Publication # 366
ISBN#978-1-77189-378-7

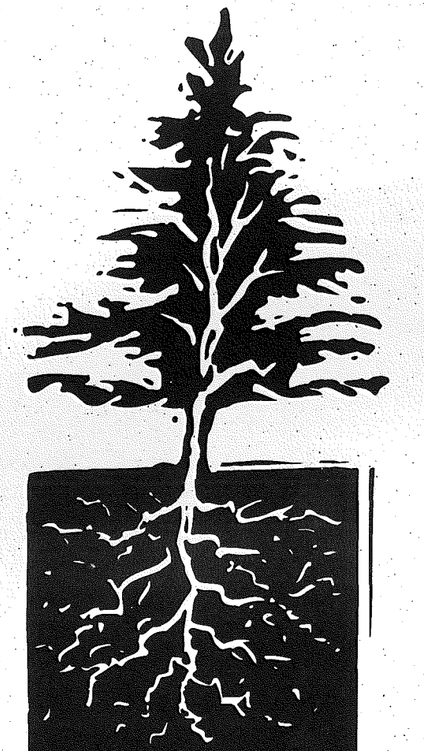
EVERYDAY CARCINOGENS: Stopping Cancer *Before* It Starts

BACKGROUND PAPER FOR THE
MARCH 26 & 27, 1999

Workshop on Primary Cancer Prevention

McMaster University
Hamilton Ontario Canada

"First, do no harm." Hippocrates



"Our great-grandchildren will look back at this period and wonder how we could condemn one third of the population to cancer, when for the last 50 years we've had good evidence that much of this disease could be eradicated."

Ross Hume Hall, Professor Emeritus, McMaster University, Former Co-Chair, Human Health Committee, International Joint Commission

DEDICATION

"What of Jonathan, who lived very gently on the earth, close to the trees, dust, soil and animals? He planted trees and was exposed to pesticides. He ate plentiful fruits and vegetables grown organically in his own garden. But what do we know of our soils, now the repository for the half-spent persistent chemicals we have used to mould nature to our purposes? He breathed the air of the city and was exposed to airborne hydrocarbons. He wore leather and dyed cloth and was exposed to aromatic amines. He drank water and was exposed to trihalomethanes."

(Excerpt from a tribute to Jonathan Vise by his friend Suvendrini Lena, a masters student studying Environmental Health at the Columbia School of Public Health).

Jonathan died in Toronto, November 29, 1998 of Ewing's sarcoma at age 25. He was the son of Mary Vise, the Canadian Environmental Law Association's librarian for 12 years.

Jonathan is one of many we remember who died too soon from cancer, including Maureen Steeves of the Breast Cancer Prevention Coalition, a former Bell Canada employee, and Bud Jimmerman of the Canadian Auto Workers. There is no scientific proof, of course, that their cancers were caused by toxic substances in the environment or hazards in their workplaces. But in their memory we will strive to establish pollution prevention as the cornerstone of Canadian environmental policy and practice, now and in the future. We all have the right to safe and healthy environments, at home, at work – everywhere.

FOREWORD & ACKNOWLEDGMENTS

The contributions of many people have made this workshop and background paper possible. Spurred by a grant from Health Canada to advance cancer prevention in Ontario, a small group of women began to meet following the February 9, 1998 forum, "Towards a Toronto Cancer Prevention Council" held at Victoria College. After several deliberations on how best to begin a cancer prevention campaign, our group felt a workshop to gather health, environment and cancer activists was a good place to begin... We chose Hamilton as our site and enlisted new partners of both genders as the months toward March 1999 flew by. Our Steering Committee now consists of fourteen people of diverse backgrounds:

• Liz Armstrong, Trish Balon, Karen DeKoning, Sheila McNair and Lorna Wilson, Breast Cancer Prevention Coalition • Marjorie Mitchell, Canadian Auto Workers Local 504 • Sarah Miller, Canadian Environmental Law Association • Nancy Kreiger, Cancer Care Ontario • Ruth Grier, Cancer Prevention Interest Group • Otto Sanchez-Sweatman, Hamilton-Wentworth Public Health • Fran Scott, McMaster Institute of Environment and Health • Valerie Hepburn, Toronto Public Health • John Balloch, United Steelworkers of America Local 1005 • Miriam Wyman, Environmental Consultant.

As for the background paper itself, many people helped with research, including Asra Aziz, Jim Brophy, Charmaine Condy, Karen DeKoning, Cecilia Kim, Nancy Kreiger, Lisa McShane, Agnes Moskowitz, Larry Stoffman, Shirley Teng, Cathy Walker and Don Wigle. Others offered numerous suggestions and constructive criticisms during the writing process, the main reviewers being Kathleen Cooper, Valerie Hepburn, Sarah Miller, Ruth Grier, Otto Sanchez-Sweatman, Dorothy Goldin Rosenberg and Paul Muldoon. Any errors, however, and most of the editorial comments are the full responsibility of Liz Armstrong, the main author.

We heartily thank Rachel Gillooly for her meticulous work in conference planning and delivery, Monica Anderson of the McMaster Institute of Environment and Health for all her prompt and cheerful assistance with logistics, Holly Fisher for contributing the artwork for our stationery, Jude Waples of Wee Back Door Designs for design and production of this report, and Linda Rosier for keeping us on time and on track.

It is the hope of our Steering Committee that this report – and our workshop – will begin a powerful groundswell in Ontario for prevention.

We invite you to visit our new website:
www.stopcancer.org

This report was made possible by a contribution from the Population Health Program, Ontario Region, Health Canada. The views expressed herein do not necessarily represent the official policy of Health Canada.

EVERYDAY CARCINOGENS: Stopping Cancer *Before* It Starts

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INTRODUCTION

Given that

- cancer is the number one cause of premature death in Ontario
- cancer is our costliest disease
- cancer affects those who have it and their loved ones in a profound, often anguishing way
- cures for most cancers are still elusive...

We in Ontario need to focus more attention on primary prevention of cancer; that is, stopping cancer *before* it starts.

This workshop, *Everyday Carcinogens*, is not about quitting smoking, or drinking less alcohol, or eating more fruits and vegetables, although these choices are critical to better health and cancer prevention. We all agree that not smoking, or stopping if you do, is the number one way to prevent or reduce lung cancer incidence, since close to 90 per cent of lung cancer is directly related to tobacco use. Lung cancer now accounts for 25 per cent of cancer deaths in Ontario.

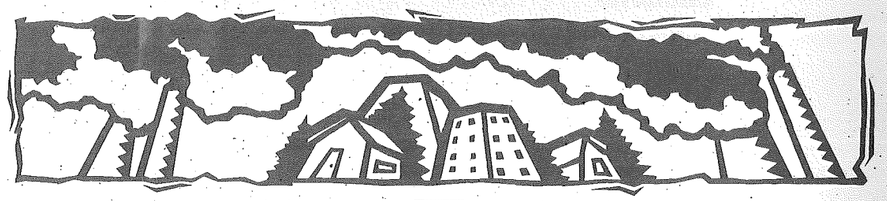
Rather, the primary purpose of this workshop is to focus attention on carcinogens we are all *involuntarily* exposed to in our daily environments - in our homes, at work, in the great outdoors. By *involuntary*, we mean carcinogens we don't choose. These are not naturally occurring cancer agents over which we may have little control, but synthetic substances in our food and water, in the air we breathe, in consumer products we use, and in chemicals at our workplaces. Our exposure to them is often unknown or ignored, and in many instances, entirely avoidable.

The second goal of this workshop is to move beyond discussion of these occupational and environmental exposures, to look at practical solutions and plans of action to prevent cancer.

As the Baby Boomers age, the number of new cancer cases will continue to rise in Ontario. However, almost all cancer funds are currently spent on treatment and cure. If we are to turn the tide against epidemic cancer rates, we must invest additional funds *now* in the primary prevention of cancers linked to everyday carcinogens.

Reducing carcinogens in our daily lives will not only lighten our burden of cancer, it will have other positive effects – for our overall health, for workers in hazardous occupations, for Ontario's overburdened health care system, for the Great Lakes ecosystem – even for the profitability of companies wanting to 'go green.'

Recognizing that scientific knowledge and technological expertise are both crucial to a healthy future, Theo Colborn in *Our Stolen Future* also stated: "Nothing...will be more important to human well-being and survival than the wisdom to appreciate that however great our knowledge, our ignorance is also vast."



There is much that is still unknown about cancer and its environmental and workplace links. Science has its limits and often cannot give us a crystal clear picture. But this should not paralyze us. In the face of uncertainty, our most effective public health tool will be application of the *precautionary principle* – making it a rule to always choose the least harmful way. To get there will require some fundamental changes in law, policy and day-to-day practices to ensure that *pollution prevention* comes first.

Ontario is responsible for nearly half of all toxic chemical and cancer-causing pollutants in Canada.[1] To make matters worse, North American weather patterns cause the Great Lakes bioregion to become a sink for pollutants carried by air from as far away as the southern United States, Central America and beyond. Contaminants from the air 'distill' and descend into the lakes, increasing our cancer risk.[2] To disregard the connection between high cancer rates and the contamination of our ecosystem with carcinogens is to miss a golden opportunity to act for prevention.

The good news is that several excellent programs for reducing and eliminating carcinogenic and other toxic substances are already under way, here in Ontario and around the world. Some don't cost a cent. Most will save money. All will save needless pain and some lives. The challenge is to educate ourselves, build strong coalitions to take action for primary cancer prevention by applying these programs - and the precautionary principle - far and wide.

CANCER IN ONTARIO

Forty years ago, one in four Ontarians was diagnosed with cancer, while one in five died from the disease. In 1999, the odds have worsened: one in three of us will get cancer at some point in our lifetime - one in two if we count non-melanoma skin cancers - and one in four will die from it.

Cancer, the 'epidemic in slow motion', which biologist and writer Rachel Carson described over three decades ago in *Silent Spring* (1962), is apparently gathering steam as the century draws to a close.

On April 8, 1998, a front page story in *The Globe and Mail* stated: "Despite some major medical advances in recent years, the death toll from cancer continues to mount, putting an ever-increasing burden on Canada's health care system." According to estimates by Statistics Canada, the story continued, "about 129,900 people in Canada will be diagnosed with cancer this year, and 62,700 will die of it. This represents a 30 per cent jump from a decade ago in the annual number of new cases. Barring any unforeseen miracles, overall cancer rates are expected to increase by another 30 per cent by 2010."

Much of this increase is occurring because we're getting older, the statisticians explain, since cancer is 'primarily a disease of older Canadians.'[4] The leading

Canada currently ranks among the top ten countries in the world for incidence and mortality from cancer. Every day, 365 Canadians learn they have cancer and 172 die.[3]

edge of the Baby Boom is now over 50, and once this huge bubble of population passes into mid-life and beyond, even more cancers will occur. But is this much cancer in old age really inevitable? Was there this much in the past?[5]

At the other end of the age spectrum, there has been a significant increase in children's cancers over the past 25 years, including a 27 percent rise in leukemia and a 39 percent increase in brain cancer, according to the National Cancer Institute in the United States.[6] Childhood cancer, while comparatively rare, is diagnosed in over 900 Canadian children 14 years of age and younger every year.[7]

Another reason cited for the general rise in cancer incidence in Canada is earlier and better detection. For example, prostate cancer rates, already increasing steadily, shot up artificially in the early 1990s because of a new blood test which detected more cancers at an earlier stage. However, some cancers are never detected, even at death, and hence do not become part of our cancer statistics.

Even taking these age and early detection factors into account, overall cancer incidence - the amount of cancer that occurs for every 100,000 people - is still on the rise.

Looking at Ontario statistics more closely, age-standardized incidence rates for some cancers are down. The decline in stomach cancers for both men and women may be attributable to improved diet and food preservation over the decades, according to the Ontario Cancer Registry.[8] Lung cancer in men is declining, attributable to a decrease in smoking (while incidence and mortality for women have risen as smoking has increased). Colorectal cancers continue to decrease for both men and women, although rates in Ontario are still among the highest in the world. Incidence of cervical cancer for women has also lessened since routine screening programs began to detect pre-cancerous lesions during the 1960s.

AGE-STANDARDIZED CANCER INCIDENCE

Counting new cancers each year is necessary to help health agencies plan treatment and care for cancer patients. To compare cancer incidence over time, however, simple counts don't work because Canada's population is growing larger *and* aging at the same time. Hence, to get a more accurate picture of cancer trends, it's necessary to standardize new data: weight it to match age distribution in a census year (1991 is the benchmark for Ontario and Canada at this point) and compare it to a fixed number of people (that is, cancers per 100,000) rather than a constantly growing total population.

That said: The age-standardized rate for all cancers in men has increased from 335 new cases cancer annually for every 100,000 Canadian males in 1969, to an estimated 500 in 1998. For all cancers in Canadian women, the rate has increased from 280 per 100,000 in 1969 to an estimated 345 in 1998.[9] Actual Ontario rates in 1996 were lower than Canadian rates as a whole: for men age-adjusted incidence was 440 per 100,000; for women it was 337 per 100,000.[10] With respect to mortality, there has been little overall change in the risk of dying from cancer since 1964, the year when the Ontario Cancer Registry was established.

