

Clean Air Research Fund

Status Report - 2001

Clean Air Research Fund Steering Committee

March 2002

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1. Introduction

Since the inception of the BC Clean Air Research (CAR) Fund at the end of 1995, the fund has been utilized for two programs, BC Scrap-It and Clean Air Research. From the outset half of the fund has been available to the BC Scrap-It pilot program for retirement of old high-polluting motor vehicles. From 1997 contributions have been made from the fund to a number of research projects on air quality in the Lower Fraser Valley and other areas of the province. The “*Clean Air Research Fund Status Report- 1997-1999*” of July 2000 and “*Clean Air Research Fund Status Report- 2000*” dated November 2001 provided summaries of the activities supported by the fund from the beginning to the end of the year 2000. This report summarizes the projects funded from the CAR Fund in the year 2001. It provides brief descriptions and the status of the BC Scrap-It program and various research proposals considered for funding during this period.

2. Clean Air Research Fund History

In December 1995, the Canadian Petroleum Products Institute (CPPI) and BC Ministry of Water, Lands and Air protection (WLAP, formerly Ministry of Environment, Lands and Parks), signed an agreement on CPPI funding for two specific programs. While the BC Scrap-It Program is a program which provides incentives to scrap old, high-polluting motor vehicles, the Clean Air Research Program is for research projects on air quality issues in the Province with a particular focus on transportation and fuels. Under the agreement, CPPI is committed to contribute up to a maximum of \$500,000 per year for a total of \$2.5 million over the 5-year period (1996-2001), and the total annual amount is to be split between the two programs. The agreement was amended in December 1997 to include the Greater Vancouver Regional District (GVRD) as another party to the agreement. The CPPI funding members are Chevron Canada, Husky Oil, Imperial Oil, Petro-Canada and Shell Canada. Unless otherwise agreed by the Parties, \$250,000 per year will be dedicated to support clean air research on air quality issues during the 1997-2001 period. The Clean Air Research Fund (CARF) is managed by a Steering Committee consisting of one representative from each of CPPI, WLAP and GVRD.

As the original CARF was due to expire at the end of 2001, the Parties agreed in March 2001, to continue the Agreement until “... *the full commitment of \$2.5 million has been expended or committed.*” Hence the Fund will continue to be used for air quality research projects and the BC Scrap-It Program beyond the year 2001.

3. Clean Air Research Fund Program Achievements in 2001

As in previous years, the CAR Fund was used to support both the BC Scrap-It Program and a number of research projects in 2001. The achievements of these financial contributions are described in the following sections.

3.1 BC Scrap-It Program

The BC Scrap-It Program was launched as a pilot project for retirement of old high-emitting vehicles in 1996 by WLAP in the Lower Mainland and Victoria. The program funding

partners included the CPPI, BC Hydro, Vancouver and Victoria Regional Transit Commissions and BC Automotive Dealers Association (BCADA). WLAP, GVRD, and AirCare provided additional in-kind support to the program. The pilot program was operated from April 1996 to November 1998, and 955 vehicles of 1983 or older high-polluting vehicles were scrapped. The vehicle owners were offered incentives, such as transit pass and cash toward the purchase of lower-emitting new or post-1988 used vehicles, to have their vehicles scrapped and recycled.

Based on the experience of the pilot program, in November 1998 the Scrap-It program was expanded to the owners of 1987 or older vehicles. Since 1999 the program has been funded by the CPPI, Translink, Insurance Corporation of B. C. and the BCADA. WLAP, GVRD, and AirCare (now Pacific Vehicle Testing Technologies) have continued their support for the program. The choice of incentives for the vehicle owners participating in the program was also widened to include cash payments towards purchase of new natural gas vehicle, bicycle and van-pooling. More than 800 vehicles were scrapped between November 26, 1998 and December 31, 2000. Nearly 600 vehicles were approved for scrapping and nearly 400 scrapped during the year 2001. The vehicle owners opted for: 151 transit passes, 10 West Coast Express passes, cash for 164 new and used less-polluting vehicles, 1 vanpool, and 29 bicycles.

The CPPI paid \$150,000 towards the program in the year 2001, which brought the total CPPI contributions to the Scrap-It since 1996 to \$688,550. Environment Canada has agreed to provide an annual contribution of \$60,000 in fiscal years 2001-2002 and 2002-2003, and some of these funds will be applied to the 2001 operating budget.

The major benefits accrued from the Scrap-It program have been a cost-effective reduction in vehicular emissions and an increased public awareness about alternatives to the use of old high-polluting vehicles. The estimated reductions in emissions of hydrocarbons (HC), nitrogen oxides (NO_x), carbon monoxide (CO) and carbon dioxide (CO₂) from recycling and replacement of old vehicles during the pilot and expanded phases of the program are provided below. These estimates are based on the findings in the August 1997 study, "Evaluation of the Scrap-It Pilot Program", one of the projects funded from CAR Fund.

