Canadian Coalition for Lead-free Gasoline

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Lead in 1988:
More urgent than ever

A brief presented to the Honourable Tom McMillan

Minister of the Environment

and

The Honourable Jake Epp

Minister of National Health & Welfare

by the Canadian Coalition for Lead-free Gasoline

June 15, 1988

Canadian Council on Children and Youth
Canadian Environmental Law Association
Canadian Institute of Child Health
Canadian Teacher's Federation
Friends of the Earth - Canada
Greenpeace Foundation
Learning Disabilities Association of Canada
Niagara Neighborhood Assn Lead Pollution Committee (Toronto)
Pollution Probe Foundation
South Riverdale Community Health Centre (Toronto)
STOP (Montreal)
Toxics Watch Project (Edmonton)

EXECUTIVE SUMMARY

- In March 1985 the United States government announced a rapid 91% reduction of lead in gasoline to a very low .026 g/l to be met in January 1986.

- In September 1985 the Royal Society of Canada's Commission on Lead in the Environment published a report on lead in gasoline and concluded that if health effects below 25 µg/dl were demonstrated by ongoing studies, then a move to the US level by 1990 would be both advisable and possible.

- In March 1986 the Canadian Government announced its intention to move to the US level, but with a 7 year delay until 1993.

- Numerous studies published in the last 2 years have shown that lead causes health problems at much lower levels than previously thought. These include:

  - Reduced birth weights were found in studies from Scotland and Cincinnati at blood-lead levels as low as 12-13 µg/dl in the mothers.

  - Pregnant women in Australia with higher blood-lead had a higher risk of pre-term delivery than those with lower levels. This was measured around 10 µg/dl.

  - Hearing damage has been demonstrated to occur at very low levels of exposure (5 µg/dl) and may contribute to learning problems in children.

  - Studies in Boston, Cincinnati, Australia and Greece have shown mental development deficits among infants and children at levels as low as 6 µg/dl.

  - A study of intellectual attainment among older school children in Edinburgh, Scotland has shown a clear correlation between higher blood-lead levels and poorer reading and math skills. These effects were observed down to the lowest levels found in the study, 6 µg/dl.

- The USEPA and the US Centers for Disease Control no longer consider 25 µg/dl to be acceptable, but consider 10-15 µg/dl as "of serious concern in young children". The USEPA will soon propose new, lower, enforceable standards for lead in ambient air and drinking water based on the need for stronger measures to protect public health.

- The latest published information on Ontario children indicates that 52% of children 6 and under exceeded 10 µg/dl in 1984. We estimate that across Canada, half a million pre-school children are now experiencing blood-lead levels of 10 µg/dl and higher.

- In 1987 the International Joint Commission and the Canadian Medical Association recommended that the Government of Canada accelerate the phase-down schedule for lead in gasoline.

- Accelerating the phase-down by 3 years will prevent 5000 tonnes of lead from entering the Canadian environment.

- The Canadian Coalition for Lead-free Gasoline urgently recommends that the Government of Canada accelerate the schedule for phasing-down lead in gasoline to achieve .026 g/l by January 1990.

INTRODUCTION

The Canadian Coalition for Lead-free Gasoline consists of organizations concerned about the environment, public health, child development, and education, all of which are affected by lead pollution. Since its founding in 1985, the Coalition has been pressing governments to end pricing policies which encourage the use of leaded gas, and more importantly, pressing the federal government to remove lead from gasoline altogether.

Lead in gas remains a major, if not the largest source of lead exposure to Canadians. The latest blood-lead levels measured in Canada are unacceptably high, and show that the average Canadian has a lead body burden which can produce measurable health effects.

The federal government announced in March 1986 its intention to regulate a 90% reduction of lead in gas by January 1, 1993. Since that decision was made, numerous new studies have been published showing harmful health effects at much lower levels than were thought dangerous in 1986. The level of blood-lead considered unacceptable at that time was 25 micrograms/ decilitre (µg/dl). In 1988, sufficient new scientific evidence has been published that 10-15 µg/dl is now considered by the United States Environmental Protection Agency (USEPA) and the US Centers for Disease Control (US CDC) to be of serious concern in young children. There is evidence that even this level may be

too high in women of child bearing age to protect developing fetuses.

The Canadian government's decision to wait with the lead phase-down until 1993 was questionable when it was announced. In light of the new evidence, more rapid action to eliminate lead from gasoline and all other sources is essential.