The trend lines for many other cancers are on the rise, however, and several of these have acknowledged links to occupational and environmental hazards.[11] Included are some of the less well-known cancers, such as non-Hodgkin's lymphoma, soft tissue sarcoma, multiple myeloma, melanoma (skin cancer), and cancer of the brain and central nervous system. Rates for two very high profile cancers – breast and prostate – also continue to rise, with some evidence that at least part of this increase may be linked to exposure to synthetic hormones (known as 'endocrine disruptors') in many pesticides, pharmaceuticals, plastics, and a wide range of other products and their ingredients. Cancer of the testes, another hormone-dependent cancer, is also on the increase. (Look closely at the chart below for age-adjusted and percentage changes.)

It's difficult to put a precise figure on how many cancer deaths are caused by occupation and 'environmental' hazards combined – much depends on the definition of environment. Even calculating workplace cancers alone, it adds up to many lives lost prematurely to cancer every year.[12] For all of Canada, the annual figure is 5,400 cancer deaths; Ontario's share is more than 2,000 deaths.

For purposes of this report, we are defining 'environmental carcinogens' as all synthetic – man-made – substances in our air, water, food and soil, as well as products we use and consume, including pharmaceutical drugs, that can cause cancer, or contain ingredients that are carcinogenic. These are the carcinogens of our everyday lives.

ONTARIO CANCER RATES RISING, FALLING

	30 years (1966-1996) % Increase/Decrease		1966 Actual New Cases	1996	1965/66/67 per 100,00 population	1994/95/96	1965/66/67 per 100,000 population	1994/95/96
	Women	Men	Women & Men		Women		Men	
Breast	+29%		2,355	6,234	75.91	98.04		
Cervix	-59		792	596	26.50	9.91		
Uterus	+11		509	1,214	16.80	18.58		
Prostate		+102%	1,210	5,844			56.74	114.78
Testis		+65	84	272			3.02	4.98
Larynx	+66	+80	184	398	0.64	1.06	6.23	6.28
Lung	+349	+30	1,832	6,408	8.75	39.26	58.31	75.78
Melanoma	+116	+273	166	1,366	4.72	10.21	3.43	12.8
Kidney	+66	+47	325	947	4.41	7.35	8.39	14.04
Thyroid	+146	+133	142	729	3.74	9.21	1.34	3.12
Hodgkin's	+47	-15	179	306	2.41	3.56	3.83	3.27
Mult. Myeloma	+60	+79	137	552	2.53	4.04	3.45	6.19
Oral cavity	+11	+3	416	1,021	4.75	5.29	11.82	12.17
Colorectal	-11	+13	2,764	5,898	47.16	42.14	53.66	60.81
Brain	+56	+35	332	690	3.99	6.24	6.08	8.19
Non-Hodgkin's	+106	+115	422	1,833	6.48	13.32	8.87	19.06
Leukemias	+15	+16	587	1,360	7.82	9.00	12.17	14.17
Esophagus	-4.4	-7.5	221	476	2.27	2.17	6.55	6.06
Stomach	-56	-52	1,015	1,032	12.99	5.72	25.33	12.22
Pancreas	-2.0	-22	567	1,041	7.91	7.75	12.37	9.62
All sites	**+18%**	**+31%**	**17,386**	**45,129**	**286.54**	**337.38**	**342.50**	**448.84**

The age-standardized percentage increases/decreases of cancer rates, and rates per 100,000 population were calculated taking averages from three year periods – 1965-67 and 1994-1996 – to reduce the effect of single year aberrations. Raw data was provided by Cancer Care Ontario.

TYPES OF CANCER

There are five major types of cancer:

- ***carcinomas*, which account for more than 80 per cent of the cancers diagnosed in Canada, occur in the tissues of various body organs, such as the breast, lung, kidney, prostate and liver**
- ***sarcomas* occur in bone, cartilage, fibres and muscles of connective tissue**
- ***myelomas* occur in bone marrow**
- ***lymphomas* occur in the lymphatic system**
- ***leukemias* occur in the blood system**

The National Post, Tuesday January 26, 1999

More Men Suffer From Testicular Cancer

'Something strange is going on': 60% increase in Ontario

By Brad Evenson

The rate of testicular cancer, often called the "young man's disease" because most get it before their 40th birthday, has risen by 60% in the past 35 years in Ontario.

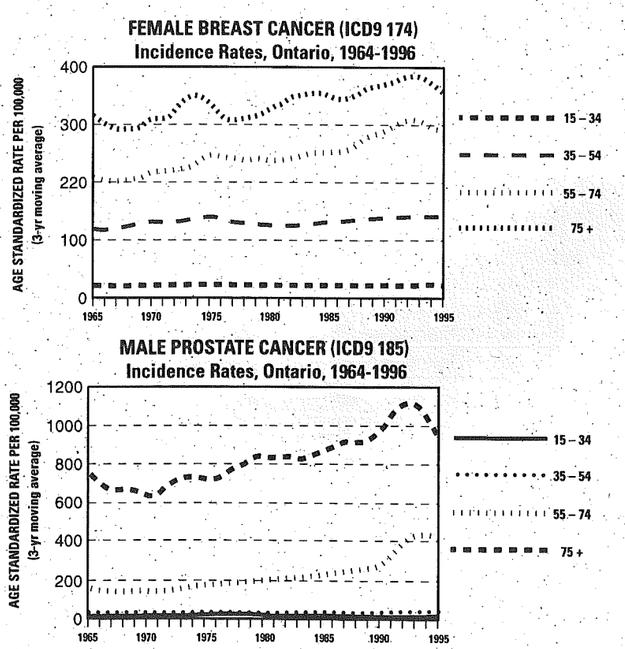
The statistics are similar across the country. And not only are its victims getting younger, evidence suggests the rise in testicular cancer is linked to a worldwide phenomenon of shrinking testes, genital deformities, and low sperm counts. Some scientists believe the culprit could be exposure to such organic chemicals as DDT and PCBs, which disrupt the body's endocrine system.

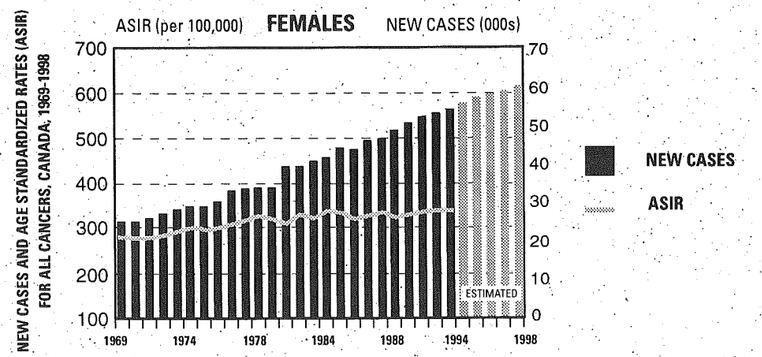
"This rise has been reported throughout the Western world, so it doesn't seem like that much of an inference to conclude that something strange is going on," said Dr. Laurence Klotz, a professor of surgery at the University of Toronto... A study published today in the *Canadian Medical Association Journal* says although testicular cancer is rising at about 2% a year in Ontario, there have been great advancements in treatment. What is more mysterious are its causes.

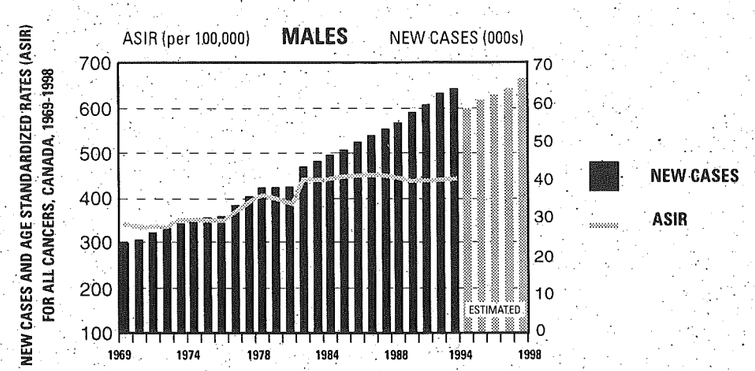
Dr. Klotz, a leading Canadian authority on testicular cancer, said it usually begins in the fetus, when male sex organs are being formed. "The testicle is extremely sensitive to hormonal influences in utero. And if those hormonal influences are deranged even mildly, you get what's called dysgenesis, meaning you get malformation of the cells," he said.

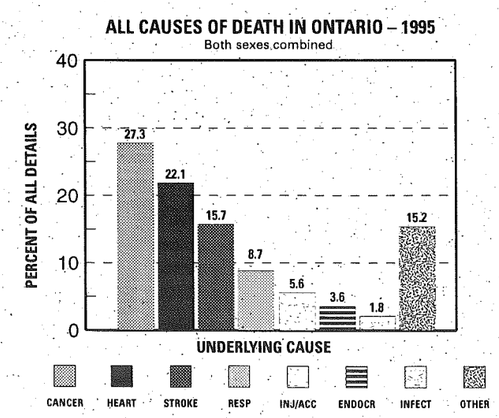
When a boy hits puberty and his testicular cells undergo rapid growth, these malformed cells can cause cancer. One reason the average age of victims is getting younger is because boys – like girls – now reach puberty earlier. In 1965, there were 69 cases of testicular cancer reported in Ontario males aged 15 to 29. In 1995, there were 215...[13]

Some scientists believe the culprit could be exposure to such organic chemicals as DDT and PCBs, which disrupt the body's endocrine system.









While cancer is 'primarily a disease of the elderly,' according to *Canadian Cancer Statistics 1998*, 22 per cent of breast cancer cases occur in women under age 50 and fully 66 per cent of cases are in women under 70. Twenty-two per cent represents 4,250 Canadian women under 50 who are diagnosed with breast cancer every year; nearly 13,000 are under 70.

WHAT IS CANCER? AND HOW DOES IT OCCUR?

"The physician who is an honour to the medical profession is one who has a due regard to the seasons of the year and the diseases which they produce – to the states of the wind peculiar to each country and the qualities of its waters – who marks carefully the localities of towns and of the surrounding country, whether they are low or high, hot or cold, wet or dry – who, moreover, takes note of the diet and regimen of the inhabitants and, in a word, of all the causes that may produce disorder in the animal economy."

Hippocrates in *"Airs, Waters and Places"*

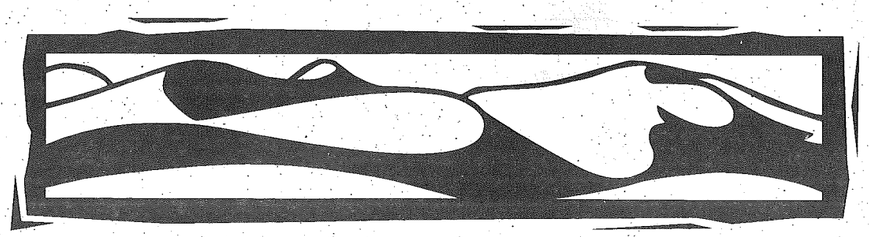
Cancer is not a single disease, as we usually think, but many diseases with a common trait. "Cancer is a general term for more than 100 diseases characterized by the uncontrolled, abnormal growth of cells in different parts of the body that can spread to other parts of the body," *The Cancer Dictionary* explains.[14]

How does cancer occur? It begins as a result of damage to our genes. Cancer historian Robert Proctor explains that while all cancer is 'genetic', it can happen two ways – either we inherit it, or it is caused by other factors that occur during the course of our lives. Only a small fraction of cancers – about one to 15 per cent, depending on the type of cancer – are inherited via defective genes from our parents. The rest result from injuries to our genes during our own lifetime.[15]

Genes can be damaged when routine errors occur during cell division. But in Sandra Steingraber's phrase, 'sabotage by carcinogens' also occurs. "This process can happen through numerous pathways," she says, and it is a highly complex process. The human body is equipped with mechanisms to fend off both mistakes in cell reproduction and carcinogens. But after many insults, these protective mechanisms can break down or become overwhelmed. "Fortunately, the carcinogenic process is lengthy and complicated, often requiring decades to unfold. It is also capable of being arrested at many points along the way." [16]

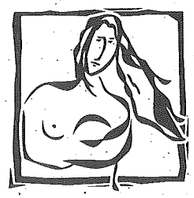
Peter Montague describes the development of cancer in these simple terms:

> *"Damaged ('initiated') cells are likely to be removed from the body by a natural process called 'apoptosis'. (Therefore anything that interferes with apoptosis may encourage cancer without being recognized as a carcinogen.)*
>
> *An 'initiated' cell that survives apoptosis does not begin to grow uncontrollably until several more things happen to it. The cell has to be 'promoted' by agents (such as x-rays or certain chemicals) that interfere with the ordinary messages being transmitted back and forth between the cell and the body it inhabits. In some instances, estrogen (female sex hormone) can 'promote' cancer cells. The result of 'promotion' is an expanded cluster of abnormal cells, waiting to become true cancers.*



> *Still these promoted cells do not multiply uncontrollably unless something else happens to them. The 'something else' is called progression and it results from more physical injury to the cell's DNA – and progression in all likelihood requires more than one physical injury. Again, x-rays and certain chemicals (in cigarette smoke, for example), might cause progression. Thus cancer is a multi-step process, requiring perhaps 5 or 6 (or more) 'insults' to a cell before cancer develops.*
>
> *A cell that has been sufficiently damaged takes on fearsome properties – it becomes more sensitive to hormones, it can spread and invade other parts of the body, and it develops a knack for attracting blood vessels to nourish the growing tumor. It is now a cancer and, left alone, it will multiply (grow) until it kills its host.*
>
> *Very few things have the ability to initiate cancer and promote it and make it progress. Things that can do this are called 'complete carcinogens.' Radiation is a 'complete carcinogen' (including cosmic radiation from outer space, which we cannot avoid) but most carcinogens are not – most carcinogens either initiate cancer or promote it or cause it to progress."*[17]

"The human body is equipped with mechanisms to fend off both mistakes in cell reproduction and carcinogens. But after many insults, these protective mechanisms can break down or become over-whelmed."