Estimated Emission Reduction Benefits of the Scrap-It Program

Program Phase	Reduction in Contaminant and Greenhouse Gas Emission, tonnes			
	HC	NO _x	CO	CO ₂
Pilot	164	43	1,173	7,691
November '96 - December '00	143	39	1,254	7,762
January '01 – December '01	67	18	509	3,230

Note: Assuming 13,010 km/yr distance driven for 3 years, the remaining life of the scrapped vehicle.

Source: *Scrap-It Program Administration Office, February 5, 2002.*

On the basis of the pilot program evaluation, the Scrap-It program has been found to be cost-effective, about \$2, 177 per tonne of 'emission' reduced. The 'emission' in this context refers to the contaminants with smog-forming potential, and calculated as (HC + NO_x + CO/7). The

cost-effectiveness of greenhouse gas reduction was estimated to be \$130/t of CO₂, indicating that the program is not currently cost-effective when considered only in terms of these gases.

3.2 Clean Air Research Fund Contributions

In the year 2001, about \$68,000 was paid from the CAR Fund towards the completed and on-going projects. This amounted to nearly \$318,000 in contributions from the CAR Fund to various projects during 1997-2001. The funding committed towards remaining on-going projects and proposals approved-in-principle by the end of 2001 amounts to about \$162,000. Accordingly, the total contributions from CAR Fund expended and committed towards various research projects, and the fees paid to the CAR Fund coordinator, to date amount to nearly \$500,000. The estimated total value of all projects co-funded from the CAR Fund is approximately \$10.4 million, which includes the budgets for three major projects namely Ethanol BC (\$7.4 million), Pacific 2001 (\$1.4 million) and Canadian Synthetic Diesel Fuel Testing (\$635,000). The total value of all other projects which have been completed, in-progress and approved-in-principle amounts to approximately \$892,000.

3.3 Clean Air Research Program Achievements

Proposals submitted to the Steering Committee for CAR funding are required to meet the following eligibility criteria:

- (1) research projects should be on air quality issues relevant in B. C. and in particular on issues related to transportation and fuels;
- (2) in general, funds will not be available solely for capital equipment purchases, on-going programs or staff salaries and benefits;
- (3) generally the funding will be limited to a maximum of one-third of the total project cost, with an annual maximum of \$50,000 or 20% of the fund for any single project;
- (4) payments will be made either in installments according to approved project deliverables or in full upon project completion.

Typically no projects will be funded in advance, and all three Steering Committee members must approve a project. Preference will be given to projects of immediate priority or relevance, and to those co-funded by other partners.

Five new proposals for financial support from the CAR Fund were received in 2001, bringing the total proposals received since 1997 to 35. Of the five new proposals, the funding was approved for three, one was approved-in-principle and one was not approved. Three of the approved projects are currently in-progress. Two proposals approved-in-principle in 2000 still remain so, pending submission of revised proposals. In 2001, a proposal considered in 1999 was rejected for funding, and two proposals submitted in 2000 were withdrawn. In addition, in October 2001 approval was given for funding a training session on a new model for estimation of on-road motor vehicle emissions.

As shown in Table 1, one planning project from a university student was completed in July 2001.

Table 1: Projects Completed in 2001
(Completed projects during 1997-2001 in parenthesis)

Project Proponent	Project Type				
	Basic Research	Applied Research (Study & Assessment)	Planning	Pilot Demonstration Program	Other
University - Academic - Student	(2)	(1)	1 (2)		
Business and Industry		(3)			
Government agencies		(5)	(2)		
Non-governmental Organizations					

The completed project along with its key findings is described below. The status of (i) projects in-progress, (ii) projects approved-in-principle, (iii) proposals not approved, and (iv) proposals deferred or withdrawn at the end of 2001 is summarized in Tables 2 and 3. These projects and proposals are outlined, along with their status, in Section 4. The special funding approved in 2001 for funding of a training session is also described briefly in Section 4.5.

3.3.1 Project Completed in 2001

“Improving Behavioural Parameters in Transportation Modelling in B. C. and Canada”

Project Lead/Sponsor

School of Resource and Environmental Management, Simon Fraser University sponsored this research project for a graduate thesis work. WLAP was CAR Fund Steering committee Contact.

Project Goal and Objectives

The primary goal of the project was to identify the mode choice response of single-occupant vehicle drivers in the Lower Mainland of B. C. to certain transportation demand management (TDM) measures. A quantitative survey was used to address the key data gaps and to use the results as an aid in policy makers’ abilities to evaluate TDM measures for air pollution reduction.