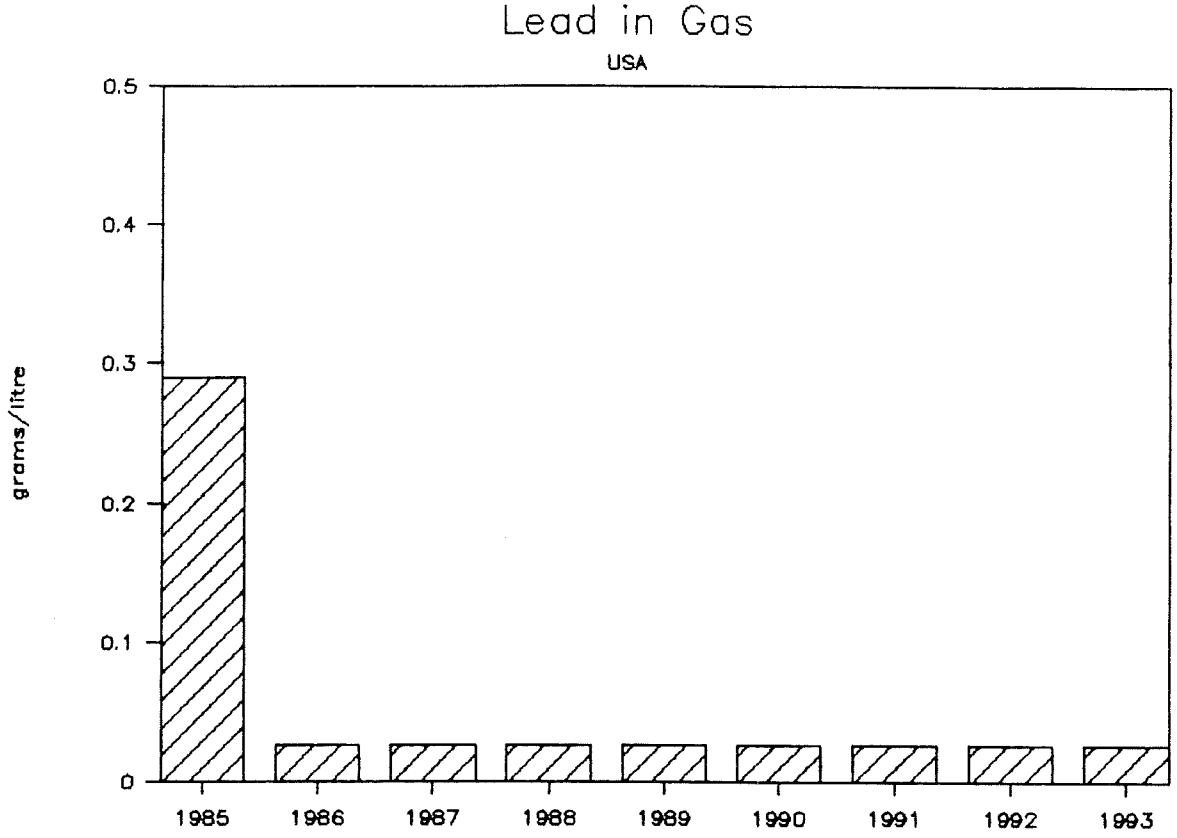
CHRONOLOGY

Canada has always lagged behind the US on removing lead from gasoline. In 1985 there was roughly .44 g/l of lead in Canadian gasoline (although .77 g/l was legal). In the US, the level had been .29 g/l for three years.

The USEPA completed a major cost-benefit analysis in 1985 on reducing the level of lead in gasoline. They found that the additional costs to the refining industry were four times lower than the combined savings of reduced maintenance costs and better fuel economy for motorists, and savings in health care and remedial education. The EPA considered these economic benefits of lead reduction (as well as the emerging evidence of low level health effects) dramatic enough in 1985 that they decided to rapidly and sharply reduce the amount of lead allowed in gas. By January 1986 they had reduced allowable levels by 91% to .026 g/l.

Less than a year later however, in March 1986, Canadian Environment Minister Tom McMillan announced that he would not be reducing lead in gas to the same level until 1993, a wait of 7 years. Although this decision was announced with strong language about the seriousness of the problem, the decision to delay perplexed most observers, since US and Canadian children's blood were similarly contaminated by lead.

Mr McMillan had just received advice on how to proceed with phasing down lead in gas from The Royal Society of Canada's


Lead in Gas
USA
grams/litre
0.5
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0
1985
1986
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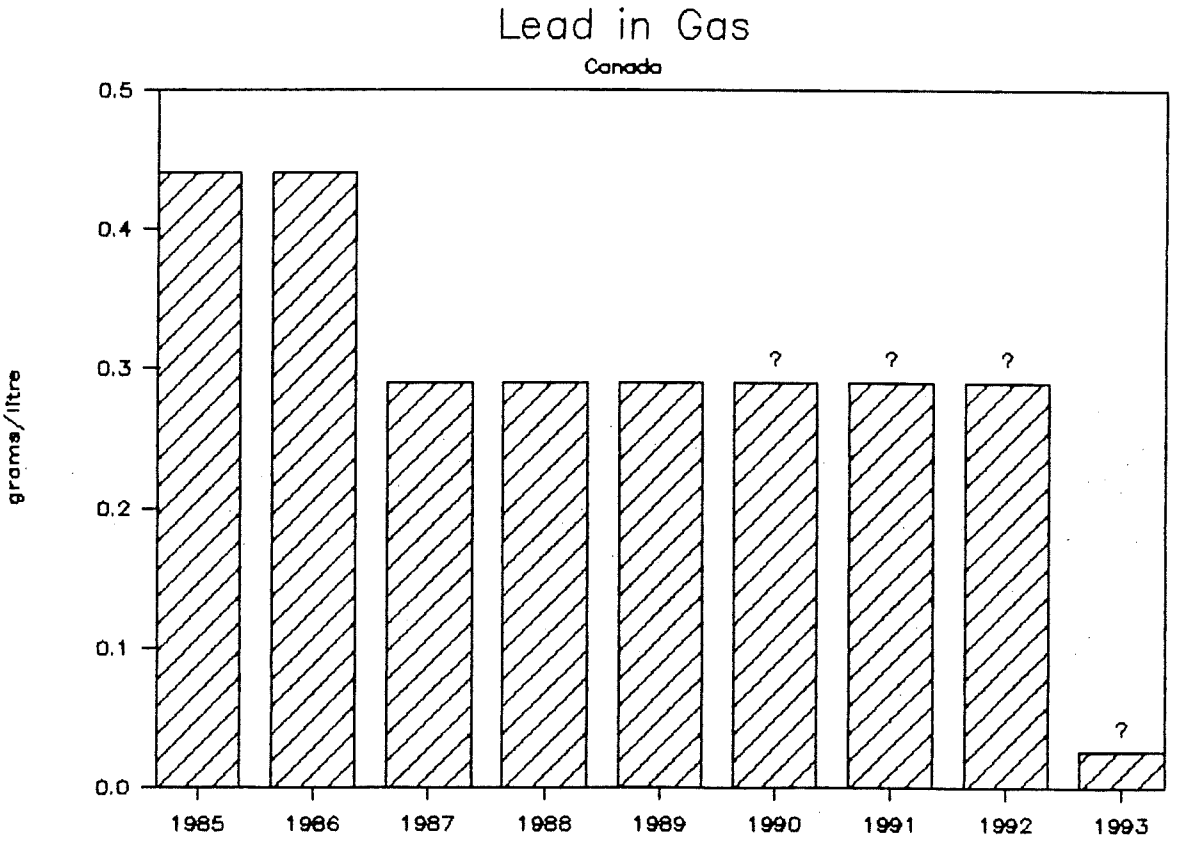
Lead in Gas
Canada
grams/litre
0.5
0.4
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1985
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Commission on Lead in the Environment. The Commission published a report in 1985 on lead in gasoline and concluded that a 1993 timeline was adequate to protect "most" Canadian children. That report was criticized by member groups of the Canadian Coalition for Lead-free Gasoline, and by international experts in the field of the health effects of lead.