CONTAMINATED BREAST MILK

Who would allow an infant to ingest low concentrations of several hundred synthetic poisons with every mouthful of their mother's milk? Unwittingly we *all* do – certainly all of us in 'developed' countries. It's also likely that every breastfed baby in the world is now getting some man-made toxins in mother's milk. That's how thoroughly we have drenched our environment with contaminants – and how efficiently air and water currents cast them to the far ends of the earth where they biomagnify up local food chains.

"Scientists first discovered that human breast milk was contaminated with DDT in 1951," Peter Montague reports in Rachel's Environment and Health Weekly. "DDT, like many other chlorinated organic chemicals, is soluble in fat but not very soluble in water, so when it enters the body it is not easily excreted and builds up in fatty (adipose) tissue. The main way that females excrete such chemicals is through their breast milk."[18]

Some of these contaminants are known carcinogens. The terrible irony of this situation is that women who breastfeed have a lower lifetime risk of breast cancer, probably because they discharge carcinogens and other toxins from their breasts as they feed their children.

Here we insert the requisite statement that – despite these traces of toxins – breastfeeding is a practice that offers far more benefits to babies than feeding them infant formula. It's still a good thing to do, and in recent years, contamination of breast milk has declined from the high levels reported in the 1970s.

However, more outrage about tainted breast milk is warranted, as is the need for more funding for research on the primary prevention of cancer and other diseases. Canadian scientists recently discovered aromatic amines (AAs), a possible breast carcinogen, in human breast milk for the first time, as reported in the peer-reviewed journal, *Chemical Research in Toxicology* in January 1999. "Chronic exposure of the general population to AAs is a matter of public health importance," write David Josephy and Lillian DeBruin from the University of Guelph along with Janusz B. Pawliszyn at the University of Waterloo. "The presence of AAs in human milk implies that breast ductal epithelial cells, the target of mammary carcinogens, are also exposed."[19] AAs were also found by the researchers in the breast ductal fluid of non-pregnant, non-lactating women, meaning all women are vulnerable.

Aromatic amines are used in the production of plastics, pesticides, pharmaceuticals and dyes, including food dyes that colour soft drinks. In the environment, AAs are found in industrial waste, air and water pollution, tobacco smoke and diet – now including breast milk.

"We need to discover the major sources of these exposures," says Dr. Josephy, lead researcher from Guelph. "Control of (these contaminants) might ultimately help to lessen breast cancer risk, and possibly the risk of some other cancers."

But research into prevention is a hard sell – where's the profit in it? – and in mid-March, Dr. Josephy and his colleagues were still hunting for grant money in Canada to continue their work.

NATURAL VERSUS SYNTHETIC CARCINOGENS

Carcinogens are not rarities. We encounter hundreds of them in our daily lives.[20] A wide variety of cancer-causing agents, such as solar radiation and radon gas, are naturally present in our environment. Certain substances in food are carcinogenic, such as aflatoxins, which occur in moldy corn, nuts, peanut butter, bread, cheese and certain fruits. Piperone in black pepper and alkaloids in some herbal teas and honeys contain carcinogens. In addition, some biologic agents can cause cancer, such as the Epstein-Barr and Hepatitis B and C viruses. One of the risk factors for breast cancer is a woman's lifetime exposure to the natural estrogens her own body creates; the longer her exposure, the higher the risk of contracting breast cancer.

Some of earth's substances are benign until they're extracted, refined and used in the manufacturing of various products. Five examples are asbestos, uranium, arsenic, silica and nickel. The processes of mining, milling and/or smelting ores containing these materials make them carcinogenic to workers. This is a major issue in Canada, since asbestos, uranium and nickel mining are substantial industries. End products from some of these materials are also carcinogenic – asbestos fibres in fire-retardant insulation and roofing materials are two examples.

But to these naturally occurring substances (and the processes of extracting, modifying and using them), humans have added many more. Most synthetic carcinogens are the product of the chemical and nuclear revolutions which began during the Second World War. Since the 1940s, over 75,000 new chemical combinations created in labs have made way into commerce and our everyday lives – plastics, pesticides, pharmaceuticals, insulators, paints, dyes, detergents, degreasers, and so on. Great Lakes scientists say that within three months after the release of a newly invented chemical, it can be detected in the flesh of Great Lakes fish.

How safe are these substances? As the Environmental Defense Fund says in its 1998 report, *Toxic Ignorance*, "Even the most basic toxicity testing results cannot be found in the public record for nearly 75 per cent of the top-volume chemicals in commercial use."[21]

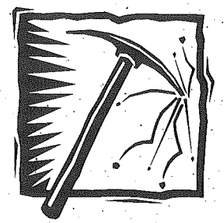
And how many of these synthetics are carcinogenic? Again, very difficult to say. Ellen Connett, editor of the newsletter, *Waste Not*, in Canton New York, recently combined several of the recognized carcinogen lists[22] to yield the *Citizens' Guide to Human Cancer*, which concluded that there are "667 chemicals, substances, mixtures, agents and medical treatments, which have been identified as 'known to cause human cancer.'... In identifying the uses of these chemicals," Connett writes, "we found that the four main ones were in the manufacture of plastics, pharmaceuticals, pesticides and dyes."[23]

Since the 1940s, over 75,000 new chemical combinations created in labs have made way into commerce and our everyday lives.

"Even the most basic toxicity testing results cannot be found in the public record for nearly 75 per cent of the top-volume chemicals in commercial use."

Connett adds: "Despite their known carcinogenicity, these chemicals have become an integral part of ...global commerce. Even more disturbing is that we believe this list is the tip of an even larger iceberg, since many thousands of other chemicals, in daily use, have not been examined for their cancer-causing potential."

One class of the known cancer-causing agents is artificial 'ionizing'[24] radiation. This includes the fallout from atomic bombs, medical x-rays and mammograms, routine emissions and waste products from around nuclear power plants, as well as other nuclear spills and accidents, both small and large. According to Dr. Rosalie Bertell of the International Institute of Concern for Public Health in Toronto, virtually every human body tissue has been associated with radiation-induced cancer, but some tissues, such as the breast, lung, thyroid, stomach, colon, liver and skin, appear to be more sensitive than others. The largest source of artificial radiation released into the environment has come from atmospheric nuclear weapons tests, particularly in the 1950s and early 1960s.



Electromagnetic fields (EMFs) are another source of man-made radiation. This 'non-ionizing' radiation has been linked in several studies to cancer, notably childhood leukemia and breast cancer.[25] EMFs are invisible lines of force which radiate from all sources of electricity, including transmission and distribution lines, transformers, interior home wiring and electrical appliances, gadgets and machinery. In June 1998, an international panel of experts convened by the U.S. National Institute of Environmental Health Sciences reported that electrical and magnetic fields such as those surrounding electric power lines should be regarded as a "possible human carcinogen."[26] While some critics dismiss the connection between EMFs and cancer and call for an end to this research, there is enough of a positive association to warrant 'prudent avoidance' of EMFs wherever possible.

Scientific debate over the role of natural versus synthetic carcinogens is vigorous. Over the years, some scientists have argued that natural carcinogens, mainly in food, are likely to pose a far greater cancer hazard than the man-made variety.[27] In the 1970s, Berkeley biochemist Bruce Ames developed a test to estimate the cancer-causing potential of substances using bacteria instead of animals, then wrote a series of articles warning of increasing cancer rates and the need for tough regulation for industrial carcinogens. By the early 1980s, however, his opinion had changed, and he began describing the abundance of natural carcinogens. This was not to frighten people *more* about cancer-causing agents, Ames said, but to relieve old fears. "Our world is full of carcinogens ...Fortunately, almost all of these are present in tiny doses which pose no real danger."[28]

Two decades before, in *Silent Spring*, biologist Rachel Carson had maintained it *was* tiny doses that made the difference. "The most determined effort should be made to eliminate those {synthetic} carcinogens that now contaminate our food, our water supplies, and our atmosphere, because these provide the most dangerous type of contact – minute exposures, repeated over and over, throughout the years."[29]

John Wargo, author of *Our Children's Toxic Legacy*, writes: "If anything, an awareness of our exposure to natural carcinogens should generate greater urgency toward eliminating the avoidable synthetic ones. Moreover, natural carcinogens in foodstuffs present only one route of exposure. Unlike their synthetic counterparts, plant-generated chemicals do not spill into waterways, pollute groundwater, contaminate sport fish, waft up from dump sites or drift into other continents. Presumably, natural carcinogens have not skyrocketed in production over the past half century. They cannot explain the coincident rise in cancer rates."[30]

Public health scientist Devra Lee Davis of the World Resources Institute notes that "natural carcinogens can often be dismantled by human enzymes before they cause harm or, in the case of fruits and vegetables, are often accompanied by equally potent anti-carcinogens."[31] Grassroots activist Ellen Connett adds that few natural carcinogens are long-lived. "Mother Nature seldom puts materials into the environment which are persistent, and thus do not accumulate in the food chain or our tissues."[32]

As the circular debates on cancer culprits rage on, are we losing sight of the need to act?

"If anything, an awareness of our exposure to natural carcinogens should generate greater urgency toward eliminating the avoidable synthetic ones."

John Wargo, *Our Children's Toxic Legacy*

HERE-WE-GO-AGAIN DEPARTMENT:
ATTACK OF THE KILLER VEGGIES

The Washington Times uses the U.S. National Research Council report "Carcinogens and Anticarcinogens in the Human Diet," which was issued three years ago, to contradict last week's Consumers Union study that showed "even a single daily serving of some produce can deliver unsafe levels of toxic pesticide residues' for young children." *The Washington Times* says the NRC report said "the dose makes the poison, not the substance itself...the risks are purely hypothetical [because] the restrictions that agencies like the Environmental Protection Agency put on pesticide residues are based not on studies of humans but of lab rats...[and] there may be far more naturally occurring, 'wild' pesticides and chemicals - that plants use to protect themselves - in the food supply than the man-made variety."[33]

(The Washington Times, February 23, 1999, page A16.)

The state-of-the-debate should not be whether natural carcinogens are more potent than man-made ones, but focus instead on all ways and means of eliminating synthetic toxic substances. It can be done! (See *Textiles Without Toxins*, page 41).

HOLMES, DEADLY HOLMES

Asbestos is one of the best known and well studied workplace carcinogens, with an ability to induce cancer and respiratory disease at relatively low levels of exposure. Although this fact was reported in the medical literature as early as the 1930s, it was Dr. Irving Selikoff and his colleagues at Mount Sinai Hospital, New York in 1964 who documented the excess disease caused by asbestos and brought it to public attention. Their findings revealed very high rates of cancer, including cancer of the lung, larynx and gastrointestinal tract. Asbestos was also shown to cause a fibrotic lung disease, called asbestosis, and mesothelioma, a fatal cancer.

One of the most dramatic Canadian examples of excess exposure to asbestos is now unfolding in Sarnia, Ontario where more than 300 former workers from two now-defunct Holmes insulation facilities (one known as the Caposite plant) are filing compensation claims for occupation-related diseases, including many cancers, believed related to their work at these plants.

During the 16-year period, from 1958 to 1974, when the Caposite plant closed and the Holmes facility moved to another location in Sarnia, government inspectors sampling asbestos fibres in air at Caposite recorded "counts {that} were the highest ever encountered by this Branch in any of the plants in Ontario." In 1958, the company and the health ministry (responsible for health and safety at the time) exchanged letters acknowledging the potential health hazards of asbestos exposure and, later that year, found levels 28 times higher than the existing standard. At the time, no orders or directions to reduce fibre levels were issued.

The ministry did not return for nine years. Then, in 1967, inspectors took 34 air samples, of which only five were below the legal limit in place at the time. Nine directions for asbestos handling and ventilation were issued; not one was followed up by the company or enforced by the government. Five years later, in 1972, the next check revealed exposures that were 8520 times higher than the current Ontario limit. Following 29 more orders and directions - all ignored - the Caposite plant was ordered shut down. This 1973 'cease production' command was also ignored.

How bad was the plant? Ontario's Royal Commission on Asbestos defined the Johns Manville plant in Scarborough as a 'world class industrial disaster' given the level of asbestos exposure tolerated at that facility. Yet, compared to the Holmes' Caposite plant, Manville was almost pristine. The highest level recorded at Manville was in the 40 fibres per cubic centimetre range; at Caposite, the air samples reached an astronomical 852 fibres per cc.

The Workers Safety and Insurance Board has recognized 51 of 54 deaths from occupational cancers at Holmes, a number twice that of workers who lost their lives at the Westray mine disaster in Nova Scotia.