Project Funding

CAR Fund – \$8,000.
Other Partners – Environment Canada - \$8,000, and WLAP - \$8,000
Total - \$24,000

Contractor

Kevin Washbrook, Graduate Student, School of Resource and Environmental Management, Simon Fraser University

Approval Date

The project was approved by Steering Committee in November 2000.

Completion Date and Status

Original completion date of May 2001 was extended to July 2001. Final report is dated July 30, 2001.

Key Results

The commuters from Ladner and Tsawwassen were selected for the study, and a telephone presurvey was used for a follow-up mail survey of 650 qualified respondents. The experiment was used to measure preferences of commuters among three modes of travel, namely driving alone, carpooling and riding a 'hypothetical' express bus to and from work. The survey responses were analyzed statistically to determine 'elasticities of probability' of different responses for fuel, parking and road charges. The results appear to under represent 'the true elasticities of demand for driving alone in response to road and parking charges in the region' The results may be biased due to several possible reasons. Further study using a 'mode choice simulator' to determine market shares of the travel modes has been recommended.

**TABLE 2: Clean Air Research Fund
Research Projects - In-Progress at the end of 2001**

Project Title	Project Proponent/ Sponsor	CARF Steering Committee Contact	Project Application Date and			Project Funding (\$)					Project Progress Status		Comments
			Application Date	Project Start Date	Project Completion Date	Total Proposed	CAR Funding Requested, Approved and Paid			Other Partner Funding	Interim Report	Final Report	
							Requested	Approved	Paid				
<i>Projects In-Progress</i>													
1 Development of a Fine Particulates Model for Lower Fraser valley - Phase II	Environment Canada	GVRD	February 1998	Fall 1997		150,000	50,000	50,000	45,000 in September 1999	GVRD - 50,000 Env. Can. - 50,000	January 1999, June 1999		CAR Fund amount is used primarily for Phase II. Project delayed and \$5,000 is withheld pending completion.
2 Ethanol BC - Process Development Program	The University of B. C.	BC WLAP	March 1999		March 2005	7.4 million over 5 yrs.	100,000 at 20,000/yr. for 5 yrs.	20,000/yr for 5 yrs.	20,000 in May 2000 and 20,000 in April 2001	Various amounts from federal and provincial governments and several private sectors.	November 2000, May 2001, October 2001		The project is currently an initiative of the provincial Green Economy Secretariat. Capital cost is \$2.5 million, and operating cost is \$4.9 million. A Steering Committee has been formed and several supplementary projects have been approved in 2001.
3 Canadian Synthetic Diesel Fuel Testing Project - Phase 2	CPPI	CPPI	June 2000	Late 2000	Summer 2002	635,000 (in 2000-2001)	15,000 in 2000-2001			7 potential partners will contribute.	April 2001, September 2001		CAR funding was approved in the 4th Quarter. The project is on-going.
4 Ambient and Personal Exposure Levels of Fine Particulate Matter (PM _{2.5}) Throughout the Prince George Airshed	The University of Northern B. C.	BC WLAP	October 2000	September - October 2000	Summer 2002	55,000	10,000	10,000		Various amounts from federal and provincial governments and several universities in cash and in-kind.	April 2001		CAR funding was approved in December 2000. The project is on-going.
5 Ammonia Measurements - Pacific 2001 Field	Env. Can. (to be undertaken by S. Pryor, Indiana University)	CPPI	January 2001	August 2001	June 2002	(Total budget for Pacific 2001 research projects is \$1.4 million)	54,780 (for this proposal only)	50,000	30,005 in December 2001	None for this particular project; but several partners are contributing towards the total cost of Pacific 2001.	August 2001, November 2001		Field work was done in August-September 2001 as a part of "Pacific 2001" intensive measurement program in the LFV.
6 Tunnel Study Pacific 2001 - Effects of Fuel and Lubricant Quality on Vehicle Emissions. Fuel Analysis.	Env. Can. (Lisa Graham)	CPPI	January 2001	August 2001	Summer 2002	(Total budget for Pacific 2001 research projects is \$1.4 million)	Approx. 12,000 (for this proposal only)	12,534		None for this particular project; but several partners are contributing towards the total cost of Pacific 2001.	November 2001		CPPI has incorporated its original proposal of fuel and lubricant analysis into a larger project of Environment Canada as a part of Pacific 2001 intensive air quality monitoring program in August-September 2001. Fuel analysis part of the project was done by November 2001.
7 Review of B. C. AirCare On-Road Program	AirCare Steering Committee	GVRD	May 2001	December 2001	March 2002	75,000	25,000	25,000		GVRD - 5,000, ICBC - 5,000, Env. Can. - 25,000, WLAP - 5,000, FVRD - 5,000, Pacific Vehicle Testing/TransLink - 5,000.			The project would undertake a review of BC ACORP for results from testing of heavy-duty vehicle emissions since its beginning as a pilot program in 1996 to date.