The Royal Society's advice was based on avoiding lead poisoning (25 µg/dl) in children; it dismissed the emerging evidence of health effects below 25 µg/dl as inconclusive and did not discuss the need for inclusion of a safety margin. However, the Royal Society's report did recommend that lead should be reduced to the US level of .026 g/l by 1990 if health effects at lower than 25 µg/dl are demonstrated.[1] The report referred to the extensive research under way at the time which might demonstrate harmful effects at blood-lead levels below 25 µg/dl.

In its October 1986 Final Report, the Royal Society endorsed the government's proposal to wait until 1993.[2] That conclusion was criticized by member groups of the Canadian Coalition for Lead-free Gasoline, by the Canadian Medical Association and by international experts in the field of the health effects of lead because of the seriousness of the emerging

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1. Royal Society of Canada, Commission on Lead in the Environment, Lead in Gasoline - A Review of the Canadian Policy Issue, Interim Report, September 1985.

2. The Royal Society of Canada, Commission on Lead in the Environment, Lead in the Canadian Environment: Science and Regulation, Final Report, September 1986.

research findings on "low-level" health effects. It is these research projects which now have reported and form the basis of this brief. It should be noted, however, that despite its other weaknesses, the very first recommendation in the Royal Society's Final Report was that "Public health and environmental policy should be to reduce blood-lead to its lowest possible level."

NEW EVIDENCE

The 1986 decision was made on the basis of 25 µg/dl of blood-lead being excessive and the level at which corrective action is to be taken.[3]

Since the government's March 1986 announcement of its intention to regulate by 1993, significant new scientific evidence has been published. These studies show health effects due to low levels of lead exposure (especially in newborns) from pre-natal exposure) at levels below 10 µg/dl. Among the many concerns for health problems from lead, the most troubling is that the damage caused by lead to the developing brain and nervous system is likely irreversible, and will lead to permanent limitations in people's mental and other abilities.

The most powerful evidence comes from a series of prospective, or "real-time" studies of child development, where the pregnancies (and the children) are closely monitored for blood-lead levels and many other factors which normally confound and confuse the results of studies which try to "reconstruct" past histories of subjects after the fact. These studies are in progress in Boston, Cincinnati, and Port Pirie, Australia.

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3. A child with a confirmed blood-lead level of 25 µg/dl is considered to be "lead poisoned".

Port Pirie

In Port Pirie over 700 pregnancies among women living near a large lead smelter were studied, and the children's mental and physical development is being followed. The study team first reported in 1986, on pregnancy outcomes. They found an "increasing gradient in the risk of preterm delivery in association with increasing blood-lead". The women with blood-lead levels over 14 µg/dl had a risk of pre-term delivery 8.7 times greater than those with blood-leads under 8 µg/dl.[4] There was even an increased risk (2.7 times) measurable between the below 8 µg/dl group and the 8-11 µg/dl group. Although Canadian data is limited, it is likely that a large number of Canadian women of child bearing age have blood-lead levels in the 8-11 µg/dl range and higher.

The Port Pirie results confirm the relationship between blood-lead levels and shorter gestation also observed in a group of mothers and their infants in Glasgow, UK. In this latter study, the median blood-lead of the mothers and of the newborns was 14.5 µg/dl and 12.6 µg/dl respectively.[5]

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4. McMichael et al, The Port Pirie Cohort Study: maternal blood-lead and pregnancy outcome, *Journal of Epidemiology and Community Health* 40, p 18, 1986.

5. Moore et al, Some studies of maternal and infant lead exposure in Glasgow, *Scottish Medical Journal* 27, p 113, 1982.

These studies and others led Davis and Svendsgaard to conclude in September 1987 that

> "the weight of available evidence suggests that the duration of gestation is affected by exposure to lead during pregnancy and that these effects can occur even when blood-lead levels are below 15 µg/dl.[6]

A more recent paper on the Port Pirie children has reported on the children's mental development at 24 months of age. After correcting for numerous variables which could influence the results, the investigators found that increasing blood-lead levels were significantly correlated with poorer scores in a series of mental development tests. The children's blood-lead levels had increased after birth due to environmental exposures to a mean of 21 µg/dl at 15 months.[7]

Cincinnati

In another prospective study 300 children born to women living in the inner city of Cincinnati are being studied for signs of developmental problems. The results of this study raise serious concerns about the levels to which developing fetuses are exposed through maternal blood. In the Cincinnati children, mean blood-lead values were lower than in the Port Pirie group. Maternal blood contained a mean of 8 µg/dl of lead, and newborns

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6. Davis and Svendsgaard, Lead and child development, *Nature*, 24 September 1987.