(From material provided by Jim Brophy, Executive Director, Occupational Health Clinic for Ontario Workers, Windsor)

CARCINOGENS IN THE WORKPLACE

When it comes to exposure to involuntary carcinogens, workers are on the front line. In fact, a great many known and suspected human carcinogens were first recognized where people work. The English physician Percival Pott discovered in 1775 that chimney sweeps suffered an excess of scrotal cancers resulting from exposure to soot and tar. In 1879, two German physicians identified the 'mountain sickness' suffered by silver and uranium miners as lung cancer. In 1895, the link between synthetic aniline dyes and bladder cancer was initially detected. These were the first in a series of discoveries about workplace-related cancers. Many culprit substances were new chemicals introduced during the Industrial Revolution.[34]

These days, workers in at least sixty different occupations experience elevated death rates from cancer, Sandra Steingraber writes. "Farmers from industrialized countries around the world {that is, those who use pesticides and other toxic petrochemical products on their land} exhibit consistently higher rates of many of the same cancers that are also on the rise among the general population... Elevated cancer rates are also found among painters, welders, asbestos workers, plastics manufacturers, dye and fabric makers, firefighters, miners, printers and radiation workers."[35] While blue collar workers bear the brunt of exposure to cancer-causing agents, other occupations also have increased incidence: "People who work in a number of so-called professional jobs are also at higher risk: for example, chemists, chemical engineers, dentists and dental assistants and – perhaps most ironically – chemotherapy nurses. Many of the chemicals used to treat cancer are themselves carcinogenic to patients, as the high rate of adult cancers among childhood leukemia survivors attests."[36]

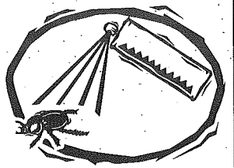
Research related to occupations and cancer has traditionally been carried out on males. However, since there are now over 70 million women who work outside the home in Canada and the United States, new connections are being made. A recent report in *The Washington Post* about a conference on the health of women in the workplace noted that several occupational cancers are emerging vis-à-vis women. "In the agricultural sector, where women are exposed to pesticides, fuels and sunlight, they are showing elevated rates of cancer, including ovarian, one of the deadliest," wrote *Post* writer Judy Mann in her coverage of the conference on September 18, 1998. "Elevated incidence of bladder and nasal cancers are showing up in the textile industry. Women who work at dry cleaners are showing elevated rates of esophageal, kidney, bladder and ovarian cancers, as well as leukemia."[37]

Even much of this information is based on old data. As Sheila Hoar Zahm of the U.S. National Cancer Institute commented, "Many women are in new industries, such as the semiconductor industry, and there are no studies yet available on how they are faring."[38]

See Appendix A: *Occupational Risks for Cancer*

"It is not uncommon for workers in Ontario to experience exposures to toxic substances such as metalworking fluids, diesel exhaust and benzene at many times their safe level."

Jim Brophy, Occupational Health Clinic for Ontario Workers, Windsor



"If truckloads of dust with the same concentration of toxic chemicals as is found in most carpets were deposited outside, they would be considered hazardous-waste dumps."

CARCINOGENS AT HOME

We tend to think of our homes as a refuge, but they're apparently not a sanctuary from pollutants. *Scientific American*, in a February 1998 article entitled 'Everyday Exposure to Toxic Pollutants' reported: "Most citizens [are] likely to have the greatest contact with potentially toxic pollutants not outside but inside the places they usually consider to be essentially unpolluted..." including their homes, cars and offices.[39]

Actually, this is not 'news'. Many studies of indoor air quality, including these, were done in the 1980s. And the results were consistent: Because indoor air pollutants are not as easily dispersed or diluted as outdoor pollutants, concentrations of toxic chemicals are often much higher, with peak concentrations of twenty toxic compounds – some linked with cancer and birth defects – 200 to 500 times greater inside than outdoors. If outdoor levels were as high as the Environmental Protection Agency (EPA) and others found indoors, there would be a loud and sustained cry for tougher air quality standards. Given our colder climate, Canadians are even more at risk since we spend more time indoors.

Dr. Samuel Epstein, in *The Safe Shopper's Bible*, points out the disturbing irony that workers employed in manufacturing toxic product are "usually healthy, receive training in the handling of hazardous chemicals, are provided with protective clothing, and are exposed for eight hours or less each day." Women who stay home, and their children, on the other hand, "receive no warning about hazardous ingredients or training in the handling of products containing hazardous substances. Nor are they provided with protective clothing and may be exposed up to 24 hours a day."[40]

The main sources of 'home' pollution are "right under people's noses," *Scientific American* says, including "moth repellents, pesticides, solvents, deodorizers, cleansers, dry-cleaned clothes, dusty carpets, paint, particleboard, adhesives, and fumes from cooking and heating, to name a few." A final thought: "If truckloads of dust with the same concentration of toxic chemicals as is found in most carpets were deposited outside, they would be considered hazardous-waste dumps."[41]

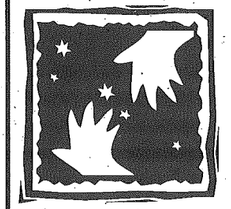
See Appendix B: *Everyday Carcinogens at Home*

SMALL PEOPLE, BIG PROBLEMS

"The pesticides and volatile organic compounds found indoors cause perhaps 3,000 cases of cancer a year in the U.S., making these substances just as threatening to nonsmokers as radon (a natural radioactive gas that enters many homes through the foundation) or secondhand tobacco smoke. And toxic house dust can be a particular menace to small children, who play on floors, crawl on carpets and regularly place their hands in their mouths. Infants are particularly susceptible: their rapidly developing organs are more prone to damage, they have a small fraction of the body weight of an adult and may ingest five times more dust -100 milligrams a day on the average. Before 1990, when the EPA and U.S. Department of Housing and Urban Development established standard methods for sampling dust on carpets, upholstery and other surfaces, it was difficult to quantify the risk to children. Since then, however, improved techniques have allowed scientists to make more concrete statements about the degree of exposure. For example, we can now estimate that each day the average urban infant will ingest 110 nanograms of benzo(a)pyrene, the most toxic polycyclic aromatic hydrocarbon. Although it is hard to say definitively how much this intake might raise a child's chance of acquiring cancer at some point, the amount is sobering: it is equivalent to what the child would get from smoking three cigarettes.

The research also points out that, for small children, house dust is a major source of exposure to cadmium, lead and other heavy metals, as well as polychlorinated biphenyls and other persistent organic pollutants. Carpets are most troublesome because they act as deep reservoirs for these toxic compounds (as well as for dangerous bacteria and asthma-inducing allergens, such as animal dander, dust mites and mold) even if the rugs are vacuumed regularly in the normal manner. Plush and shag carpets are more of a problem than flat ones; floors covered with wood, tile or linoleum, being the easiest to clean, are best."

(*Scientific American*, February 1998, *'Everyday Exposure to Toxic Pollutants'*)



"When we place children's health at the centre of our concern about environmental pollution... government policy makers and regulators will need to re-examine their environmental standards, risk assessment procedures, and exposure calculations for contaminants in the environment, based on the greater vulnerability of our children."

Monica Campbell, Toronto Public Health

CARCINOGENS IN THE ENVIRONMENT - AT - LARGE

As St. Catharines' cancer activist Meryle Berge often says, "Pollution knows no boundaries." Toxic substances, particularly the long-lasting variety, have the ability to travel astonishing distances. The excellent 1996 book about hormone disruptors, *Our Stolen Future*, describes how molecules of PCBs made in 1947 by Monsanto's chemical production plant in Alabama might now be found virtually anywhere in the world: "...in the sperm of a man tested at a fertility clinic in upstate New York, in penguins in the Antarctic...at a sushi bar in Tokyo, in monsoon rains falling on Calcutta."[42] While these toxins can journey to the ends of the earth, they also make their way into mother's milk both here at home and abroad. While they cross continents, they also cross placentas.

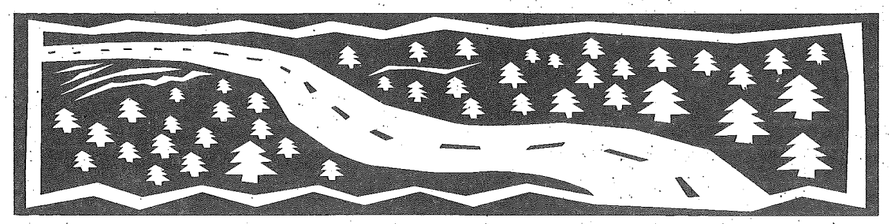
The closer people are to sources of carcinogens, the higher their exposure, and ultimately the higher their cancer rates. One can be exposed through food, water, air, dermally (through skin), or a combination of these pathways. This is not rocket science, but the epidemiology studies are now catching up to common sense.

A few examples from recent research illustrate how carcinogens in the environment-at-large are boosting overall cancer incidence:

- Ontario residents who drink and use chlorinated water over long periods have higher rates of bladder cancer (see page 30).
- A 1997 British study showed an association between childhood leukemias and nearby environmental hazards, such as industries that involve large-scale use of petroleum or chemical solvents, including oil refineries, air fields, paint makers and foundries.[43]
- Several large studies have revealed higher cancer rates around toxic waste sites, including one New Jersey investigation that showed higher death rates for stomach and colon cancers in communities near hazardous waste sites.[44]
- A 1974 study by the New York State Department of Health showed a significant association between living near chemical plants and the risk of developing breast cancer.[45]
- A recent Kentucky study revealed a connection between triazine herbicides (such as atrazine) and breast cancer; the counties with the highest rates of triazine herbicide use had the highest breast cancer rates.[46]
- A new study of the children's leukemia cluster in Woburn, Massachusetts (the focus of the recent feature film, *A Civil Action*, based on a book of the same name), traces the cancers back to consumption of drinking water laced with solvents that the mothers of these children drank when they were pregnant.[47]

Every year in Canada, over 50 million kilograms of pesticides are used on crops, forests, lawns, gardens and animals. There are about 6,000 pesticide products, formulated from approximately 500 active ingredients and a variety of 'inert' ingredients.

World Wildlife Fund



CANCER: THE PREVENTABLE DISEASE

In the 1950s, John Higginson, a cancer epidemiologist and director of the World Health Organization's International Agency for Research on Cancer (IARC) in France, compared cancer rates worldwide, calculated the differences from place to place, then declared that 80 to 90 per cent of all cancers were caused by 'environmental factors'.[48] "Higginson defined environment as one's total life experience: marital status, what you eat, where you live, where you work, the air you breathe, the food and water you take in," explains Ross Hume Hall, former co-chair of the Human Health Committee of the International Joint Commission, in the March-April 1998 issue of *The Ecologist*. "Higginson did not believe in a single cause, but rather that a constellation of interacting factors leads to the disease. 'Cancer is preventable... if we identify and are able and willing to deal with these factors.'"[49]

In 1964, an expert committee of the World Health Organization confirmed Higginson's claim about the percentage of cancers that were preventable. The committee agreed that more than three-quarters of human cancers – over 80 per cent – fell into the preventable category when what it called 'extrinsic' factors were taken into account. 'Extrinsic' was very nearly synonymous with Higginson's broad definition of 'environment'. As Sandra Steingraber explains in her book, *Living Downstream*, geneticists believe 'environmental' includes everything beyond a cell membrane, including hormones, vitamins, caffeine, drugs, etc. Ecologists, on the other hand, think of the environment as everything outside one's own skin. But these two approaches are not contradictory, Steingraber writes. "What we drink, inhale, and find to eat in the environment external to ourselves quickly becomes our internal environment."[50]

"What we drink, inhale, and find to eat in the environment external to ourselves quickly becomes our internal environment."

IN THE KILLING FIELDS

A Japanese study performed in 1979 found that an alcoholic extract of a local plant, *taraxacum officinale*, administered to mice for 10 days, markedly inhibited the growth of inoculated Ehrlich ascites cancer cells within a week after treatment. A freeze-dried, warm-water extract of the plant's root was patented by the Japanese in 1979 for use as an anti-cancer agent. These and other findings lend support to the Chinese use of this plant for breast cancer.

For over a century, *taraxacum officinale* was regarded as an official drug in the United States, and the dried root remains listed in the U.S. pharmacopoeia. Its primary pharmacological activities relate to digestion, liver function and diuresis. High in inulin, this plant has demonstrated experimental hypoglycemic activity in several animal studies. Because insulin is composed of fructose chains, it may act to buffer blood glucose levels, thus preventing sudden and severe fluctuations.

Many studies show that *taraxacum officinale* is a rich source of vitamins (C, D and B-complex) and minerals (magnesium, iron, silicon, copper, phosphorus, zinc, potassium and manganese). It also contains relatively high amounts of choline, an important nutrient for the liver, and its leaves have the highest Vitamin A content of all greens (14,000 international units per 100 grams).

Taraxacum officinale has been in constant use as both a food and medicine for at least 1000 years in various cultures throughout the world. It is recognized as one of the most time-honoured, effective and popular folk remedies, and is extremely safe, even in large amounts. The ancient Egyptians knew and used it, and Theoprastus described and praised its remedial powers 300 years before Christ.

It has many redeeming qualities as a contributor to the environment, providing a wealth of mineral-rich composted matter and an abundant source of early season food and incentive for the pollinator community. The persistent taproots are effective in breaking up the hardest of hardpan soils, and often play crucial roles in erosion control.

