

**GROWTH WITHOUT AIR POLLUTION:
VANCOUVER AND ELSEWHERE**

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Biographical Note: A leading figure in research on the health effects of air pollution, Dr. Bates has served as visiting professor at the University of California, Johns Hopkins, Harvard Medical School and other prominent universities in North America and abroad. He currently serves as an advisor to the GVRD on the air pollution problems facing the Lower Mainland of British Columbia.

There are certain human failings that we all share (and are prepared to confess to in moments of candour). One of these is an inherent laziness when we know that we should take steps to prevent things from happening -- crisis response often seems to be the most that we can manage.

The Lower Mainland knew that it had a serious air pollution problem when, on September 3rd, 1988 at 4 p.m., ozone levels in the Fraser Valley reached 212 parts per billion. Such a high level was totally unexpected. It is easy to miss such events because the highest ozone concentrations are reached some miles downwind from where the significant emissions -- mostly oxides of nitrogen from transportation -- occur. Not only is such a level of ozone deleterious to crops, but it will also adversely affect normal people. In a study of farm workers in the Fraser valley in the summer of 1993, it was shown that the ozone level (at about 70 parts per billion) was reducing their maximal lung function. (See Table 1)

Residents in the Fraser Valley have noticed the increase in days with limited visibility, particularly in the summer, and this is due to fine particle pollution. Those among us who would urge that no significant steps should be taken to curb air pollution until significant adverse effects have been demonstrated, must have been dis-

**TABLE 1: NOX Emission Inventory
(Total Lower Fraser Valley, 1985)**

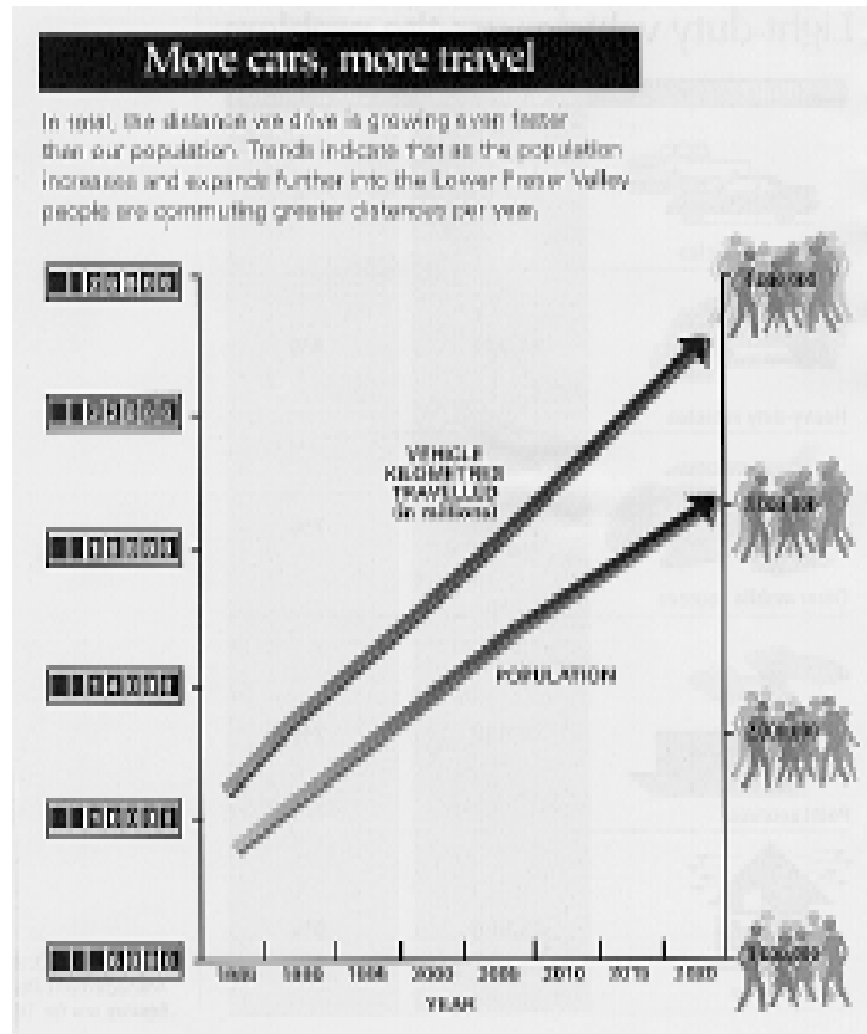
SOURCE	TONNES/YR
Light Duty Vehicles	21,754
Heavy Duty Vehicles	8,644
Other Mobile Sources	14,235
Subtotal	44,633
Point Sources	6,789
Area Sources	3,342
Total	54,764

Table Note: The dominance of vehicles in the emissions of NO_x is apparent. NO_x emissions are important because they are responsible for the downwind formation of ozone and photochemical aerosols in the summer, and it is these that are affecting the Fraser Valley.