7. Baghurst et al, The Port Pirie Cohort Study: Lead Effects on Pregnancy Outcome and Early Childhood Development, in *NeuroToxicology* 8, p 395, 1987.

(at 10 days) had 4.6 µg/dl of blood-lead. Even at these low levels, the researchers found a clear correlation between higher blood-lead exposures in utero and poorer mental development scores when the babies were both 3 and 6 months of age. The effect was more pronounced in boys. The researchers concluded

> "neurobehavioural deficits were related to lead exposures in this study that were well below the `corrective action' level..." [8] and
>
> "These findings suggest that what constitutes safe levels of lead exposure for children may not be safe for the fetus."[9]

The Cincinnati researchers also found a decrease in birth weight with increasing blood-lead levels. Over a ten fold increase in blood-lead, birth weights decreased between 58 and 601 grams. This effect was observed at maternal blood-lead levels of 12-13 µg/dl.[10] [11] [12] Low birth weight has been well

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8. Dietrich et al, Low-level fetal lead exposure effect on neurobehavioural development in early infancy, *Pediatrics* 8, p 721, November 1987.

9. Dietrich et al, Early effects of fetal lead exposure: developmental findings at 6 months, paper presented at *International Conference on Heavy Metals and the Environment*, New Orleans, September 1987.

10. Bornschein et al, Effects of Prenatal Lead Exposure on Infant Size at Birth, presented at *Workshop on Lead and Neurobehavioural Effects in Children*, Edinburgh, September 1986.

11. Personal communication, Dr Paul Succop, Cincinnati Study Group, University of Cincinnati, April 1988.

12. Bornschein et al, Prenatal lead exposure and pregnancy outcomes in the Cincinnati lead study, paper presented at *International Conference on Heavy Metals in the Environment*, New Orleans, September 1987.

established for many years as contributing to developmental problems itself. As Bornschein et al reported, "Any factor which contributes to the likelihood of low birth weight, also increases the likelihood of poor developmental outcome".[10]

The last major effect observed so far in the Cincinnati study is a correlation between increased blood-lead and reduced stature (height). The study team reported that both exposure in the womb and exposure after birth influenced growth. The relationship was observed at blood-lead levels below 10 µg/dl.[13] A USEPA study published in 1986 found a similar relationship between reduced growth and increasing blood-lead to as low as 5 µg/dl.[14]

Boston

The prospective study which started (and reported) earliest is underway in Boston, Massachusetts and is being carried out by researchers at the Boston Children's Hospital and Harvard Medical School. Approximately two hundred children have been followed since birth, and like those in the Port Pirie and Cincinnati studies, were examined for scores on the same set of mental development tests. The researchers measured the levels of

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13. Shukla et al, Effects of fetal and early postnatal lead exposure on child's growth in stature - the Cincinnati lead study, paper presented at *International Conference on Heavy Metals In the Environment*, New Orleans, September 1987.

14. Schwartz et al, Relationship Between Childhood Blood Lead Levels and Stature, *Pediatrics 77*, p 281, March 1986.

lead in umbilical-cord blood at birth to determine the levels of lead to which the developing fetus was exposed. Subsequent samples are also being taken regularly to monitor lead levels as the children grow.

The mean cord-blood lead level for the whole group was 10.4 µg/dl. The infants were divided into three groups, high-exposure (greater than 14 µg/dl), medium (6-7 µg/dl) and low exposure (less than 3 µg/dl). After examination at 6 months of age on a series of tests, the researchers found strong correlations between high lead exposure and low mental development scores.[15]

As the study has progressed, and the tests have continued at 12, 18, and 24 months, results indicate that the mental development deficits in the higher exposure group have continued. It should be noted that the effects were correlated with prenatal blood lead exposures, not with exposures after birth.

In addition further analysis has shown that, especially at the lower-exposure end of the spectrum, children from poorer families are extra-sensitive to the effects of lead on development. This effect was observed at blood-lead levels as low as 6-7 µg/dl.[16] [17]

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15. Bellinger et al, Early Sensory-Motor Development and Prenatal Exposure to Lead, *Neurobehavioural Toxicology and Teratology 6*, p 387, 1984.

16. Personal communication, David Bellinger, April 1988.

After the 12 month report, the authors observed

> "infants experiencing...cord blood concentrations greater than 10 µg/dl achieved [mental development] scores that, at both 6 and 12 months, were significantly lower than those achieved by infants experiencing lower levels of prenatal exposure".[18]

After the 24 month report (published April 1987), the authors concluded

> "It appears that the fetus may be adversely affected at blood-lead concentrations well below 25 µg/dl, the level currently defined by the Centers for Disease Control as the highest acceptable level for young children."[19]

An interim report of the Boston children at age 5 years was presented in September 1987. A new set of tests has been applied which is more effective for older children, and the pattern is changing. Preliminary analyses suggest that at 5 years, developmental deficits correspond more closely to the children's post-natal (or current) blood-lead levels, and not to levels experienced in the womb. Still, the deficits are being observed at blood-lead levels where the mean (for the whole

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17. Bellinger et al, Low-Level Lead Exposure, Social Class, and Infant Development, 1988, *In press*.

18. Bellinger et al, Low-Level Lead Exposure and Infant Development in the First Year, in *Neurobehavioural Toxicology and Teratology 8*, p 151, 1986.