Yet year after year, North Americans spend many millions of dollars waging chemical warfare - often with known or suspected carcinogens - against *taraxacum officinale*, the bright yellow wildflower that is a perennial favorite in children's bouquets and flower chains. Its common name is dandelion.

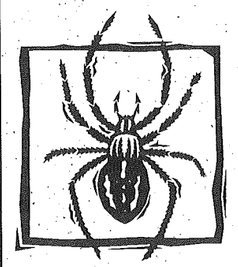
(Main source of information: *The Healing Power of Herbs*, Michael Murray, ND, Prima Publishing, 2nd Edition, 1995. Presented by Gord Smith, ND, Carnarvon Ontario).

COUNTING LIVES, NOT NUMBERS

Over the years, many attempts have been made to divide the total number of cancers into categories, yielding graphs and charts showing percentages of tumours caused by one factor or another. This can be highly controversial – even deceptive – since we don't live in a simple pie-chart world. While these analyses are generally accompanied by detailed texts, slices of the pie can take on a life of their own.

One example of this is a report called *The Causes of Cancer: Quantitative Estimates of Avoidable Risks of Cancer in the United States Today*. In 1981, Britons Richard Doll and Richard Peto carried out this study for the U.S. National Cancer Institute. They essentially agreed with the WHO report that 75 to 80 per cent of U.S. cancers fell into the avoidable category. However, they calculated factors such as 'diet', 'tobacco' and 'infection' first, then attributed smaller remainders to 'occupation' and 'pollution'.[51]

It is important to the controversy over what causes cancer to realize that Doll and Peto themselves had some serious reservations about their numbers. The text of their report acknowledges these in several places. For example, as Peter Montague described recently in *Rachel's Environment & Health Weekly*, "they 'guestimated' (their word, page 1235, Volume 66, No. 6, Journal of the National Cancer Institute, June 1981) that 35% of cancers are caused by poor diet but said the individual estimates that add up to 35% are 'uncertain in the extreme' (page 1235). They estimated that 30% of cancers are caused by tobacco preparations and 3% by alcohol. They estimated that industrial chemicals (including food additives, occupational exposures, pollution, and industrial products) together accounted for 8% of all cancers, or less. However they also said (page 1239) 'important occupational [cancer] hazards may quite possibly exist that have not yet been detected....' and, 'On present knowledge, therefore, it is impossible to make any precise estimate of the proportion of the cancers of today that are attributable to hazards at work (let alone how many future cancers may arise from past occupational exposure during the years before 1980), and none of the estimates that have been made are claimed to be anything more than informed guesses.' They further said (page 1241), 'We do not, ourselves, consider particularly reliable any explicit numerical estimates of the proportion of cancers currently ascribable to occupation...' On page 1251, they say their upper limit estimate of 5% of cancers being caused by pollution is 'rather arbitrary.'"[52]



"On present knowledge, therefore, it is impossible to make any precise estimate of the proportion of the cancers of today that are attributable to hazards at work."

Doll and Peto, 1981

Among others, Dr. Philip Landrigan, Chair, Department of Community and Preventive Medicine of the Mount Sinai School of Medicine in New York, found the Doll/Peto and similar estimates off the mark: "The commonly cited figure that only four per cent of cancer deaths in United States are work-related is almost certainly too low. That estimate failed to consider cancers arising in persons above age 65, although cancers in that age group account for more than two thirds of all human malignancies and frequently include tumours of occupational origin."[53]

Yet despite Doll and Peto's own doubts, these and similar numbers are still – in the late 1990s – quoted in epidemiology textbooks, and by cancer experts who are apparently not aware of the authors' own reservations.

Yet despite Doll and Peto's own doubts, these and similar numbers are still - in the late 1990s - quoted in epidemiology text-books, and by cancer experts who are apparently not aware of the authors' own reservations.

In 1995, the Ontario Cancer Treatment and Research Foundation (OCTRF) estimated that the number of cancer deaths attributable to known risk factors in Canada "suggests that approximately half of are attributable to tobacco (29%) and diet (20%). Occupation (9%), family history (8%) and alcohol (6%) are the next most common causes. Finally, reproductive factors (4%), sexual activity (3%), sunlight (1%) and ionizing radiation (1%) account for some of the remainder, with about 18% of fatal cancers attributable to unknown risk factors."[54]

Our earlier, conservative estimate of nine per cent of all cancer deaths caused by occupational hazards (page 4) was based on these OCTRF figures. Note that there is no category for 'pollution' or 'industrial hazards'; presumably these are included in the 'unknown' category. Dr. Samuel Epstein of the University of Illinois School of Public Health, and author of *The Politics of Cancer* (1978) and *The Politics of Cancer Revisited* (1998), believes that occupational hazards alone cause more than 30 per cent of all cancers.[55]

LIFESTYLE VERSUS ENVIRONMENT

Adding the percentages of three of OCTRF's 'known risk factors' – for tobacco, diet and alcohol – yields 55 per cent of all cancer deaths. These are commonly known as 'lifestyle' factors, because people choose to smoke, drink alcohol and eat certain foods thought to put us at higher risk of cancer. Meanwhile, the carcinogens in our environment – contaminants in our air, water and food that we don't choose – are regarded as a separate category, if at all.

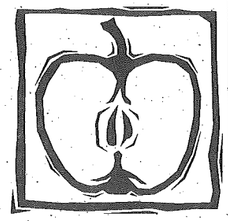
It's as if 'lifestyle' and 'environment' are two solitudes, totally unconnected. The following paragraph from a consumer brochure about cancer illustrates this separation: "You can control many of the factors that cause cancer. This means that you can protect yourself from the possibility of getting cancer. You can decide how you're going to live your life – which habits you will keep and which ones you will change."

To a certain degree, this is true. If you want to avoid lung cancer and several other tobacco-related cancers, it makes sense not to smoke, or to quit if you can (not an easy addiction to cast off). It is also wise to reduce alcohol consumption, to eat foods lower in fat, and to exercise on a regular basis.

But all of these better living choices will still not reduce cancer levels to where they were 50 years ago. A closer look at children's cancer rates – which have risen by one third since 1950[56] seems to bear this out. As Sandra Steingraber notes in *Living Downstream*: "The lifestyle of toddlers has not changed much over the past half century. Young children do not smoke, drink alcohol, or hold stressful jobs. Children do, however, receive a greater dose of whatever chemicals are in air, food and water because, pound for pound, they breathe, eat, and drink more than adults do...They are also affected by parental exposures before conception, as well as by exposures in the womb."[57]

"The lifestyle of toddlers has not changed much over the past half century. Young children do not smoke, drink alcohol, or hold stressful jobs. Children do, however, receive a greater dose of whatever chemicals are in air, food and water because, pound for pound, they breathe, eat, and drink more than adults do...They are also affected by parental exposures before conception, as well as by exposures in the womb."

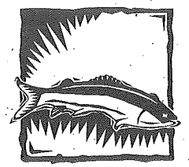
Even our belief in low-fat diets deserves more debate. Are high-fat North American foods really one of the main causes of breast cancer? We've heard this for so long that we assume it must be so. Yet, in her detailed analysis of lifestyle-versus-environment as cancer agents, Steingraber concludes that several long-term, well funded studies have shown that dietary fat is unlikely to play a major role by itself. "Rather than continuing to focus single-mindedly on the absolute quantity of fat consumed, several researchers have called for a more refined, ecological approach. Two obvious starting points would be to assess the link between breast cancer and diets high in animal fat, and to launch



a definitive investigation into the extent to which various kinds of fat are contaminated by carcinogens. We already know with certainty that animal-based foods are our main route of exposure to organochlorine pesticides and dioxin. It's time to look at the whole picture."[58] Even the whole picture about lung cancer deserves more scrutiny. About 13 per cent of lung cancers are not related to smoking. Why?

Lifestyle versus environment? One freely chosen, the other not? It's not so simple. Coffee, categorized as 'possibly carcinogenic to humans' by the International Agency for Research on Cancer, seems at first to be a classic lifestyle choice. However, the coffee we drink also includes the water we pour through the ground beans. Most tapwater here in Ontario contains by products of the chlorination process that are carcinogenic, as well as other suspect chemicals, and these are not our own choice.

Yes, there is a definite need to quantify and classify carcinogens, but not to set up a political tug-of-war to shift or avoid the issue of cancer causation. Identification of all known and suspected carcinogens should be the first step in eliminating them wherever possible.



FISH STORIES

It's a paperback called *The Guide To Eating Ontario Sport Fish*. Judging by the title, it sounds for all the world like a friendly reference on how to prepare and savour that prize pike you've just netted in Georgian Bay. In reality, it's a digest – updated every second year – that describes precisely how contaminated with chemicals and heavy metals your particular fish is depending on its lake or river of origin.

Four to six thousand fish from approximately 1,700 locations around the province are analyzed every year at the Ministry of Environment laboratory in Toronto for a variety of substances including mercury, PCBs, mirex, DDT and dioxins. The results are used to develop the tables in the sport fish guide, which give size–specific consumption advice for each species tested from each location.

Clearly there are concerns about reproductive and developmental effects: "As of July, 1998 the Ontario Ministry of the Environment advises women of childbearing age, and children under 15, to eat only those fish that have been given the 'clear fish' symbol in the 1997–1998 *Guide to Eating Ontario Sport Fish*, and to eat these fish no more than four times a month. They should eat no other sport fish caught in Ontario."

How do Ontario fish become so contaminated that many are unfit for human consumption? This occurs through a process called 'biomagnification' which concentrates persistent toxins as they move up the food chain. Although levels of PCBs, for example, may not even register in standard water tests, they accumulate in animal tissue – particularly fatty tissue – as the lower species are eaten by the next group up the chain. Top predators (herring gulls, for example) have PCB levels up to 25,000,000 times higher than the water where they catch their food. As for the lake trout, second on the chain, PCB levels can reach 2,800,000 times the background water level. Humans, also top predators, experience levels similar to herring gulls.

On the one hand, the Ministry of Environment and Energy issues this fish guide, while on the other, the Ministry of Natural Resources stocks the lakes with sport fish that are unable to reproduce naturally in the contaminated waters. One year, a 'winner' of *The Toronto Star's* annual salmon derby was disqualified because his fish was too healthy and toxin–free to have survived in Lake Ontario.

"Tell me, does the St. Lawrence beluga drink too much alcohol and does the St. Lawrence beluga smoke too much and does the St. Lawrence beluga have a bad diet...is that why the beluga whales are ill?...Do you somehow think you are immune and that it is only the beluga whale that is being affected?"

Leone Pippard, Canadian Ecology Advocates, 1990

THE COMPLEXITY OF CANCER

As Ross Hume Hall elegantly puts it: "Too often cancer research has focused on finding the last straw. It's time we looked at all the straws."

Which carcinogen initiated my sister's breast cancer? (Food additives, alcohol, a solvent at her workplace, exposure to her own hormones?) And what promoted it? (A series of mammograms, chest x-rays, estrogen replacement therapy?) And what carcinogens caused it to progress to full blown cancer? (Electromagnetic fields, pesticides on food, smoking, tamoxifen, too many french fries?)

What about the profusion of chemicals that mimic or otherwise disrupt our highly sensitive hormone systems? And the growing scientific understanding that many synthetic substances (while not necessarily carcinogenic) have the ability to reduce the effectiveness of our immune systems to cope with cancer-causing agents, even at infinitesimal doses.[59]

Research rarely considers mixtures of substances, and their potential to act synergistically - their sum possibly being more damaging than each substance individually. The Environmental Protection Agency in the United States has recently begun to address this issue of mixtures. With over 75,000 synthetic chemicals now being used by industry and agriculture, and in the products we consume, it is a forbidding task.[60]

Given all of these issues and unanswered questions, there is still much that is a mystery about the causes of cancer. As Richard Doll and Richard Peto concluded: "There is too much ignorance for complacency to be justified."[61]

HORMONE DISRUPTORS

One of the most unexpected discoveries about the tens of thousands of synthetic chemicals created since the Second World War is that many of them - scientists don't know how many yet - are hormone disruptors. Hormone - or endocrine - disruption has emerged as one of the key environmental health issues of the 1990s. Evidence described in the 1996 book, *Our Stolen Future*, strongly suggests that man-made chemicals are interfering with the hormones that control and regulate growth, health and behavior in wildlife and humans, and are leading to birth defects, reproductive failures, problems of sexual development, reduced intellectual potential, attention deficit disorders and reduced sperm counts.

So serious are these concerns that the Environmental Protection Agency in the United States plans to examine all pesticides plus 15,000 common commercial chemicals for effects on the endocrine systems of humans or wildlife. The list of target chemicals was developed by sorting approximately 87,000 common industrial chemicals by size and production volume; the final list is composed of chemicals small enough to pass through cell membranes and produced yearly in amounts of 10,000 pounds or more.[62]

While much of the attention on hormone disruptors focuses on reproduction, birth defects and more subtle developmental effects, cancer should also be part of the picture, Sandra Steingraber argues. "At times, these discussions seem nearly to eclipse the quieter, but longer-running conversations about possible contributions of estrogen-mimicking contaminants to cancer. Certain breast cancers, for example, are notorious for growing faster in the presence of estrogen, which is why prescribing antiestrogenic drugs is standard chemotherapeutic protocol. Many other cancers - those of the ovary, uterus, testicle, and prostate, for example - are also known to be, or suspected to be, hormonally-mediated."[63]

"We do not have all the evidence. But we have sufficient evidence to justify action against environmental degradation. We do not have absolute proof. We have pieces of a jigsaw puzzle, enough pieces to start to see the whole picture. We ignore it at our peril. We wear seat-belts, don't we?"