Source: GVRD

concerted to learn that adverse effects on people have also been shown to occur at the particle pollution levels we are now experiencing. How have these significant levels of ozone and particulate pollution come about?

This is easy to answer since, between 1985 and 1992, the population increased 20% and the trips by car drivers increased over 40%. (See Figure 1) Vehicle miles travelled have consistently exceeded the growth in population. Cars have become progressively less polluting, but such increases in their use mean that the total emissions of pollutants increased. We don't have to look very far to

FIGURE 1: Lower Fraser Valley Population and Travel

Source: GVRD Air Quality Management Plan, 1994.

answer the question of why people are driving more: with both parents working, car trips to Daycare Centres become obligatory; young families find that they have to live further away from their work to avoid mortgages that are excessive in relation to their income; and

TABLE 2

The Greater Vancouver Regional District called for a planned 50% reduction in emissions by the year 2000. Actions taken included:

1. Major reductions in NO_x emissions from Burrard Thermal (Natural Gas) Generating plant by introduction of catalytic technology
2. Smaller reductions in NO_x from refineries and cement manufacturing plants
3. Introduction of AIRCARE Program (Mandatory Vehicle Emission Testing)
4. Beginning of strategies to reduce vehicle miles travelled, including:
 - Transport Demand Management
 - Extension of electric Rapid Transit
 - Building of designated bicycle access routes
5. Control of hydrocarbon fugitive emissions at gasoline handling plants

the many opportunities offered our young people now, such as ballet, music, skiing, skating, and horse-back riding to name a few, usually involve parental car journeys. One might also note that justifiable concern for the safety of children travelling alone generally results in more vehicle use.

The Greater Vancouver Regional District, in concert with the Fraser Valley Districts and with the provincial government, has taken some significant steps to try to reduce vehicle emissions. (See Table 2) The AirCare initiative (generally ridiculed by the media when it was introduced) has revealed that significant numbers of new cars have emissions higher than their design specifications; and the correction of this in both old and new models has lowered emissions of carbon monoxide and hydrocarbons. (See Table 3) Efforts have been made to reduce single driver commuting trips by van-pooling arrangements; and plans have recently been published for more transit initiatives on an ambitious scale. As announced in

TABLE 3: AIRCARE Programme in British Columbia**Calculated Emission Reductions**

Pollutant	Emission Reductions 1992-1993 (tonnes/yr)	Emission Reductions 1993-1994 (tonnes/yr)	Emission Reductions 1994-1995 (tonnes/yr)	Total (tonnes)
HC	2,900	4,800	3,500	11,200
CO	36,000	68,000	50,000	154,000
NOX	95	460	225	780
TOTAL	38,995	73,260	53,725	165,980

Table Note: The small reduction in NOx emissions attained by the AIRCARE programme, compared to significant reductions in carbon monoxide (CO) and hydrocarbons (HC) is evident.

September 1995, these call for extensions of rapid transit; expansion of the bus and trolley fleet from 930 to more than 1200; expansion of the articulated bus fleet from 21 to 160 by the year 2006; and other measures. In the circular I received there was no note of what fraction of these vehicles would be propelled by diesel engines; nor any note whether buses fuelled by natural-gas are being considered to reduce pollution. It is surprising that such massive capital investment as this, with profound implications for air quality, seems to occur with little public input. Diesel vehicles are responsible for a considerable fraction of fine particle pollution. (See Figure 2) It is these particles, less than 10 microns in size, that have recently been shown to be responsible for significant adverse health effects, so we have a special reason to be concerned about them. Will all these measures be sufficient to maintain our air quality?