TABLE 3: Clean Air Research Fund
Research Proposals - Approved-in-Principle, Disapproved for Funding and Deferred or Withdrawn in 2001

Project Title	Project Proponent/ Sponsor	CARF Steering Committee Contact	Project Application Date and			Total Proposed	Project Funding (\$)				Project Progress Status		Comments
			Application Date	Project Start Date	Project Completion Date		CAR Funding Requested, Approved and Paid			Other Partner Funding	Interim Report	Final Report	
							Requested	Approved	Paid	Partner Fund (\$)			
Proposals Approved-in-Principle													
1 Tailpipe Emissions of Greenhouse Gases from In-Use Gasoline, Diesel and Alternative Fuelled Vehicles	CPPI	CPPI	June 2000	see comments	see comments	see comments				see comments			The project was approved-in-principle at the June 2000 meeting, and CPPI was requested to prepare a Project Proposal and hold discussions with potential funding partners. CPPI would discuss with AirCare about emissions data availability and with BC WLAP about partial funding from Climate Change Fund.
2 Cost-effectiveness of Alternative Transportation Fuels	CPPI	GVRD	June 2000	see comments	see comments	see comments				see comments			CPPI would be working with GVRD to prepare a revised Project Proposal.
3 Potential Road Dust Emissions Mitigative Measures	GVRD	GVRD	October 2001		March 2002	45,000	15,000	15,000		GVRD - 25,000 FVRD - 5,000			After confirmation of funding from partners, the Request for proposal was issued in November, 2001 with a bid closing date of December 12, 2001.
Proposals Disapproved for Funding													
1 Mitigating Climate Change Through Rideshare	Commuter Connections	BC WLAP	June 1999			181,000	Part of 25% of the total			Fed. Govt. may pay 75% of the total. Others have been requested.			The original proposal of January 2000 was reconsidered in January 2001. As the proponent had not followed up Committee's recommendation for a joint project with Translink, the proposal would no longer be considered for funding.
2 Air Emissions from the Chevron Burnaby Refinery Human Health Impact Assessment	BC WLAP (Region 2)	BC WLAP	January 2001			42,620	17,620			WLAP- 25,000. GVRD and Chevron - in-kind contribution.			The proposal was considered in January 2001; but in February 2001, CPPI advised that funding request could not be approved due to limited scope of project and the proposed methodologies.
Proposals Deferred or Withdrawn													
1 Emission Inventory of Mobile Sources	CPPI	CPPI	June 2000			100,000	10,000 - 35,000			9 potential partners identified			In January 2001, the decision was made to hold the proposal in abeyance in view of the current inventory activities at the national, provincial and regional levels.
2 Control Strategy for 1, 3 Butadiene Emission from Mobile Sources	CPPI	CPPI	June 2000										At the October 2001 meeting CPPI advised that the proposal should be considered as withdrawn, as a similar study is being conducted by a sub-group of the National Air Issues Coordinating Committee.

4. Status of CAR Funded Projects and Proposals till the end of 2001

Summaries of the year-end 2000/1 status of 14 projects and proposals under four different categories are provided below. These projects and proposals include those received in 2001, as well as those received during 1998-2000 but are still in-progress or remain as approved-in-principle in 2001. As mentioned earlier, a brief description of the special training session approved for funding is provided in Section 4.5.

4.1 Projects In-progress at the end of 2001

1. "Development of a Fine Particulate Model for the Lower Fraser Valley"– Phase II

Project Lead/Sponsor

Environment Canada, Pacific and Yukon Region is the sponsor of this two-phase project, and GVRD is CAR Fund Steering Committee Contact.

Project Goal and Objectives

The primary goal of the project is to incorporate a fine particulate matter module to an existing air quality model for ground level ozone to enable an integrated assessment of multi-pollutant effects on the air quality. Phase I of the project, completed in September 1998, recommended development of a modified model during Phase II.

Project Funding

CAR Fund – \$50,000.

Other Partners – Greater Vancouver Regional District - \$50,000, and Environment Canada - \$50,000

Total - \$150,000

(Funding Notes – CARF payment of \$45,000 was made in September 1999, and the remainder will be paid on completion of the project.)

Contractor

Systems Applications International, Inc., San Rafael, California, U. S. A.

Approval Date

The project was approved by the Steering Committee in February 1998.

Completion Date and Status

Phase I of the project was completed in September 1998. Phase II work is continuing with some delays due to problems with the meteorological model. Data from existing air quality and meteorological monitoring and emission inventory programs plus other recent information are being used to test the performance of the UAM-VPM model. Two interim progress reports on Phase II were submitted in January and June 1999, and a workshop was held in March 1999. Environment Canada has been in discussions with the consultants to resolve problems with the model development.

