what pollutants are in the air and indications of what effects the pollutants have on soil, water, and human well-being.

By converting concentrations of five major air pollutants to a single number and a matching description, the public is readily able to understand the air quality.

A rating of 0-25 indicates good air quality, 26-50 is fair, 51-100 is poor, and more than 100 is very poor.

The categories reflect the maximum desirable, acceptable and tolerable levels specified by the National Air Quality Objectives.

According to the report on Guidelines for the Index of Quality of the Air printed in 1993 by Environment Canada, a rating of 25 corresponds to the federal maximum desirable level, a rating of 50 corresponds to the federal maximum acceptable level, and a rating of 100 corresponds to the federal maximum tolerable level.

"It gives everyone a better idea of what's in the air and how the levels change. The province has different levels of each pollutant depending on what activity is more abundant in that area," said Cromb.

For example at 11 a.m. on Monday, Oct. 26, Calgary downtown reported a rating of good with the highest pollutant being ozone rated at 9.

Calgary east reported a good rating with ozone at 11 and the west end reported a good rating with ozone at 18.

For the same time and date, Edmonton central reported a good rating with nitrogen dioxide at 10, the east reported a good rating with dust and smoke at 13 and the northwest reported a good rating with the highest level of pollutant being ozone at 10.

CHASE
NEWS MONITORING
RESEARCH & ANALYSIS
PUBLICITY SERVICES

Red Deer Advocate
Circ: 19,756
Wednesday, October 28, 1998
Page: B1

Exhaust levels measured

By CAMERON KENNEDY
Advocate staff

Where there's smoke, there's pollution — maybe.

ROVER (Roadside Optical Vehicle Emissions Reporter) will measure exhaust emissions at high-traffic locations over the next two days.

"Red Deer does not have an air quality problem," says Bryon Jeffers, director of development services. "But by continuing to raise awareness about vehicle emissions, we can help ensure that Red Deer does not develop a problem in the future."

The project is a joint venture between the Ontario Ministry of the Environment and Alberta's Clean Air Strategic Alliance. In addition to Red Deer, ROVER will test vehicle emissions in Edmonton, Calgary and Canmore.

ROVER measures emissions with a passive beam of light that straddles the road. When a vehicle breaks the beam, a computer measures the energy variations created by the vehicle's exhaust. The equipment can test one vehicle every half a second.

A "clean" vehicle releases less than one per cent carbon monoxide in its exhaust. Vehicles which produce more than one per cent require maintenance.

"We are just giving drivers something to think about," says Blair Kidney, senior environmentalist with the ROVER team. "We don't chase them down or issue tickets, or anything like that."

Kidney will submit ROVER's Red Deer results to the city next week. A provincewide report should be available by the end of December.

What governments do with the final report, Kidney says, really depends on the location and attitude of communities.