It all depends on what will happen to growth; but it seems likely that the population of the Lower Mainland will continue to increase (even if not at the hectic rate of the past few years), and that

FIGURE 2 - Fine particulate emissions in the Lower Fraser Valley
- 1990 (primary particulates only, excluding road dust)

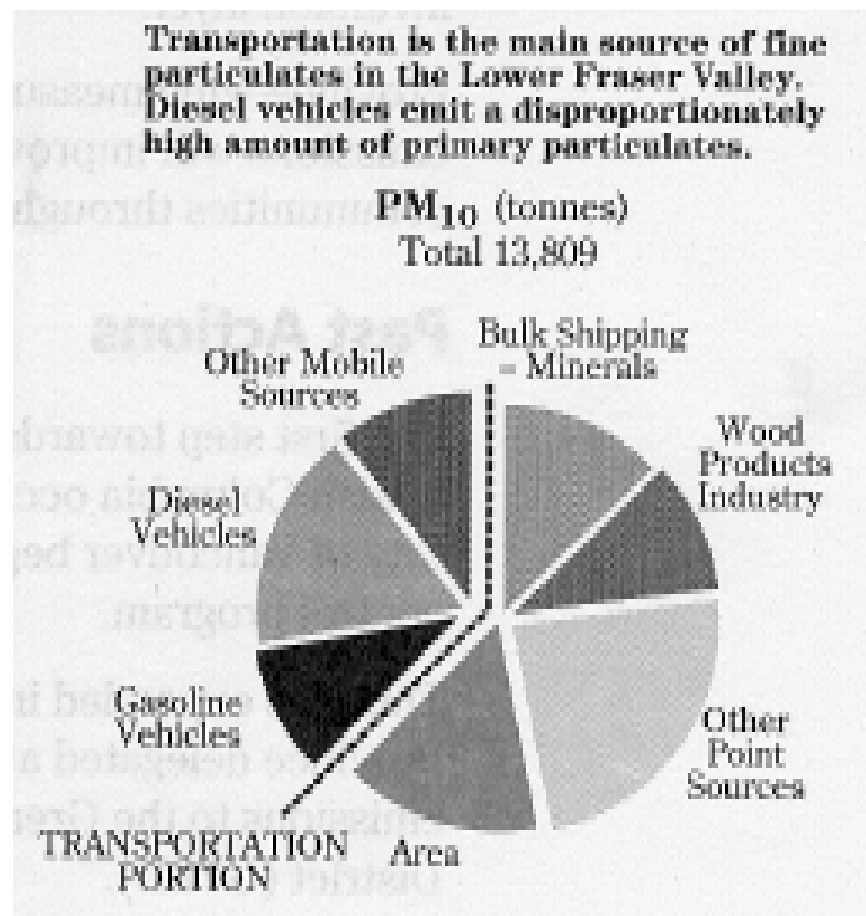


Figure Note: This figure is taken from the 1990 GVRD Emission Inventory. The fine particle emissions from diesel vehicles constitute a disproportionate fraction of the total. PM₁₀ refers to the particles less than 10 microns in size, and it is these that have been shown recently to be associated with significant adverse health effects, including premature mortality.

Source: Province of B.C., Ministry of Environment, Lands and Parks, "Clean Vehicles and Fuels for British Columbia - A Policy Paper," April 1995, page 7.

car use will continue to increase disproportionately. If air pollution is not to worsen, emissions per vehicle must be reduced as the size of the fleet increases. If air pollution is allowed to get worse, we will have to meet increasing costs incurred as a result -- these include human health costs and reduced agricultural productivity. Recent calculations have shown that even at existing air pollution levels, these are far from negligible. One commonly hears detailed calculations of what industry may have to spend to reduce air pollution, usually without any reference to what we are already having to pay for its consequences.

We should also note that London, with a well established public transit system, had a remarkably severe air pollution episode in December 1991; and Paris, which also has a very good public transit system, had a photochemical air pollution episode in the summer of 1995 which attracted international attention. It is obviously not sufficient to expand public transit without dealing with emissions from vehicles.

What more should we be doing? There are significant ways of reducing single occupant vehicle trips that we have not yet adopted; for example, our roads can be made more friendly to cyclists (on account of bad design, main access roads are too hazardous at the moment); and the filing of transport demand management schemes by major employers, can be mandated. We can urge the necessity of introducing some form of testing of heavy diesel vehicles (responsible, as they age, for a disproportionate amount of the fine particle pollution). We can hope that the Ballard Fuel Cell being developed in North Vancouver will provide a commercially competitive zero emission bus (when it does so, we should insist that our transit authorities invest heavily in it). We can support the California initiative to mandate the introduction of zero emission cars (see Figure 3), and make sure that, if and when these become available, we are not denied the opportunity to purchase them. If they were competitive in price and maintenance costs, and if the infrastructure were to be provided for them, I believe that many people would buy them for commuting use. California has led the way in reducing vehicle emissions. Because of heavy vehicle density and many hours of sunlight,