19. Bellinger et al, Longitudinal analysis of prenatal and postnatal lead exposure and early cognitive development, in *New England Journal of Medicine 316*, p 1037, April 23, 1987.

group) is a relatively low 6.4 µg/dl.[20]

In addition to these "real-time" prospective studies, other studies have been published recently to lend weight to the evidence that lead can cause human health effects at levels well below the "excessive" level of 25 µg/dl.

Edinburgh

In Edinburgh, Scotland a group of 855 school children aged 6-9 was studied for intellectual attainment relative to blood-lead measurements. The children's mean blood-lead level was 10.4 µg/dl.[21] The study took into account and corrected for thirty-three possible variables which might have skewed the results. The children were divided up into 10 different groups according to blood-lead levels, ranging from a low of 5.6 µg/dl to a high of 22.1 µg/dl, all below the 25 µg/dl level. A clear relationship was found between increasing blood-lead and poorer scores in reading, number skills and combined test scores throughout the entire range of exposures. In other words, the researchers found no evidence of a threshold; of a level below

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20. Bellinger et al, Low-level lead exposure and child development: assessment at age 5 of a cohort followed from birth, in *Proceedings of International Conference on Heavy Metals in the Environment*, New Orleans, September 1987.

21. This level is identical to the mean level for children under 6 in southern Ontario in 1984. See Duncan et al, Blood Lead and Associated Risk Factors in Ontario Children 1984, Ontario Ministries of Health, Environment and Labour, 1985.

which no effects occur.[22]

Athens, Greece

A group of researchers from the University of Athens studied hundreds of children from 2 communities just outside the city. The first group had a mean blood-lead level of 24.7 µg/dl, and the second group had a mean level of 12.5 µg/dl. After a series of behavioural assessments were completed, the researchers reported that in the community with the lower mean blood-lead levels, there was a significant association between increasing blood-lead and attentional deficits. In the high blood-lead group, significant associations were found between increasing lead and attentional deficits and various measures of hyperactivity.[23]

A subsequent study on over 500 children in the Athens area by the same group confirmed the deficits in attentional abilities with increasing blood-lead, with no threshold below which the effects are not observed. The deficits were observed between groups of children with blood-leads of below 15 µg/dl and

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22. Fulton et al, Influence of blood-lead on the ability and attainment of children in Edinburgh, in *The Lancet*, p 1221, May 30, 1987.

23. Hatzakis et al, Blood lead and classroom behaviour of children in two communities with different degree of lead exposure: evidence of a dose-related effect?, in *Proceedings of the International Conference of Heavy Metals in the Environment*, Athens, Greece, 1985.

15-25 µg/dl.[24]

US Population studies

Researchers from the USEPA have analyzed data from the second National Health and Nutrition Examination Survey (NHANES II) and reported on a relationship between increasing blood-lead and hearing impairment. The study measured lead-related hearing deficits across the entire range of lead exposure (as low as 5 µg/dl) with no apparent threshold.[25] The study concluded that "an individual with a blood-lead level of 20 µg/dl is 10-20% more likely to have [poorer hearing] than an individual with a blood-lead level of 4 µg/dl."

The study further reported that there was not only a correlation with blood-lead and hearing deficits, but higher blood-lead was significantly correlated with the ages at which children first sat up, walked and spoke. An apparent threshold blood-lead level where the speech and sitting up effects first appeared was 11.5 µg/dl.[26]

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24. Hatzakis et al, Psychometric Intelligent and Attentional Performance Deficits in Lead-Exposed Children, in *Proceedings of the International Conference on Heavy Metals In the Environment*, New Orleans, September 1987.

25. Schwartz & Otto, Blood-lead and minor hearing impairment, in *Proceedings of the International Conference on Heavy Metals In the Environment*, New Orleans, September 1987.

26. Schwartz & Otto, Blood-lead, Hearing Thresholds, and Neurobehavioural Development in Children and Youth, *Archives of Environmental Health 42*, p 153, May 1987.

Significance of findings

Most of the effects observed at low levels are measures of, or contribute to, deficits in mental development. This includes lower birth weight (observed at 12-13 µg/dl), reduced growth (observed at 5-15 µg/dl), pre-term delivery (observed at 8-11 µg/dl and 14 µg/dl), and suppressed scores in many mental development tests (observed as low as 4.5 µg/dl). The possibility that hearing problems (observed down to 5 µg/dl) contribute to learning problems and reduced intellectual attainment cannot be discounted. The Edinburgh study which related blood-lead levels as low as 6 µg/dl to intellectual attainment deficits in school children (rather than the other effects, which were mostly observed among infants) may illustrate the kind of effects which overexposed infants are vulnerable to later in life.

The degree to which impaired mental development leads directly to reduced IQ later in life is still difficult to define. However, this is one of the effects causing the greatest concern from these studies. In an individual, a reduction of a few points of IQ would not be considered significant, however, a shift of this magnitude in the whole population would have serious social and economic consequences for a nation. It would have the effect of depriving tens of thousands of children of achieving superior status, and at the other end of the scale, could quadruple the number of children with severe intellectual

deficits (IQs under 80).[27]

No Margin of Safety

"Safe" levels of most pollutants are set to include a margin of safety. Such levels are set lower than the "lowest observed effect level" and are measures of prudence meant to protect against unknown possible biological impacts of the pollutant. Safety factors can range anywhere from 10 to 5000 depending on the pollutant, how much is known about it, and what kind of threats it poses. For lead, however, there is no safety margin between "lowest observed effect levels", official "safe levels" or the real levels being experienced in the population. Average Canadians have lead in their bodies in amounts which numerous studies have shown can lead to measurable health effects.