2. "Ethanol BC"

Project Lead/Sponsor

The University of British Columbia (UBC) leads this multi-stakeholder sponsored project under a stakeholder Steering Committee. WLAP is CAR Fund Steering Committee Contact.

Project Goal and Objectives

The primary goal of the project is to develop technology for a commercial process for production of ethanol from softwood residue and a facility in B. C. by the year 2005. The project has three major objectives – process development demonstration, development of policy recommendations and preparation of a business plan for commercialization of the process.

Project Funding

CAR Fund –\$100,000 over a 5-year period with an annual contribution of \$20,000. Other Partners – Province of B. C. - \$300,000, and various amounts of cash and in-kind contributions from Federal Government Agencies, UBC and the private sector. By the end of 2001, Environment Canada contributed \$20,000 from its Georgia Basin Ecosystems Initiative – Clean Air Action Plan, and \$120,000 from the forest products industry (Canfor, West Fraser, Weldwood and Slocan) by taking advantage of the provincial beehive burner fee rebate program.

Total estimated cost - \$7.4 million for the 5-year project duration.

(Funding Notes – CARF payment to date has been \$40,000 for the years 2000 and 2001.)

Contractor

UBC Faculty of Forestry is the primary contractor. Several sub-contractors are also to be retained for ancillary work.

Approval Date

The project was approved by the Steering Committee in July 1999.

Completion Date and Status

This is a 5-year project consisting of several components. The work on the Ethanol Process Development Unit (PDU) at UBC Faculty of Forestry is continuing. Some success has been reported in the selection of yeast for conversion of glucose sugar to ethanol. Under a contract from Ethanol BC, Ethopower has successfully completed characterization of syngas generated from woodwaste. The syngas is planned as a feedstock for ethanol production. Funding has been approved for BioOil production from woodwaste by DynaMotive Technologies. A pilot plant for the process is located at BC Research, and a commercial facility is being planned at a sawmill plant in the interior of the province in 2002. Lignol Innovations plans to develop technology for ethanol and activated lignin production from softwood residue in a pilot plant at BC Research. The company is anticipated to apply for funding in the near future.

No significant development in the on-going projects during the last quarter of 2001 has been reported.

3. *"Canadian Synthetic Diesel Fuel Testing Project – Phase 2"*

Project Lead/Sponsor

Shell Canada Products Ltd. on behalf of CPPI is leader of this two-phase project, and CPPI is CAR Fund Steering Committee Contact.

Project Goal and Objectives

The primary objective of the project is to install and operate an advanced single cylinder diesel engine to test diesel fuels produced from oil-sands and conventional crude oil.

Emissions from burning of these fuels will be measured to determine the effects of an exhaust gas recirculation (EGR) system, as well as the effects of fuel sulphur content on particulate matter emissions.

Project Funding

CAR Fund –\$15,000 approved for Phase 2.

Other Partners – National Research Council, Syncrude, CPPI, Suncor, Imperial Oil, Environment Canada, and US Dept. of Energy.

Total - \$635,000 in cash and in-kind for Phase 2.

Contractor

National Research Council, Ottawa.

Approval Date

Phase 2 of the project was approved by the Steering Committee in October 2000.

Completion Date and Status

A Caterpillar single cylinder engine was equipped with an exhaust gas recirculation (EGR) system and debugged earlier in the year. It was further tested to optimize the EGR rates to generate the desired NO_x emission level and the injection timing was adjusted to prevent overheating during one of the engine test modes. EGR rates were varied from 5 to 50%, averaging 16.5 % over the 8 test modes used. Fuel samples from Canadian refineries are being collected for evaluation to develop a proper fuel matrix. The project is scheduled for completion in May 2002.

4. “Ambient and Personal Exposure Levels of Fine Particulate Matter (PM_{2.5}) Throughout the Prince George Airshed”

Project Lead/Sponsor

Faculty of Natural Resources and Environmental Studies, University of Northern B. C. is the sponsor of the project, and WLAP is CAR Fund Steering Committee Contact.

Project Goal and Objectives

The objective of the project is to develop a detailed understanding of the relationship between ambient PM_{2.5} concentrations and actual personal exposure levels and to determine the spatial variation of these parameters within the Prince George airshed.

Project Funding

CAR Fund –\$10,000 approved.

Other Partners – National Sciences and Engineering Research Council, Science Council of B. C., Harvard School of Public Health, Univ. of B. C., WLAP, Environment Canada, Conor Pacific, Canfor and Univ. of Northern B. C..

Total - \$55,000 in cash and in-kind.