Ruth Grier, former Minister of Health and Minister of Environment for Ontario

THE LIMITS OF SCIENCE

Science prefers simplicity. With tens of thousands of new chemicals and other substances introduced into our world over the last fifty years, the challenge for the two main sciences that address environmental and occupational links to cancer is very complex.

Toxicology, developed by industry in the 19th century to measure the danger of chemicals in the workplace, simply cannot assess the variety of mixtures typical of many late 20th century production plants – or in the world beyond the factory door. Ross Hume Hall says, "Each of us – babies, toddlers, young people, old people – carries hundreds, if not thousands, of different chemical residues in our bodies. Toxicology is blind to the dangers of carrying this life-time burden...John Doull, Professor of Toxicology, University of Kansas, and author of the authoritative text on the subject, admits toxicology is incapable of assessing mixtures."[64]

Epidemiology, the science that addresses the incidence, distribution and control of disease in a population, has inherent shortcomings in this age of multiple substance exposures. Two serious deficiencies:

1) Populations in industrial countries are all exposed to so many pollutants and other possibly causative factors every day, that it's hard to pinpoint what is at the root of specific health problems. 2) There are no 'clean' populations left to serve as control groups.

Hume Hall asks: Why depend so heavily on toxicology and epidemiology when other scientific fields, such as wildlife studies, have clearly linked cancer in fish, birds and mammals to the same environmental contaminants experienced by humans?

A growing number of science and health agencies are advocating 'weight of evidence', an approach officially endorsed by the International Joint Commission on Great Lakes Water Quality in its *Sixth Biennial Report* (1992), and used by the Great Lakes Health Effects Program of Health Canada. Ontario's Task Force on the Primary Prevention of Cancer is another supporter: "In the absence of definitive studies on human populations, research initiatives should be geared towards a 'weight of evidence' approach to assessing environmental health risks. Synthesizing evidence from a number of approaches, including laboratory research and wildlife observations, will contribute to a greater understanding of suspected environmental carcinogens."[65]

There is even more promise for cancer prevention in the emerging science of cellular biology. This discipline has been discovering that various toxins leave distinguishable clues – biological markers – in our bodies. Different carcinogens produce different patterns of mutations in genes. These markers are indicators of physical damage caused by the interplay between human genes and carcinogens. "They are decoding tools, like molecular fingerprints or footprints left at the scene of the crime," explains the community guidebook, *Taking Action For a Healthy Future*". {Biological markers} serve as both signals of past exposure and predictors of future cancers. Much as a gunshot wound indicates the firearm used, the particular nature of a certain gene mutation suggests the type of carcinogen responsible for the damage. Cigarette smoke leaves one type of lesion, ultraviolet radiation another, and exposure to vinyl chloride yet another. We are well on the way to solving some of the mysteries about cancer's causes and effects that have eluded scientists for many decades. As this work progresses, we will know exactly what the 'smoking guns' are..."[66]

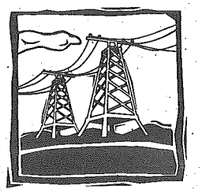
While we wait for science to sharpen new tools, reams of studies have been probing associations between cancer and toxic substances. The possible connection between chlorinated chemicals such as DDT and PCBs and breast cancer, for example, has been one major focus of investigation for the past 10 years. Some study results show strong associations between these toxins and cancer; other results are weaker, some have been negative. Given these mixed outcomes, can we safely conclude there is no proof of the link between DDT/PCBs and breast cancer? If so, we may do this at our peril.

The example of smoking and lung cancer is useful here. It was only in 1996 that researchers discovered the substance in cigarette smoke, called benzo(a)pyrene, that causes the genetic mutation in lung cells that yields the same tumours experienced by smokers. In other words, positive proof of the link between smoking and lung cancer is very recent. How many deaths from smoking would there have been if our governments had waited until 1996 to warn against the dangers posed by tobacco? Instead, they acted in the mid-1960s, based on results of many animal experiments and statistical associations, warning us of the dangers of lung cancer from smoking.

Researcher Devra Lee Davis agrees with those who say there isn't enough proof about the association between exposure to environmental chemicals and most cancers, at least not from an epidemiological standpoint. "From a scientific point of view, they are correct. We never have enough proof in science, and we can always do more research. That's what science is all about; science is inherently uncertain. But do you wait until you have enough dead bodies before taking action?"[67]

THE PRECAUTIONARY PRINCIPLE:

When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context, the proponent of an activity, rather than the public, should bear the burden of proof. (Wingspread Statement on the *Precautionary Principle*, 1998)



CLUSTER COVER-UP?

Cancer and occupational exposure to electromagnetic fields (EMFs) is highly controversial. While it was work-related exposures that first brought the EMF-breast cancer link to prominence (results of studies on electricians, telephone, utility and power line workers, as well as radio and telegraph operators showed an association), there is often reluctance to acknowledge or thoroughly investigate suspected cancer clusters in workplaces where they occur.

At a Bell Canada office building in Hamilton, Ontario, nine cases of cancer were diagnosed in an eighteen-month period during 1994-96. Six of these cases were breast cancer, all in pre-menopausal women in their early thirties to mid-forties. Statistically, the risk for women in this age group is one in 600, not one in ten as occurred in the Bell office, according to Dr. Samuel Epstein, University of Illinois School of Public Health.

Lorna Wilson and Trish Balon, two of the six women diagnosed with breast cancer, don't believe the cluster was simply 'coincidental' as the company concluded. "We were all working long hours in close quarters with a great deal of electrical equipment around us," Lorna explains. "Because we expressed concern that the workplace might be causing our cancers, the company hired an EMF expert from McGill University to look at the situation. But before any tests were done, they moved half the employees and equipment off the floor. Only then was the area tested for EMFs."

"The company doctor said our cancers happened either by coincidence or because we had incredibly bad luck," Trish adds. "To this day, the floor we worked on is stripped to the bare concrete. They destroyed any chance of finding answers about EMF levels in our workplace."

ONTARIO: THE POLLUTION PICTURE

A PRECAUTIONARY TALE

In April, 1984, a report entitled *Toronto's Drinking Water: A Chemical Assessment*, was presented to the local board of health. The report identified trihalomethanes (THMs), which are by-products of disinfecting water with chlorine, as possible carcinogens. On the basis of 'incomplete' information about potential harmful impacts – including a slight increased risk of cancer from drinking chlorinated water – the report's co-authors recommended that the city investigate disinfection alternatives."...(T)here are...vast uncertainties about the health effects of many chemicals that have been detected in drinking water. The report outlines those that are known, but our knowledge is very incomplete. Little is known about possible health hazards from the ingestion of chemicals detected infrequently and at low concentrations. Moreover, our knowledge of the combined effects of chemicals is almost non-existent."[68]

As an alternative to chlorine, the authors recommended the Ontario Ministry of Environment carry out a comprehensive field study to evaluate the effectiveness of ozone and granular activated carbon, based on ozone's 'excellent biocidal activities' and its successful application in Europe and Montreal.

Fifteen years later, a November 21, 1998 headline in *The Toronto Star* reads: *"Chlorinated drinking water linked to cancer."*

The report by the Laboratory Centre for Disease Control (LCDC) to which *The Star* referred estimated that 160-185 excess bladder cancers occur annually in Ontario from use of chlorinated drinking water. Don Wigle, Project Director at LCDC, says that this represents nearly half of one per cent of all cancer incidence in Ontario. He comments that once analysis of the data is completed for other sites, such as the colon, rectum, liver, kidney, breast, brain, leukemia and lymphoma, the total cancer risk from chlorination of drinking water could be shown to be as high as 1 to 2 per cent of all cancers. "Only recently have we begun to explore links between cancer and the environment using adequate methodologies, and the next decade will see many more results of research using molecular markers of exposure and genetic susceptibility. For toxic chemicals of all kinds, it is conceivable that a much-improved knowledge base could show that about 10 per cent of all cancers have important environmental links."[69]

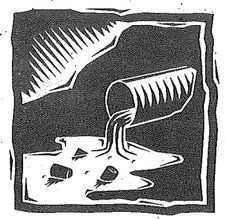
"Only recently have we begun to explore links between cancer and the environment using adequate methodologies, and the next decade will see many more results of research using molecular markers of exposure and genetic susceptibility."

Don Wigle, Laboratory Centre for Disease Control, Ottawa

THE MOST TOXIC PROVINCE

The Great Lakes Basin, home to the great majority of Ontarians and the source of much of our drinking water, is unique in the world. Together, the lakes constitute about 20 per cent of surface freshwater on earth. However, intensive human activity on both the Canadian and U.S. sides of the border has had profound effects on this extraordinary ecosystem.

The worst of times, from a toxic loading standpoint, occurred from the early 1950s to the early 1970s, according to a recent Health Canada state-of-knowledge report. "By the mid-1980s, over 800 distinct chemical substances from a variety of industrial, agricultural and municipal sources had been identified in the Great Lakes Basin, of which only 40 to 50 per cent were well known."[70]



In 1972, Canada and the United States signed the first Great Lakes Water Quality Agreement, then spent $10 billion over the next five years cleaning up, achieving 80 per cent reductions in phosphorous discharges that caused algae blooms and starved many aquatic organisms of oxygen. Water quality improved, and the levels of PCBs, DDT, dioxins and furans declined significantly during the 1970s and early 1980s. It became evident when the trend levelled off, however, that more needed to be done to address emerging wildlife and human health problems. A new agreement was signed in 1987, naming 11 substances as critical pollutants for action and elimination: alkylated lead, methylmercury, hexachlorobenzene (HCB), polychlorinated biphenyls (PCBs), four pesticides (DDT, dieldrin, toxaphene and mirex), polychlorinated dioxins (PCDDs), polychlorinated furans (PCDFs), and benzo{a}pyrene. All are known or suspected carcinogens.

As one of the major Great Lakes' jurisdictions, how does Ontario rank as a polluter? Latest statistics (1996) showed that for two years running, this province came third – after Texas and Tennessee – in most toxic discharges of all Canadian provinces and American states. Ontario contributed fully half of Canada's total emissions.

Bayer Rubber is one of the cited companies that has since responded positively to a government challenge to curtail emissions of benzene, a known human carcinogen. Benzene emissions have been reduced at Bayer from 1200 tonnes in 1989 to 9.2 tonnes in 1997. This was accomplished by substituting cyclohexane for benzene. Although cyclohexane contributes to smog, it is believed to be less harmful than benzene. Bayer is now working to reduce cyclohexane emissions with a closed-loop system and establishment of a leak detection and repair program. While voluntary programs of pollution reduction are commendable, strong regulations and enforcement will get Ontario's toxic emissions down faster, farther, and will level the playing field for all industrial operations.

TREADING WATER ON TOXICS

A joint 1997 report by the Canadian Environmental Law Association, Great Lakes United and the National Wildlife Federation to the International Joint Commission argues that the Canadian and U.S. governments have 'not come close' to achieving the stated goal of 'zero discharge' of persistent toxic substances into the Great Lakes ecosystem:

> "Despite significant developments in environmental law and policy in Canada and the U.S. over the past 25 years, regulatory strategies still are not being designed in the philosophy of zero discharge. The U.S. Clean Water Act, the Canadian Environmental Protection Act and Ontario's Municipal Industrial Strategy for Abatement are all predicated on the continued use and release of persistent toxic substances. Each is based on the philosophy that some level of toxic contamination is 'acceptable' and that

cont'd page 33

***The Toronto Star* July 28, 1998**

ONTARIO PRODUCES NEARLY HALF OF WORST POLLUTANTS

PROVINCE BUCKS NATIONAL TREND OF POLLUTION REDUCTION

By Brian McAndrew Environment Reporter

Ontario's industries produced nearly half of all the toxic and cancer-causing chemical pollution in Canada in 1996, according to an Environment Canada report released yesterday.

Industries across the province spewed 5,499 tonnes of the worst pollutants listed in the report into the air and water and onto land, the National Pollutant Release Inventory revealed. That's 41 per cent of the 13,253 tonnes of the worst toxic pollutants released by industry across Canada...

While pollution nationwide is decreasing, Ontario created more industrial waste in 1996 compared with 1995, according to the report... Ontario industries released 55,842 tonnes of chemical waste into the environment in 1996, a decrease of 6,030 tonnes. But they captured 42,643 tonnes of chemical waste, an increase of 9,571 tonnes over 1995. Captured wastes were sent off-site for treatment – mostly through municipal sewers and incinerators – or disposal in landfill sites and underground storage...

Only industries with more than 10 employees and producing more than 10 tonnes of a substance are required to report to the inventory. Not all wastes – like dioxin, the deadliest of toxic chemicals – are included....