Even applying the smallest safety factor of 10 to the "corrective action" level of 25 µg/dl, yielding a level of 2.5 µg/dl, it is certain that a majority of Canadians regularly exceed this level. This situation should be intolerable to environmental and public health authorities, and action to reduce exposure should be an urgent priority.

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27. Needleman & Bellinger, letter to *The Lancet*, August 1, 1987.

NEW REGULATORY POLICY IN THE USA

In August of 1986, just months after the Canadian government's announcement, the USEPA's Clean Air Scientific Advisory Committee[28] reported to the Agency on their assessment of the scientific evidence on low-level exposure to lead. The Committee had reviewed not only the preliminary work relating to early childhood development and growth, but also to work showing interference with heme synthesis and the cardiovascular system which also show effects below 10 µg/dl. The Committee concluded that the level of acceptability had fallen sharply since 1977, when the last air quality standard for lead was adopted.

On this basis, the USEPA will propose a revised, lower standard for lead in ambient air under the US Clean Air Act in a few months. This legally enforceable standard will not be based on the old 25 µg/dl level of unacceptability, but on 10-15 µg/dl of blood-lead as excessive. Even sooner, the EPA will propose a new legally enforceable standard for lead in drinking water under the US Safe Drinking Water Act. This new standard is also driven by a concern for blood-lead levels in excess of 10-15 µg/dl.[29]

The US Centers for Disease Control no longer considers the 25 µg/dl value a level of "acceptability". Dr Vernon Houk,

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28. The CASAC is an independent panel of scientists who provide advice to the Administrator of the EPA on scientific matters.

29. Michael Davis, USEPA, personal communication, April 1988.

the Director of Environmental Health at CDC has made clear that this level is excessive for children, and that the CDC is very concerned with levels of 10-15 µg/dl.[30]

INTERNATIONAL JOINT COMMISSION NOVEMBER 1987

Lead has been one of the priority chemicals for action in the Great Lakes for many years. Lead is one of the 11 "critical chemicals of concern" for clean-up action in the lakes. Citing concern about the long-range transport and fallout of lead into the lakes, and for the health impacts on people consuming lead in fish tissues, scientists at the IJC made new recommendations in 1987.

When the Commission met in Toledo in November, the Water Quality Board pointed out that the US had severely reduced lead in gasoline, but that Canada has not, and recommended that

- the manufacture and use of alkyl lead compounds be eliminated as soon as possible, and that
- Canadian regulations limiting the lead content of gasoline be made more stringent, and the schedule for phasing out lead be accelerated.[31]

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30. Personal communication with Dr Houk, October 1987.

31. Water Quality Board of the International Joint Commission, 1987 Report on Great Lakes Water Quality, presented at Toledo, Ohio, November 1987.

MYTHS OF THE LEAD DEBATE

The Canadian Coalition for Lead-free Gasoline is increasingly concerned about arguments and misinformation used to justify continued delays in phasing out lead from gasoline.

"Lead is coming out of gas in 1993, why are you worried?"

Delaying the phase-down of lead in gas will mean small children in 1990-92 will be exposed to higher levels of lead unnecessarily. The US experience has clearly shown that within 30 days of real reductions of lead in gasoline, blood-lead levels in exposed populations drop as well, providing a direct incentive to achieve reductions as soon as possible.[32] Therefore, a drop in lead in gas three years sooner than currently planned will significantly reduce unacceptable exposures to small children for virtually the entire 3 year period.

In addition, it must be remembered that lead is a persistent toxin that will not break down in the environment. Without a more rapid phase-down, at least 5000 more tonnes of lead will be emitted into the Canadian environment from 1990 to 1993 which will persist indefinitely and contribute to long term exposures to Canadians.

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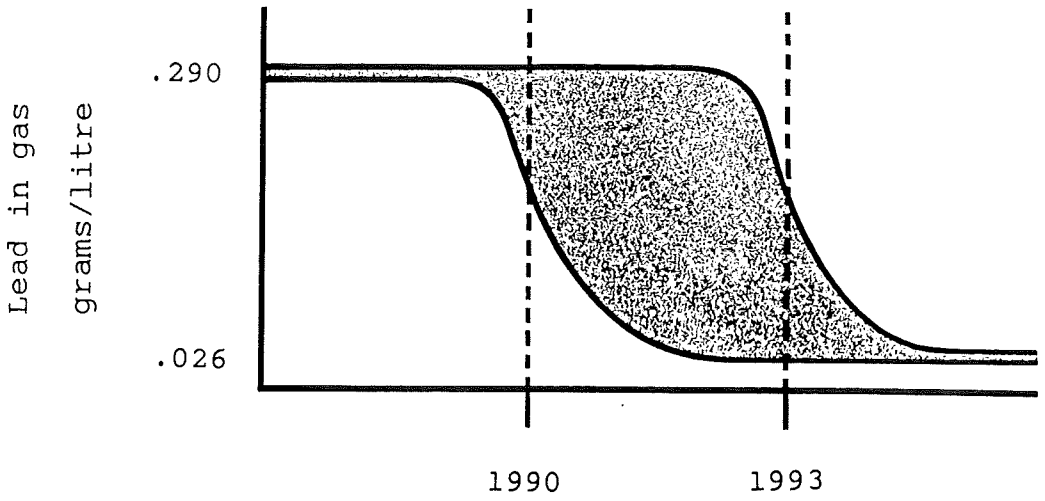
32. Personal communication, Dr Ellen Silbergeld, Senior Scientist, US Environmental Defence Fund, member of US Clean Air Scientific Advisory Committee.