(Funding Note – CAR Funding of \$10,000 was paid in April 2001.)

Contractor

Melanie Noullett, Graduate Student, University of Northern B. C..

Approval Date

Project was approved by the Steering Committee in October 2000.

Completion Date and Status

The field component of the study and laboratory analysis of samples collected was completed by May 2001. The data are being analyzed to determine spatial variations in ambient and personal exposure levels of particulate matter within the airshed. The writing of the thesis is underway, after a delay due to family commitments. Ms. Noullett hopes to complete the final draft of her thesis by August 2002. Because of this delay, a planned Poster presentation of the preliminary results was not made at the Air & Waste Management Association Annual Conference in Orlando, Florida in June 2001. However, a paper summarizing the study will be made at the Graduate Student ASI Conference in Vancouver in March 2002, and another one in August 2002 at the International Society of Exposure Analysis conference.

5. *“Ammonia Measurements – Pacific 2001 Field Study”*

Project Lead/Sponsor

Dr. S. C. Pryor, Atmospheric Science Program, Department of Geography, Indiana University is the project leader, and CPPI is CAR Fund Steering Committee Contact.

Project Goal and Objectives

The objective of the project is to undertake ammonia sampling and measurement at different gradients at three locations in the Lower Fraser Valley during ‘Pacific 2001’ intensive air quality measurement program scheduled for August-September 2001.

Project Funding

Total - \$55,000 in cash and in-kind. CAR Fund of \$50,000 was approved, recognizing that it would form a part of all Pacific 2001 research projects costing approximately \$1.4 million.

Contractor

R. Morron, Research and University Graduate School, Indiana University.

Approval Date

Project was approved by the Steering Committee in January 2001.

Completion Date and Status

The tentative completion date for a final report on the project is scheduled for June 15, 2002. Following field experiments and sample collection during the 3rd Quarter, the activities in the 4th Quarter consisted of finalization of the analytical procedures and instrument testing and calibration protocols for collected samples of ammonia and particulates. Some samples have been analyzed, and preliminary data analysis has been made. The meteorological data obtained from two sites are being used to determine the impacts of meteorological conditions on the temporal variations in ammonia levels.

6. *“Tunnel Study Pacific 2001 – Effects of Fuel and Lubricant Quality on Vehicle Emissions. Fuel Analysis.”*

Project Lead/Sponsor

Env. Can. is the leader and sponsor of this proposal and CPPI is CAR Fund Steering Committee Contact.

Project Goal and Objectives

The initial objective of the project to determine the effects of fuel and lubrication oil quality on motor vehicle emissions has subsequently been expanded by incorporating it as a part of a larger project (Tunnel Study) of Environment Canada. CPPI worked on a revised proposal with Environment Canada and Alberta Research Council to sample and analyze gasoline, diesel and lubricants in use in GVRD at the time of the Tunnel Study for measurement of motor vehicle emissions scheduled during August-September 2001 Pacific 2001 intensive air quality monitoring program.

Project Funding

Total - \$12,000 (approximate)

CAR Fund approved was \$12,000, taking into consideration that the total cost of Pacific 2001 research projects would amount to about \$1.4 million, and no further contribution from the CAR Fund was made to that larger effort.

Contractor

Alberta Research Council is to carry out fuel sampling and analysis, and Environment Canada is the principal investigator for the entire project.

Approval Date

Project was approved-in-principle by the Steering Committee in January 2001, provided it constitutes a part of a larger Environment Canada study mentioned above

Completion Date and Status

Field experiments, measurements and collection of fuel samples were done during August 9-15, 2001. Two sets of instruments for sampling and monitoring of various contaminants and gases emitted from motor vehicles were located at the entrance and exit of the Cassiar Tunnel. Gasoline, diesel and motor oil samples were also collected during the same period for subsequent analysis. Alberta Research Council submitted its report on fuel and lubricant analysis in November 2001. The chemical analysis of nearly all collected samples of vehicle emissions has also been completed by Environment Canada. The analytical data and the remote sensing measurements done during the study period, as well as the AirCare inspection data for the vehicles travelled through the tunnel, are now being examined. Preliminary mass emission rate calculations are expected to be available in March 2002.

7. "Review of B. C. AirCare On-Road Program (ACORP)"

Project Lead/Sponsor

AirCare Steering Committee is the sponsor of this proposal, and GVRD will be CAR Fund Steering Committee Contact.

Project Goal and Objectives

The goal of the project is to review the effectiveness of the 2-year operation of the mandatory AirCare On-Road Program (ACORP), the heavy-duty vehicle emission testing program in B. C.. The primary objectives of the study will be to determine the cost-effectiveness and benefits of ACORP, to review the options for program enforcement and recovery of program costs, and to provide a critique on potential impediments to the program efficiency in reducing vehicle emissions.