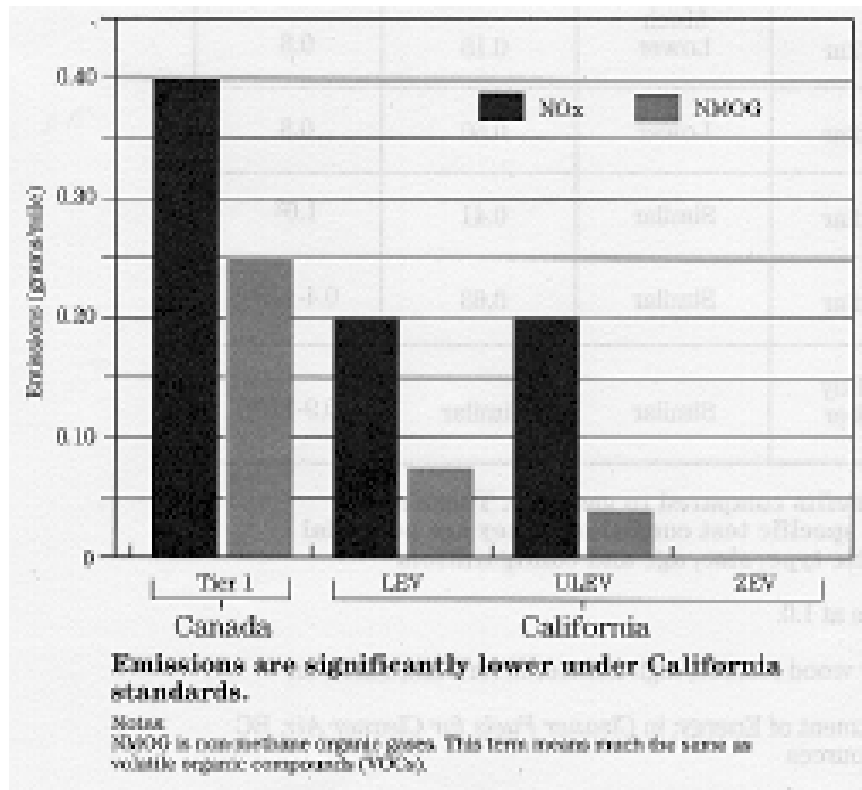
FIGURE 3 - Comparison of Vehicle Emission Standards

Figure Note: LEV = Low emission vehicles; ULEV = Ultra-low emission vehicles; and ZEV = Zero emission vehicles.

Source: Province of B.C., Ministry of Environment, Lands and Parks, "Clean Vehicles and Fuels for British Columbia - A Policy Paper," April 1995, page 22.

their photochemical pollution is a more severe problem than ours.

In most democracies, the government bureaucracies concerned with transportation, city planning, fuel licensing, and road building become very conservative and essentially defensive of all existing arrangements. The automobile and its necessary infrastructure are strongly subsidized in our society, and there are powerful interests that will urge that this situation should not be changed. The

force of public opinion can only be brought to bear on the inertia of governments if persistent questions are put to our elected representatives as to their plans of action -- and when they do take a useful initiative, we can be supportive of them. Complacency, or exclusive attention to the lobbying by special interests, can only result in a significant deterioration in our air quality in the years ahead. Individually, we can take steps to reduce the pollution for which we are responsible; but it is also very important that we try to influence the larger decisionmaking.

A small step in the right direction in 1992 has been the formation of an Air Quality Advisory Committee by the Greater Vancouver Regional District; this has allowed the expression of informed public concern to be voiced at the appropriate level. Since we are all likely to be inconvenienced if effective steps are to be taken (as we are by the annual cost of the AirCare test), public understanding of the necessity for such policies is essential.

We share one major obstacle with every other region. Although effective planning to reduce air pollution requires that we think of the whole region as one "airshed," individual communities and municipalities are reluctant to relinquish any of their sovereignty to permit effective land use planning and transportation policy for the region as a whole. "Growth without Pollution" is presumably what we mean when we talk about a "sustainable" environment. There is no doubt that a real threat to attaining this is the fiercely defended, autonomous decision-making of different parts of the whole.

No one seems to have any solution to this problem; with the result that whole regions can suffer a progressive deterioration in air quality because collaborative planning (with the inevitable constraints on individual decisionmaking this implies) did not occur.

As the complexity of regional air pollution problems has become clearer, we have learned that solutions must be planned and implemented at the local level. Dependence on a distant central government for environmental protection has been, over the past few years, somewhat (some would say, entirely) discredited. This is why we cannot evade our own responsibility for taking the necessary measures to prevent an unacceptable degradation of our air quality.