The shaded area represents roughly 5000 tonnes of lead which will go into the environment unnecessarily if the phase-down schedule is not accelerated.

The 1993 deadline was mystifying when it was announced in early 1986, since the USEPA had seen fit one year earlier to dramatically reduce lead in gasoline by January 1986. At that time, US children's blood-lead levels were the same as in Canada. There was simply no reason to justify waiting seven years in 1986, and with new concerns about health effects at even lower levels of exposure, there is no reason to wait 4 1/2 years from now.

The US industry was required to comply with the phase-down in less than 2 years, and in Canada, the Royal Society concluded the industry could meet the requirement by 1990.[33]

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33. The Royal Society of Canada, Lead in Gasoline, The Canadian Policy Issue, September 1985.

Recent discussions with Environment Canada regulators have confirmed that the Canadian industry could meet an 18 month timeline.[34]

"Farmers need lead for their tractors"

This argument is simply incorrect, since the vast majority of farm machines and equipment run on diesel fuel. In fact, farm organizations are on the record supporting the removal of lead from gasoline.

In addition, the few machines which do need small amounts of lead would still have adequate lead if 90% of the lead was removed. The 90% reduction in the US was based on that level being adequate to protect such old engines.

In any case, the use of leaded gas on farms contributes to human exposure to lead by contaminating food supplies.

"The CDC still says that 25 µg/dl is the concern level despite the new research"

Upon hearing this statement, Dr Vernon Houk, Director of the CDC's Center for Environmental Health told the Coalition "That is a serious misuse of our data. The CDC is very concerned about children's blood-lead levels in the 10 to 15 µg/dl range." He explained that as soon as CDC can develop population screening

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34. Personal communication, Glenn Allard and Jim Armstrong, Commercial Chemicals Branch, Environment Canada, September 1987.

techniques that can reliably measure blood-lead at these levels, they will alter their action/screening level down to 10-15 µg/dl.

"Most lead exposure in Canada is not due to lead in gasoline anymore" and ***"Canadians are exposed to lead from other sources too, especially food."***

There has been no data published which supports the assertion that very little of Canadian's total exposure to lead comes from gasoline-lead. The Royal Society cited Health & Welfare Canada data in 1986 to show that over 90% of children's total exposure to lead comes from dust and dirt, and food. Since at least half of urban dust and dirt-lead comes from lead in gasoline,[35] and a third of food-lead comes from lead in gasoline (see below), then at least half of Canadian children's lead exposure comes either directly or indirectly from lead in gasoline.

Canadians, however, are exposed to lead from other sources. This does not mean that a major source, and a source which is easy to control, should not be controlled as quickly as possible. This is really an argument to pursue controls on other sources as well as on lead in gasoline (such as regulating the rapid removal of lead solder from food cans).

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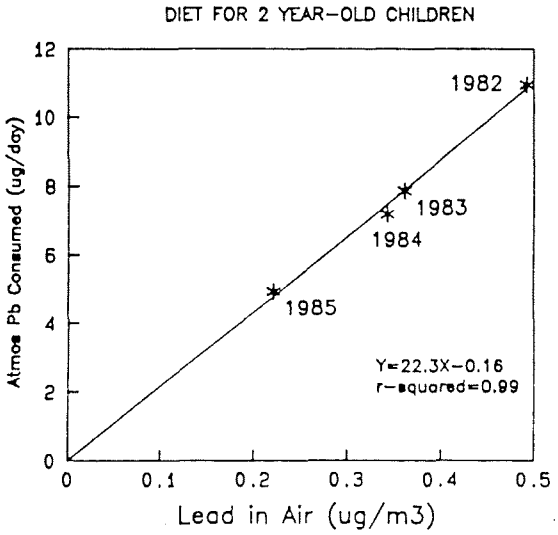
35. Health & Welfare Canada, Socio-Economic Impact Analysis of Lead Phase-down Control Options, Environment Canada, February 1984.

It has been shown that a significant portion of the contamination of food by lead originates from lead in gasoline. In a paper presented in New Orleans in September 1987, R W Elias reported on human exposures to all lead in the United States from 1982 to 1985, the years when the US was moving downwards from the level of lead in gas in Canada right now. This paper shows clearly that levels of lead in US food supplies dropped in absolute lock-step with levels of lead in air.[36]

This study suggests that in Canada, an accelerated reduction of gasoline-lead will result in rapid and significant reductions in food-lead as well.

LEAD IN AIR vs ATMOSPHERIC LEAD IN FOOD



Source: "Recent Changes in Human Lead Exposure", R W Elias.

36. Robert Elias, Recent Changes in Human Lead Exposure, in Proceedings of *International Conference on Heavy Metals In the Environment*, New Orleans, October 1987.

"The USEPA Cost-Benefit study cannot be applied in Canada; we are simply a different country."

This argument is based on the fact that there are fewer acute lead poisonings (over 25 µg/dl) in Canada than in the US, and suggests the benefits of reduced lead poisoning among children will be less in Canada than in the US.

While it is true that there are fewer cases of this level of lead poisoning in Canada than in the US, the balance of benefits in the US study did not pivot on savings related to prevention of these poisonings. In fact, the US data shows that even ignoring all health care savings, the economic savings to motorists in the form of increased fuel economy and reduced maintenance costs alone exceed the increased costs to the refining industry. Any benefits to public health are in addition to these economic benefits.

"US children have higher blood-lead levels than Canadian children, so the urgency is not the same..."