Project Funding

Total - \$75,000

CAR Fund approved - \$25,000. Other partner contributions: Environment Canada - \$25,000, B. C. agencies - \$25,000 (Insurance Corporation of B. C. - \$5,000, Ministry of WLAP - \$5,000, Fraser Valley Regional District - \$5,000, Greater Vancouver Regional District - \$5,000, and Pacific Vehicle Testing Technologies/TransLink - \$5,000).

Contractor

G. W. Taylor Consulting, Ottawa.

Approval Date

Project was approved-in-principle by the Steering Committee in May 2001.

Completion Date and Status

The contract was awarded on December 14, 2001. The project is scheduled to be completed by March 31, 2002.

4.2 Projects Approved-in-Principle by the end of 2001

1. *"Tailpipe Emissions of Greenhouse Gases from In-use Gasoline, Diesel and Alternative Fuel Vehicles"*

Project Lead/Sponsor

CPPI is both the sponsor of this proposal and CAR Fund Steering Committee Contact.

Project Goal and Objectives

The objective of the project is to analyze the greenhouse gas (GHG) emissions and fuel economy of in-use vehicles and to compare these results with the expected theoretical results and the new vehicle mileage ratings. To carry out this phase of the project a correlation must be established between existing FTP (US Federal Test Procedure) results and the measurement of GHG emissions and fuel economy in gasoline, diesel fuel and alternative fuel powered vehicles. CPPI will hold further discussion with AirCare and WLAP and prepare a revised proposal.

Project Funding

The project budget and funding requirement will be determined based on the revised proposal..

Contractor

AirCare.

Approval Date

Project was approved-in-principle by the Steering Committee in June 2000.

Completion Date and Status

New project schedule is to be provided in the revised proposal.

2. *"Cost-effectiveness of Alternative Transportation Fuels"*

Project Lead/Sponsor

CPPI is the sponsor of this proposal and GVRD will be CAR Fund Steering Committee Contact.

Project Goal and Objectives

The original objective of the project was to analyze available information to determine the cost-effectiveness of alternative fuels in reducing air pollutant and greenhouse gas emissions.

However, CPPI has subsequently received feedback on the project objective from several potential funding partners, and it has become evident that reaching consensus on the scope of work would be very challenging. As it is possible to incorporate parts of this proposal into a future GVRD project on examining diesel vehicle emissions, CPPI will discuss with GVRD and prepare a revised proposal.

Project Funding

To be determined when a revised proposal is finalized.

Contractor

To be determined.

Approval Date

Project was approved-in-principle by the Steering Committee in June 2000.

Completion Date and Status

New project schedule is to be provided in the revised proposal.

3. *"Potential Road Dust Emissions Mitigative Measures"*

Project Lead/Sponsor

GVRD is both the Project Sponsor and the CAR Fund Steering Committee Contact.

Project Goal and Objectives

Road dust has been identified as a source of particulate matter (PM₁₀ and PM_{2.5}) in the Lower Fraser Valley (LFV). In the past two years GVRD conducted a program to collect and analyze road dust samples from LFV roads to determine temporal and spatial variations in road dust emissions. The objectives of the proposed study are to determine the fate of emitted road dust and control measures to reduce emission. The study will be conducted through a review of available information and by interviewing staff in the regional governments and municipalities involved in road cleaning.

Project Funding

The estimated cost of the study is \$45,000, of which \$15,000 is requested from the CAR Fund.

Contractor

The Request for Proposal will be issued and the contractor will be selected through a bidding process

Approval Date

The proposal was approved by the CAR Fund Steering Committee in October 2001.

Completion Date and Status

The anticipated date for awarding a contract is early January 2002 with a completion date of March 2002.

4.3 Proposals Rejected for Funding in 2001

1. "Mitigating Climate Change Through Rideshare"

In June 1999 Commuter Connections submitted a proposal for partial funding of a 3-year project on establishment of rideshare programs at 22 post-secondary institutions across the country, including 3 campuses in the Lower Mainland of B. C.. The estimated total budget is \$359,000, including \$103,000 worth of in-kind contribution. According to the proponent, the federal government has confirmed a payment of \$181,000. Initially a contribution of 25% of the remaining \$75,000 was requested from the CAR Fund.

However, in June 2000 the proponent requested funding of \$20,000 – 25,000. The Steering Committee reconsidered the project, and decided to advise the proponent to explore the possibility of a joint project with Translink and modify the proposal accordingly. As there has been no response from the proponent to date, it has been decided not to further consider the proposal for funding.