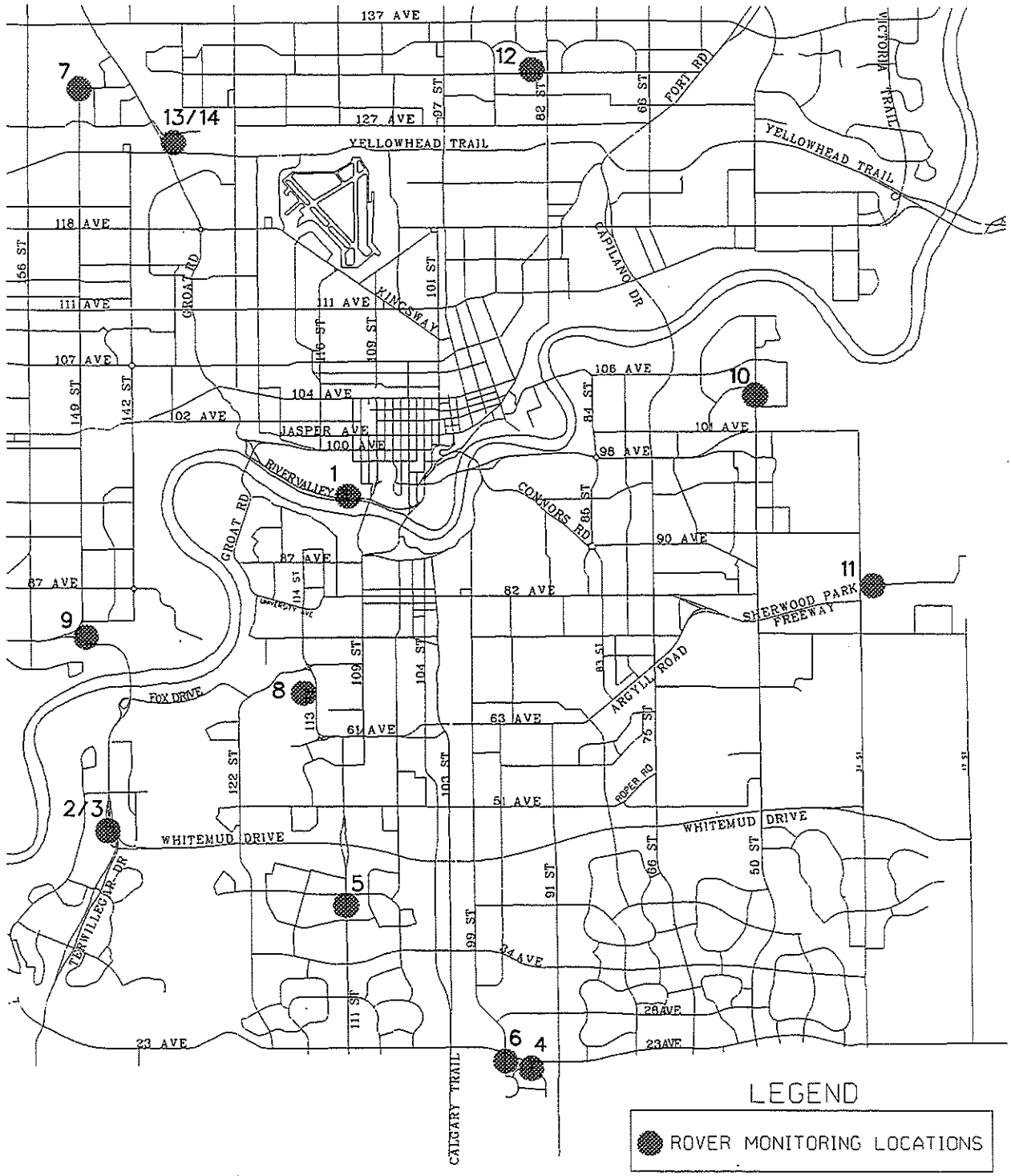
British Columbia and Ontario, for example, have mandatory maintenance programs that require drivers to test their vehicle every two years.

Councillor Morris Flewwelling says Red Deer residents have a positive environmental attitude and are prepared to control vehicle emissions.

"People have become very environmentally aware," says Flewwelling, pointing to the success of the city's recycling program. "Public support would be translated into political support for emission control. Now that might lead to extra expense but I think our people are ready for that."

Another option, Jeffers adds, is to cut emissions voluntarily, before governments introduce regulations. Warming up the car for less than three minutes in winter, following posted speed limits and using car pools or public transportation all help reduce vehicle emissions, says Jeffers.