When the Ontario Blood-Lead Survey of 1984 was published, an accompanying news release hailed the results as showing that Ontario children had lower blood-lead levels than children in the US. This conclusion did not appear in the report itself - only in the news release. A closer look at the real data showed that the authors compared US information *from 1978* (when all levels were higher) to Ontario data from 1984. This

misleading analysis is the only evidence which has suggested that Americans are any more exposed than Canadians.

Actual blood-lead levels in urban US children in 1983 were 10 µg/dl.[37] Numerous studies show that Canadian and US cities are similarly contaminated with lead.

"Leaded gas sales are dropping in Toronto and Montreal anyway, where the main concern for exposure lies."

This argument ignores the contribution to rural children's lead exposure that comes from leaded gasoline, and ignores western Canadian cities, where a much higher proportion of leaded gas is sold because of the older fleet of vehicles. Few blood-lead measurements have been carried out in Calgary, Edmonton, Winnipeg or Vancouver, but not having the information is no excuse to ignore a public health threat which the evidence suggests is serious.

CURRENTLY IN CANADA

The latest information on blood-lead levels in Canada indicates that children in southern Ontario average 10.4 µg/dl of blood-lead and that city kids have an average of 12.0 µg/dl.[38]

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37. Personal communication, D Pirkle, US CDC, March 1986.

38. Duncan et al, Blood Lead and Associated Risk Factors in Ontario Children 1984, Ontario Ministries of Health, Environment and Labour, 1985.

In western Canadian cities, levels could easily be as high, or higher, because of the much higher proportion of leaded gasoline sold there. If a "safe" level of 10 µg/dl is used, these data suggest that 52% of children under 6 in southern Ontario in 1984 were overexposed to lead. In urban areas, this figure amounts to 71%.

Although blood-lead levels are certainly slightly lower than this now, as a result of the small reduction in lead in gas as of January 1987, the overall population is grossly overexposed to this pollutant. We conservatively estimate that in 1988, about half a million Canadian preschool children are experiencing blood-lead levels at or above 10 µg/dl.[39] Clearly Canadian children have no safety margin against the effects of lead, and swift action is required.

Ongoing concern over these issues recently led the Canadian Medical Association to pass a resolution at its 1987 convention to reiterate its support for a rapid phase-down of lead in gasoline by January 1990 (See Appendix 1).

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39. This estimate assumes a mean blood-lead level of 7 - 8 µg/dl, a geometric standard deviation of 1.42 - from the Ontario Blood-Lead Survey of 1984, in a log normal distribution.

CONCLUSIONS

The Royal Society's report, Lead in Gasoline acknowledged that health effects below 25 µg/dl might be demonstrated when the research underway in 1985 was completed, and that if additional protection of Canadians from these effects was thereby demonstrated necessary, that a move to reduce lead in gasoline by 90% by 1990 was appropriate.

In the opinion of the US Centers for Disease Control, the USEPA, and the international scientific community, health effects of lead well below 25 µg/dl have now been demonstrated. Therefore, more rapid action to remove lead from gasoline as soon as possible is justified.

If the government does not accelerate the removal of lead from gasoline it will be ignoring advice from the Royal Society of Canada, the Canadian Medical Association, the International Joint Commission, the consensus of the international scientific community, and will be falling far behind the measures taken by the Reagan Administration.

The Canadian Coalition for Lead-free Gasoline urgently recommends that the Government of Canada accelerate the schedule for phasing-down lead in gasoline to achieve .026 g/l by January 1990.

CMA POLICY SUMMARY

LEAD IN GASOLINE

The CMA urges the federal government to reduce immediately the lead content of gasoline to no more than 0.29 g/L and to reduce it further, to 0.026 g/L, by Jan. 1, 1990. It is the CMA's position that ultimately lead must be eliminated from gasoline.

In 1983 the federal government revised the 1976 Leaded Gasoline Regulations, stating that the lead content of gasoline must be reduced from 0.77 to 0.29 g/L by Jan. 1, 1987. The CMA welcomed and strongly supported this declaration and issued a statement in 1985 summarizing its policy on lead in the environment. In March 1986 the federal government announced further plans to effectively eliminate lead from gasoline by 1992 and to institute a public awareness campaign to stop misfuelling. The CMA recommended in August 1986 that the Canadian standard match the 0.026 g/L of the US Environmental Protection Agency by Jan. 1, 1990.

It is now well recognized that lead, even small amounts, is highly toxic and has no beneficial effects in the human body. There are several sources of lead release, but the most significant is automobile exhaust. The problem is one of indirect exposure: the lead emitted from exhaust lingers in dust and on the surface of the soil and is not readily absorbed.

Children are the most susceptible to lead poisoning. In urban centres play areas are frequently contaminated with lead from automobile exhaust. Because of their higher rates of metabolism, children are known to absorb larger quantities of inhaled or ingested lead. Relatively low blood lead levels interfere with hemoglobin synthesis and are suspected of causing learning disorders, shorter attention spans, behavioural dysfunction, teratogenic effects, growth inhibition and hypertension.

Arguments persist as to the threshold blood lead levels at which clinical signs and symptoms appear and at which long-term neurologic or hematologic effects become a risk. The CMA believes that lead is a toxic, nonbeneficial substance, and since late effects may not be predictable, lead exposure should be reduced as much as possible.

The CMA encourages governments to adjust immediately federal and provincial gasoline taxes to deter the continued use of leaded gasoline. It is the association's position that lead should ultimately be eliminated from gasoline.

From the 1987 Annual meeting:

"The CMA regrets the recommendation of the Royal Society of Canada to postpone the reduction of lead in gasoline to .026 g/l and requests the federal government to make the move in 1990 as previously recommended."