2. "Air Emissions from the Chevron Burnaby refinery Human Health Impact Assessment"

In January 2001 the BC Ministry of Environment, Lands and Parks, Lower Mainland Region submitted a Project Overview for CAR Funding for the above project. The project will be undertaken by the UBC Department of Occupational and Environmental Hygiene. This 1-year project will assess the potential health impact of air emissions from the Chevron Burnaby refinery and storage tank farm. The project has been developed by an Advisory Committee consisting of MELP, GVRD, Environment Canada, Simon Fraser Health Region, the City of Burnaby, Chevron and community representatives. The total estimated budget is \$42,620, excluding in-kind contributions from Chevron and several agencies. MELP will contribute \$25,000, and the remainder \$17,620 was requested from the CAR fund. GVRD and MELP supported the funding request. However, as CPPI regarded the project scope and the proposed methodologies were too limited, the funding request was not approved.

4.4 Proposals Deferred or Withdrawn in 2001

1. "Emission Inventory of Mobile Sources"

The proposal was submitted in June 2000, and had been discussed with several agencies and other potential partners. However, as GVRD, BC Environment and Environment Canada are preparing the year 2000 emission inventories, it is decided to put this project on hold until the outcome of the discussions on the formation of a CPPI-proposed Network of Centres of Excellence for the development and maintenance of emission estimation models for mobile sources are known.

2. "Control Strategy for 1, 3 Butadiene Emission from Mobile Sources"

A preliminary proposal was received in June 2000 from CPPI for developing control strategy for 1, 3 Butadiene emission from mobile sources. This contaminant is emitted primarily from motor vehicles, and it is classified as toxic under the Canadian Environmental Protection Act. However, the Emissions Projections Working Group of the National Air Issues Coordinating Committee has recently undertaken a modeling work to characterize toxic emissions from on-road motor vehicles for the period 1995-2020. The project is due to be completed by the 2nd Quarter of 2002. As a result of this study, CPPI has withdrawn the subject proposal.

4.5 Special Project - MOBILE6 Training

At the October 2001 meeting, the CAR Fund Steering Committee approved funding of about \$6,500 requested by GVRD to organize a training session on the recently released MOBILE6 model by the US EPA for estimating on-road motor vehicle emissions. The total cost for the training by Sierra Research of Sacramento, California is estimated to be approximately \$20,000, and it will be shared by other funding partners. The training on MOBILE6 is planned for some time in January 2002. It will assist staff in government agencies and other interested parties in estimating motor vehicle emissions for the year 2000 and future emission inventories.

5. Future Outlook of CAR Fund

Under the Scrap-It program nearly 2,150 old vehicles have been scrapped during the period March 1996 to December 2001, and the CPPI contribution to the program to December 2001 has been about \$688,550. The present resources allow scrapping of about 500 vehicles per year. However, this number may increase towards 1,000 if the recent Environment Canada contribution can be leveraged with other potential contributions. Although the number of scrapped vehicles is relatively low compared to the total number of vehicles used in the region, the cumulative effect of retirement of high-polluting old vehicles over the years has resulted in cost-effective incremental emission reductions in the Lower Fraser Valley. The participation in the Scrap-It program appears to depend on the types of incentives available to the owners of old vehicles and the level of public awareness. Adequate funding for attractive incentives to vehicle owners' participation is also a key to the success of the Scrap-It program.

From August 1997 to the end of 2001 nearly \$318,000 from the CAR Fund has been contributed towards a number of research projects. In the year 2001, the contribution amounted to about \$68,000. A further amount of about \$162,000 from the CAR Fund remains committed at the end of 2001 towards several projects that are in-progress and approved-in-principle. During 1997-2001 the total value of all projects already funded and committed for funding by various partners is nearly \$10.4 million. This amount includes the budgets for three major projects namely Ethanol BC (\$7.4 million over a 5-year period), Pacific 2001 (\$1.4 million) and Canadian Synthetic Diesel Fuel Testing (\$635,000). The total value of all other projects which have been completed, in-progress and approved-in-principle amounts to approximately \$892,000.

The projects funded to date consisted of basic and applied research, including pilot demonstration of technology, and collection of information for planning purposes. The study

proponents ranged from academic and students to industry and government agencies. The type of projects included:

- analysis of air quality, emissions and meteorological data,
- air quality model development,
- enhancement of emission estimation methods,
- computer model development for greenhouse gas emission assessment,
- projects to improve AirCare testing and vehicle repair diagnosis, and
- transportation demand management.

Research projects undertaken with full or partial CAR funding have resulted in significant scientific advances through improved understanding of key air quality issues, filling of important data gaps, and development of modeling tools to better forecast impacts of emission reduction measures on future air quality. Continued financial support from the CAR Fund for research on air quality issues will lead to improved understanding of the science, and development or enhancement of models and tools for data gathering and analysis. These are necessary prerequisites for formulation of appropriate air quality management strategies and policies.