EDMONTON ROVER SITES

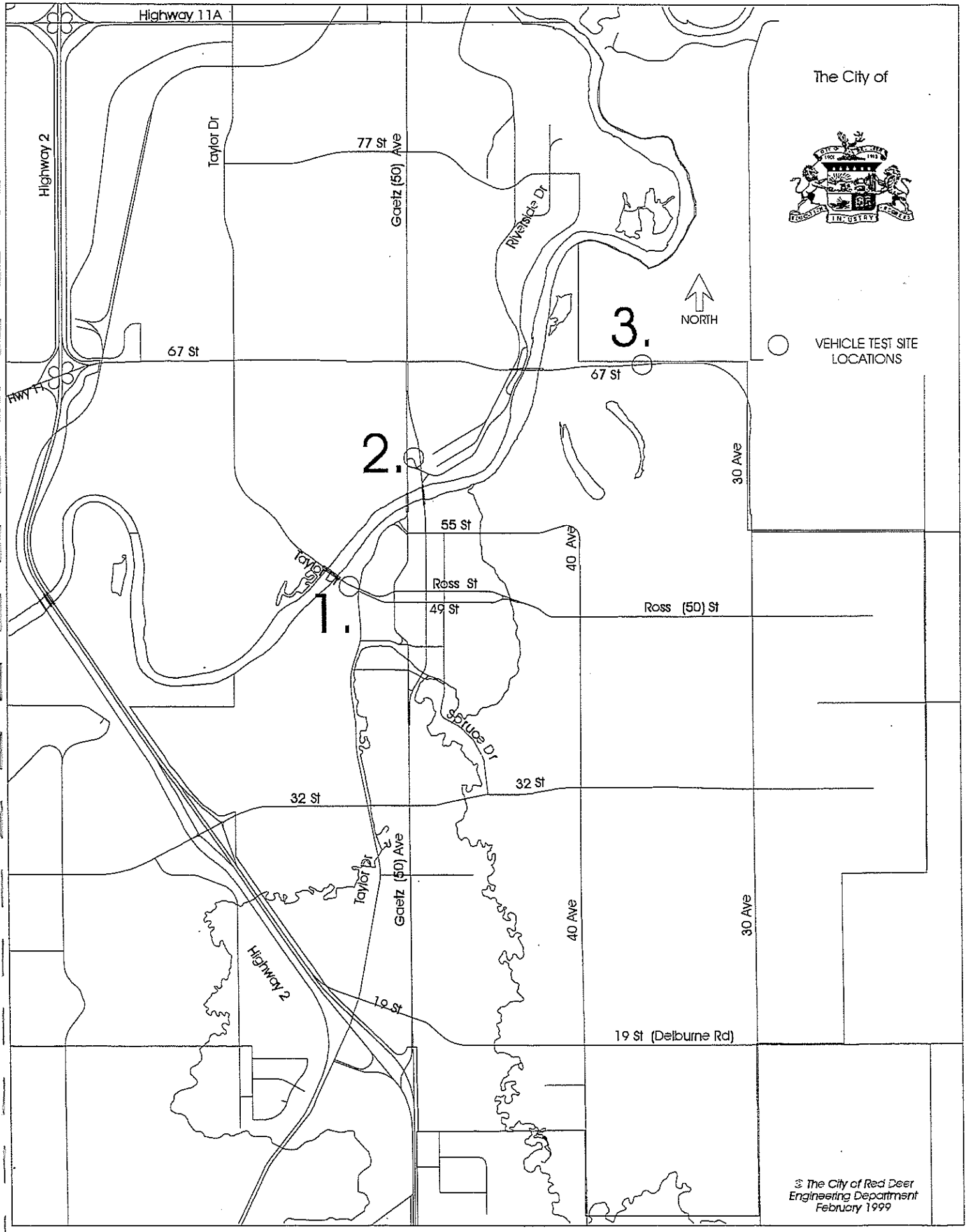


LEGEND

ROVER MONITORING LOCATIONS

JANUARY 6, 1999 ROVER.DGN

THE CITY OF Edmonton TRANSPORTATION & STREETS


Highway 11A
Highway 2
Taylor Dr
77 St
Gaetz (50) Ave
Riverside Dr
The City of
NORTH
3.
VEHICLE TEST SITE LOCATIONS
67 St
Hwy 11
67 St
2.
30 Ave
55 St
40 Ave
Taylor Dr
Ross St
49 St
Ross (50) St
1.
Spruce Dr
32 St
32 St
Taylor Dr
Gaetz (50) Ave
40 Ave
30 Ave
Highway 2
19 St
19 St (Delburne Rd)
© The City of Red Deer
Engineering Department
February 1999

Explanatory Notes for "Alberta Summary 1998 - Cumulative Integration Chart"

Definitions:

% CO - Percentage of CO registered by the monitoring equipment

LDV - number of light duty vehicles tested

Integration - cumulative sum of number of LDVs multiplied by the midpoint range of vehicle emissions

Cumulative % # LDVs - the cumulative percentage of light duty vehicles

% cumulative CO - the cumulative percentage of CO

This table represents a cumulative interpretation of all the data collected and would be read as follows:

- First row: Of the 42,295 LDVs tested during the ARP, 15,557 had measurements less than the minimum detection limit (MDL) of the ROVER. In other words, 36.8% had no measurable CO emissions.

- Sixth row: 1528 LDVs had CO emissions greater than 0.4% CO but less than or equal to 0.5% CO. Cumulatively, 72.2% of all LDVs tested had tailpipe emissions less than or equal to 0.5% CO and collectively, these vehicles contributed 9.2% of the CO measured.

- Thirty-second row: 142 LDVs had CO emissions greater than 3.0% CO but less than or equal to 3.1% CO. Cumulatively, 92.8% of all LDVs measured had tailpipe emissions less than or equal to 3.1% CO and collectively, these vehicles contributed to 46.3% of all the CO measured. Or alternatively, 7.2% of all LDVs tested had tailpipe emissions greater than 3.0% CO and collectively, these vehicles contributed 53.7% of the CO measured.