Cancer-causing chemicals like benzene were still being produced at unacceptably high levels across the province, {Canadian Institute for Environmental Law and Policy research director Mark} Winfield said. The leading benzene producers in Ontario were Hamilton steelmakers Dofasco Inc. (455 tonnes) and Stelco Inc. (225 tonnes) followed by Algoma Steel in Sault Ste. Marie (164 tonnes), Domtar Papers in Cornwall (104 tonnes) and chemical plants and oil refineries – Bayer Rubber Inc., Shell Canada, Nova Chemicals and Imperial Oil – in the Sarnia area...

The overwhelming majority of the industrial chemicals have never been adequately, if at all, tested for chronic toxic, carcinogenic, mutagenic, and teratogenic effects, let alone ecological effects, and much of the available industrial data is at best suspect."

Dr. Samuel Epstein,
***The Politics of Cancer Revisited*, 1998**

regulators can employ technology and health-based standards to stay within these 'safe' limits. Such programs are flawed because they permit the continued release of toxic substances to an ecosystem that is already significantly contaminated...

...These days, strategies to control toxic substances in Canada and the U.S. are stressing voluntary measures instead of tougher regulations to achieve their goals...The Accelerated Reduction/Elimination of Toxics (ARET) program in Canada, the U.S. Common Sense Initiative, and pollution prevention/technology program of several U.S. states are prime examples of such voluntary initiatives. While voluntary programs may be one tool for advancing zero discharge, they cannot on their own provide the necessary incentives to achieve the goal."[71]

If we have learned one lesson in the Great Lakes, says Sarah Miller of the Canadian Environmental Law Association (CELA), it's that the only way we have reduced harmful substances, such as DDT and its derivatives and PCBs, is through outright legislative bans on their use. "Even then, their harm continues through illegal dumping of stockpiles, export to developing nations, their persistence in the environment and biomagnification in the food chain."[72]

The chief federal law governing toxic substances is the Canadian Environmental Protection Act (CEPA). Proclaimed in 1988 under the Mulroney government, CEPA was revisited in 1995 by the Chrétien Liberals to address various shortcomings. The new version, Bill C32, is still not law. Paul Muldoon, Executive Director of CELA, says the new CEPA includes the right definition of pollution prevention. This definition emphasizes that prevention must focus on avoidance of the creation, use or generation of pollutants, rather than trying to control them at the end of the pipe. However, despite this progressive definition, proposed measures for implementation of the law are currently weak. In order to protect Canadians adequately, Muldoon says, the new CEPA must:

- include provisions to phase out all persistent, bioaccumulative toxic substances now in use, as well as endocrine disruptors. Immediate priority should be given to the development of a dioxin elimination plan;
- not permit the use or manufacture in Canada of *new* chemicals that are persistent, bioaccumulative and toxic;
- choose substances for regulation using a chemical *class* approach, with an emphasis on *families* of substances, rather than a substance-by-substance approach;
- include mechanisms to ensure that workers and communities are involved in decisions to move toward cleaner production processes;
- implement pollution prevention plans for all substances subject to the law.

Pollution prevention legislation is the best way to go, Muldoon says. Prevention laws have been passed in about 20 U.S. states so far, with the best examples in Massachusetts and New Jersey. "Ontario is clearly falling behind in preventive measures."

Deregulation and cutbacks have taken their toll. "Since the Harris government came to power in 1995, it has embarked on a vigorous assault on environmental protection in Ontario which is unprecedented," stated breast cancer survivor Karen DeKoning, in a speech to the First World Conference on Breast Cancer in Kingston, Ontario in July 1997. "Through repealing and amending environmental laws, regulations and policies, through massive cuts to the operating and capital budgets of the Ministry of Environment and Energy, virtually every area of environmental protection has been weakened. In an attempt to reduce the provincial deficit and balance the budget, our government has attacked the only framework we had to protect our health. Is our government now able to protect our health? It is quite probable that any savings in the budget of the Environment Ministry will be overshadowed down the road by increases in health care costs for cancer care."[73]

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STANDARDS FOR VULNERABLE POPULATIONS

Most of the hundreds of measurable toxic substances in our bodies get there through the food we eat. Food accounts for about 80 to 95 per cent of our daily intake of most persistent toxic contaminants, air contributes about 10 to 15 per cent, and drinking water contributes the small remainder, Health Canada says.[74] Since many contaminants in the Great Lakes area biomagnify in the food chain (see *Fish Stories*, page 22), some people are more at risk than others.

The Health and Environment Handbook for Health Professionals names groups 'most exposed to contaminants' as:

- anglers and hunters, Aboriginal peoples, low-income groups who rely on sport fish or game for a large part of their food, others who eat large amounts of contaminated fish and wildlife
- the developing fetus
- people who live in large or highly industrialized urban areas.

Groups 'more susceptible to the effects of contaminants' include:

- the elderly
- newborns and infants
- young children
- people who are sick.[75]

The handbook also names 'people who are individually sensitive' and 'certain ethnic minorities, especially first generation immigrants' who may not be able to read sport fish consumption advisories written in English or French.

Canadian standards for exposure to pollutants are not generally set with vulnerable populations in mind – they are based instead on levels believed tolerable to essentially average body weight males. "We have very little understanding about how toxics affect vulnerable groups in Canada," says Paul Muldoon of CELA. "There is simply no data. Risk assessors most often do not even look at the effect of substances on vulnerable groups."[76]

The United States, on the other hand, recognizes the 'unique vulnerability' of children to environmental risks. "The Environmental Protection Agency has an executive order demanding that before any U.S. standard is set, it must go through the Office of Children's Health to ensure that children are protected adequately," Muldoon says.

U.S. federal law is also moving to address vulnerabilities. For example, the Food Quality Protection Act, passed in 1996, also contributes to the well-being of children by severely limiting allowable levels of pesticides on food. By extension, this law helps safeguard other vulnerable populations.

WORKPLACE REGS: CAUSE FOR ALARA

In the mid-1990s, Ontario came close to passing the best regulations governing carcinogens and other toxic substances in workplaces in Canada, if not the world. However, these proposed regulations were stalled by industry groups as the New Democratic Party's 1990-95 term at Queen's Park drew to a close. Then Mike Harris's new government throttled the possibility altogether by dissolving the Ministry of Labour's Joint Steering Committee on Hazardous Substances in the Workplace. This committee had proposed "new limits for more than 235 substances... to match the lowest values found in one or more of five foreign jurisdictions that were studied."[77]

As Vern Edwards, Director of Occupational Health and Safety for the Ontario Federation of Labour explained: "Draft legislation had gone through the review process, had been to the legislative lawyers and was sent back to the committee for editing. Then the Tories were elected and the committee was disbanded."[78] What might have been in Ontario has since become the rule in British Columbia, which in April 1998 proclaimed one of the strongest regulations for workplace carcinogens in the world. These regulations are known as ALARA, *As Low As Reasonably Achievable*.

As it still stands, Ontario has no regulations for mandatory testing of the health effects of existing chemicals under its principal labour legislation, the Occupational Safety and Health Act (OSHA), no mandatory substitution of toxic chemicals, and no mandatory banning of the most toxic substances in the workplace, Edwards says.

Even with the best of ALARA regulations on the books, the challenge is to educate workers about their rights, to have them become aware of their use of potential carcinogens, then to make sure the regulations are enforced, ALARA negotiator Larry Stoffman of the United Food and Commercial Workers in BC says. "This regulation is powerful if workers use it and demand compliance. It is more powerful than WHMIS [Workplace Hazardous Materials Information System] requirements, because it goes beyond information and demands substitution and controls. There are penalties in place for non-compliance," Stoffman adds, "but this requires Workers Compensation Board orders and repeat orders. It will be up to the community and the workforce to become more organized and more active on this. We're presently negotiating new policies with the WCB of BC that, if successful, will add potential exposure to ALARA carcinogens to the list of workplace conditions justifying work refusals and automatic consideration of WCB sanctions. We're not there yet, but are actively pushing this concept."[79]

In Ontario, the Internal Responsibility System (IRS) is a voluntary compliance system developed by the Occupational Health and Safety Division of Ministry of Labour (MOL). In this system, a joint health and safety committee consisting of one-half management and one-half labour is responsible to "act as an advisory body, identify hazards, and obtain information about them, recommend corrective actions, assist in resolving workplace refusal cases, participate in accident investigations and workplace inspections, and make recommendations to management regarding actions required to resolve health and safety concerns." In reality, the Internal Responsibility System is not enforced through the Occupational Safety and Health Act and does not have the power of law. Given its voluntary nature, the IRS is only successful in a workplace where the employers are willing to make it work.[80]

Given the absence of ALARA regulations in Ontario, unions in several industries have become proactive on the issue of workplace carcinogens. One of the most comprehensive programs is the Canadian Auto Workers' *Prevent Cancer Campaign*. CAW-Canada's National Health and Safety Director Cathy Walker says the campaign began at the CAW Council meeting in December 1997, when delegates heard from Bud Jimmerfield, long-time health and safety activist and local union president about the need to work for elimination of carcinogens from workplaces. "Bud contracted cancer as a result of exposure to metalworking fluids at his job," Walker explains. "He died two months later leaving his wife, Diane, and their eight children. Delegates resolved at that meeting to begin a major campaign to fight occupational and environmental causes of cancer."[81]

As it still stands, Ontario has no regulations for mandatory testing of the health effects of existing chemicals under its principal labour legislation, the Occupational Safety and Health Act (OSHA), no mandatory substitution of toxic chemicals, and no mandatory banning of the most toxic substances in the workplace.

At contract renewal time, reduction of toxic and carcinogenic substances in the workplace is now part of many unions' negotiating demands. While any move toward toxics reduction is good, has it really come to this? Carcinogens as a bargaining chip? Surely all workers deserve - as a basic human right - a safe and healthy workplace.

CAW Health and Safety representatives are systematically evaluating all toxic substances in their plants (over 12,000 chemicals are used in one southwestern Ontario facility alone), then working to eliminate carcinogens or find less hazardous substitutes.

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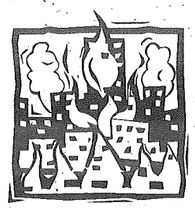
ON PAPER, ONE IN A MILLION. IN REALITY, ONE IN THREE...

The following explanation of 'Risk-Specific Dose' for known carcinogens comes from Chapter 5, 'Dose and Response For Chemicals,' *The Health and Environment Handbook for Health Professionals*, Health Canada. Also explained in this chapter is the concept of Tolerable Daily Intake (TDI). Once a contaminant has been identified as a hazard under the Canadian Environmental Protection Act, TDI and Risk-Specific Dose formulas are applied to establish a level of exposure which either 'does not pose a threat to human health', or 'is within a level of risk deemed acceptable by society.' On paper, the 'acceptable' level for a hazard can vary from yielding one excess cancer per 10,000 people per year to a level yielding one extra per million. Yet in reality, one in three Canadians is now getting cancer. As Dr. Paul Connett of *Waste Not* says: "Any avoidable risk is an unacceptable risk."

"Contaminants which are known carcinogens are generally assumed to have a non-threshold dose response - meaning that there may be no level of exposure to these contaminants that does not present some risk to health. In these cases, zero risk can be achieved only by eliminating all possible human exposure. This may not be possible with persistent contaminants that are wide-spread in the environment. Therefore it is desirable to reduce exposure to carcinogens as low as possible. 'Zero exposure' may be impossible to achieve but remains the goal for non-threshold toxicants. For such substances, a decision must be made as to how large a risk of cancer can be accepted in order to set acceptable* intake levels. Various acceptable levels of risk are currently being used around the world, depending on specific circumstances. Such levels often vary between one extra cancer death per year per 10,000 people exposed (1×10^{-4}) to the contaminant over their entire lifetime to one extra cancer death per year per million people exposed (1×10^{-6}). The use of these levels is somewhat arbitrary and often takes into account the balance between the risk to the health of the population and the cost to society associated with achieving these risk levels."

(From *The Health and Environment Handbook for Health Professionals*)



PLASTIMET - WHO'S RESPONSIBLE?

For four days and nights in July 1997, the huge fire at the Plastimet recycling plant raged in the north end of Hamilton, consuming 200 tonnes of plastic car bumpers and scrap bales containing polyvinyl chloride (PVC).

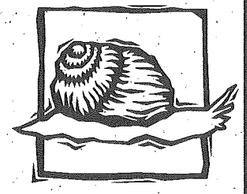
Plastimet, one of the most serious environmental disasters in Ontario history, is also believed to be one of the largest fires anywhere involving PVC. PVC is one of the most common plastic materials in use today, but also the most dangerous. Used in flooring, wallpaper, window and door frames, credit cards, water pipes - even in the heads of Barbie dolls. When burned, it is especially hazardous, releasing dioxins, furans, other chlorinated poisons and hydrochloric acid into the air.

For the 225 firefighters who fought the Plastimet blaze, about one hundred experienced short-term health problems, including skin rashes, eye, nose, throat and lung irritations, headaches and fatigue. But it is the prospect of chronic health effects, including cancer, that is even more worrisome.

As *The Hamilton Spectator* reported on August 18, 1997: "...Firefighting is an extremely dangerous line of work involving an entire career of exposures to hazards and toxins... In addition to frequent burns, falls and exposures to smoke in a dangerously unpredictable workplace, firefighters face an increased risk of lung disease and certain cancers. There is a 'relatively strong connection' between firefighters and brain and lymphatic cancers, and cancer of the blood forming cells, he said, while 'weaker evidence' shows a link to colon, bladder and kidney cancers."

The story of Plastimet is not just one of serious environment and health concerns, it's the story of responsibilities falling through too many jurisdictional cracks. Prior to the fire, this industrial site in North Hamilton was an unprotected risk and had a history of municipal fire code violations. The fire broke out during the evening of Wednesday, July 9, but the Ministry of Environment's monitoring trucks did not get to the scene until Thursday, expecting a PCB, not PVC, fire. The evacuation order for the surrounding area did not come until Friday, from the Emergency Control Group for the City of Hamilton.

Health concerns were not raised until Greenpeace warned local residents not to eat their garden vegetables and to keep their windows shut. The provincial Ministry of Health did not enter the picture, and Environment Canada stayed completely away. In the aftermath, who was responsible for cleanup? The City of Hamilton tried to get the owners to pay; they appealed, then withdrew their appeal, and the province finally stepped in.



PRIMARY CANCER PREVENTION IN ONTARIO

"Prevention is the most important part of cancer control. But there is no funding for prevention," Dr. Richard Schabas, Head of Preventive Oncology, Cancer Care Ontario, told *The Toronto Star* in November, 1998.

With 46,000 Ontarians diagnosed with cancer every year, there is a critical need for treatment and care. This is an expensive disease, with direct costs ranging from $1.4 to $1.6 billion annually, according to Dr. Schabas. Treatment centres are currently in expansion mode, but with growing cancer incidence, these facilities are stretched beyond their capacity to provide timely service to many cancer patients. Given long waiting periods, some Ontario cancer patients are attending U.S. clinics for radiation therapy, an unprecedented move to help relieve stress on the system.

Where does primary prevention stand, specifically for those cancers linked to occupational and environmental carcinogens? Some background work has been done. In 1994, the Minister of Health appointed a task force on the primary prevention of cancer to "advise the Minister with respect to the development of an action-based, effective and feasible plan for the primary prevention of cancer." The final report of the Task Force was released in March 1995, and presented over 80 detailed recommendations aimed at reducing the incidence of cancers attributable to a range of risk factors including tobacco, diet, sunlight, alcohol and persistent, bioconcentrating toxic substances that are known or suspected carcinogens.

The membership of the Task Force included senior oncologists at the Ontario Cancer Institute and the Ontario Cancer Treatment and Research Foundation, as well as cancer survivors, public health experts and environmentalists. It was the first time anywhere that such a group had been together, and the fact that there was consensus on the recommendations is remarkable. Unfortunately, a change in government three months after the Task Force reported threw into limbo everything connected with cancer – from construction of new treatment facilities to primary prevention policy.

It was not until April 1997 that the new government established Cancer Care Ontario, which had been announced two years earlier. CCO is the government's principal advisor on cancer issues and has been given responsibility for long term planning of all aspects of the cancer care system and to set direction for treatment, prevention, research and support services.

Cancer Care Ontario has identified reducing the incidence of cancer in Ontario as one of its long term goals. A report on the agency's first year of operation

states, "Preventing cancer by eliminating its causes is our best strategy to save lives and prevent suffering."[82]

Cancer Care Ontario works through eight Cancer Care Ontario Regional (CCOR) Councils, each of which is creating networks of health professionals, voluntary and community-based groups, public health, hospitals and other agencies to plan and coordinate services and treatment as well as to develop strategies for the primary prevention of cancer. In addition, municipal public health departments include cancer prevention as part of their mandate, and some cities – London, Toronto and Hamilton, for example – are planning or have already created local committees to involve citizens and community groups in action-oriented activities, with a strong focus on primary prevention. Occupational and environmental factors are included in several of these efforts.

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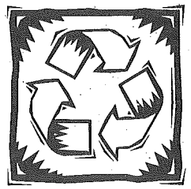
WE URGE ACTION NOW...

"Perhaps foremost among these difficulties {respecting cancer prevention} is the long natural history of cancer, the fact that for many cancers (including breast and stomach cancer), events in childhood as well as later in life may influence cancer risk in adulthood and throughout subsequent life, so that actions taken now may have a twenty to forty-year latent period before we know whether or not they have been appropriate, let alone successful. The Task Force, mindful of this truism, recognizes that it may sometimes be difficult for government to act now, when the eventual return may be uncertain, and far away in time. Yet we urge action now. Our knowledge of the causes of cancer may be imperfect, but we have no excuse for delaying application of the knowledge we now have, both for our own benefit in our later years, and the benefit of our children and grandchildren."

From "Recommendations for the Primary Prevention of Cancer"

Report of the Ontario Task Force on the Primary Prevention of Cancer, March 1995, page 11.



TEXTILES WITHOUT TOXINS

"...The team decided on a mixture of safe, pesticide-free plant and animal fibres for the fabric (ramie and wool) and began working on perhaps the most difficult aspect: the finishes, dyes and other processing chemicals. If the fabric was to go back into the soil safely, it had to be free of mutagens, carcinogens, heavy metals, endocrine disruptors, persistent toxic substances and bio-accumulative substances. Sixty chemical companies were approached about joining the project, and all declined, uncomfortable with the idea of exposing their chemistry to the kind of scrutiny necessary. Finally, one European company, Ciba-Geigy, agreed to join. With that company's help the project team considered more than 8,000 chemicals used in the textile industry and eliminated 7,962. The fabric - in fact an entire line of fabrics - was created using only thirty-eight chemicals.

The director of the mill told a surprising story after the fabrics were in production. When regulators came by to test the effluent, they thought the instruments were broken. After testing the influent as well, they realized the equipment was fine - the water coming out of the factory was as clean as the water going in. The manufacturing process itself was filtering the water. The new design not only by passed the traditional three-R responses to environmental problems but it also eliminated the need for regulation."
(From *The Next Industrial Revolution*, by William McDonough and Michael Braungart, *The Atlantic Monthly*, October 1998)

We humans really are clever enough not to foul our own nest. It's a matter of emulating nature, which creates in abundance, but does not waste vast quantities of material, or poison entire ecosystems.

"Consider the cherry tree. It makes thousands of blossoms just so that another tree might germinate, take root, and grow. Who would notice piles of cherry blossoms littering the ground in the spring and think, 'How inefficient and wasteful'? The tree's abundance is useful and safe. After falling to the ground, the blossoms return to the soil for the surrounding environment. Every last particle contributes in some way to the health of a thriving ecosystem."
(*The Next Industrial Revolution*, page 87-88)

NEXT STEPS: ACTION FOR PREVENTION

There are many possible options – for governments, for health care professionals, for businesses, for workers, for grassroots activists – to help turn the tide against carcinogens and other toxic substances. We really *can* make a difference in our various communities, and all efforts will add up to a greener, healthier future.

Even very dirty industries can turn around. The corporation Interface, one of the world's largest floor covering manufacturers, knows that cleaning up its act will not only contribute to sustainability, but also to profitability.

> "At Interface, we seek to become the first sustainable corporation in the world, and, following that, the first restorative company. It means creating the technologies of the future – kinder, gentler technologies that emulate nature's systems...In nature, there is no waste; one organism's waste is another's food. For our industrial process, so dependent on petrochemical, man-made raw materials, this means technical 'food' reincarnated by recycling into the product's next life cycle. Of course, the recycling operations will have to be driven by solar energy too...We look forward to the day when our factories have no smokestacks and no effluents. If successful, we will spend the rest of our days harvesting yesterday's carpets, recycling old petrochemicals into new materials and converting sunlight into energy. There will be zero scrap going into landfills and zero emissions into the biosphere. Literally, our company will grow by cleaning up the world, not by polluting or degrading it. We'll be doing well by doing good."[83]

"Literally, our company will grow by cleaning up the world, not by polluting or degrading it. We'll be doing well by doing good."
Ray Anderson, Chairman, Interface, Inc.

Interface isn't there yet, but the vision is in place, and the company is acting on its promise.

We invited several groups to present their toxics reduction and pollution prevention programs to our workshop *Everyday Carcinogens: Stopping Cancer Before It Starts*. What follows are thumbnail sketches of several of these programs.

TOXIC TURNAROUND:

This step-by-step guide to toxics reduction by local governments is produced by the Environmental Health Coalition (EHC) of San Diego, California. It's a simple-to-follow yet detailed manual which shows city departments how to reduce their reliance on toxic materials – solvents, cleaning preparations, paints, pesticides, etc. – in public buildings, parks, swimming pools, even in maintenance and service vehicle fleets.

From its start in 1980, the EHC's work has centered on low-income communities of colour, whose residents are more likely to be exposed to toxic pollution than wealthier, whiter communities..."The use of toxics in government agencies, as everywhere in society," EHC says, "disproportionately affects workers of colour, because they are more likely to handle cleaning products, pesticides, paints, solvents, and other toxics."

The *Toxic Turnaround* guide is divided into three parts: Why Prevent Pollution, How to Prevent Pollution and Resources. It includes many case studies, and has good information how to create a pollution prevention plan from the ground up.

For more information: Environmental Health Coalition, 1717 Kettner Blvd., #100, San Diego CA 92101. Telephone 619-235-0281 • fax 232-2670 • email: ehcoalition@igc.apc.org • www.environmental health.org. Cost for *Toxic Turnaround* is $33 (U.S. funds), which includes shipping and handling.

THE LOWELL CENTER FOR SUSTAINABLE PRODUCTION:

This is an interdisciplinary centre based at the University of Massachusetts at Lowell that develops, studies, and promotes systems of production that are safe, healthy, environmentally sound, economically viable, and socially accountable. To fulfill its mission, LCSP develops partnerships with business, government, labor, and communities to develop practical strategies to increase sustainability.

This approach is reflected in the following major LCSP projects:

- a national program of technical assistance to hospitals that provides information and tools that promote pollution prevention
- a national education, training, and technical assistance program to develop community-based indicators of sustainability
- a project to integrate and enhance the health, safety, and environmental programs of a leading textile manufacturer
- technical and strategic support for a national network of environmental, labor, and environmental justice organizations to learn about the concepts of clean production and sustainable products and to develop organizing strategies that incorporate these concepts
- a training program to incorporate cleaner production concepts into all regulatory activities of state environmental agencies.

The Center for Women and Work at Lowell is dedicated to enhancing economic opportunities and improving the conditions of work for women through research, writing, teaching, education, and social action.

For more information: Lowell Center for Sustainable Production, University of Massachusetts Lowell, One University Avenue, Lowell, MA 01854. Telephone 978-934-2980 • Fax 978-452-5711 • email: Cathy_Crumbley@uml.edu. Website: www.uml.edu/centers/lcsp/

CLEAN PRODUCTION ACTION:

This is an international nonprofit network dedicated to the advancement of sustainable production and consumption, taking the concepts and tools of cleaner production beyond the present process modification and emissions reduction focus. CPA provides the information, training and technical assistance channel that enables environmental NGOs, citizens' and labour organizations, and local governments to promote this vision of sustainability.

Clean Production Systems are circular and use fewer materials and less water and energy. Resources flow through the production-consumption cycle at slower rates. Materials must not be toxic, even in a closed-loop system, since these will cause hazards when they come to be recycled.

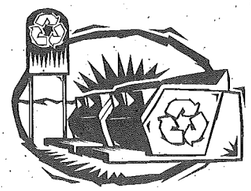
In 1996, CPA prepared guidelines for Extended Producer Responsibility as a major waste reduction tool for the for the province of Quebec. Previous strategies had concentrated on waste recycling with no focus on specific waste streams, product take-back and cleaner material use. An overview of European initiatives and an outline strategy of how to implement electronic take-back introduced this information for the first time to local governments, community groups and policymakers in Canada.

For more information: Clean Production Action, 5964 Notre-Dame de Grace, Montréal QC H4A 1N1. Telephone 514-484-4207 • Fax 514-484-2696 • email: bthorpe@web.net.

THE NATURAL STEP:

Dr. Karl Henrik Robèrt, founder of *The Natural Step*, is an oncologist and medical researcher in Sweden. In 1988, he dreamed he could write a consensus statement with other scientists about the conditions that are essential to sustainable life on earth. Twenty-one tries and plenty of feedback later, he had his consensus statement which, together with a booklet and audio cassette, were mailed to all 4.3 million households in Sweden.

The four 'system conditions' in the consensus statement describe the principles that make a society sustainable. The first two conditions have to do with avoiding concentrations of pollutants from synthetic substances, and from substances mined or pumped from the earth's crust -- ensuring that they aren't systematically increasing in nature. The third condition says we must avoid overharvesting and displacing natural systems. Finally, we must be fair and efficient about satisfying basic human needs.



"Today, society is well outside the framework set by these conditions and, as a result, we are running towards increasing economic problems as we run out of fresh and non-polluted resources," Dr. Robèrt says.

For more information: *The Natural Step Canada*: Brian Nattrass & Mary Altomare Telephone: 604-886-0957 • Fax 604 -884-0967 • email: tnscanada@aol.com

Several North American companies have embraced *The Natural Step* as the way to a sustainable, profitable future. The floorcovering company, Interface Inc., which has a plant in Belleville Ontario, is a *Natural Step* company. Telephone: 800-267-2149

HEALTH CARE WITHOUT HARM:

This campaign was created in 1996 to provide a remedy for the pollution from health care practices, particularly dioxin and mercury pollution caused by incineration of medical waste.

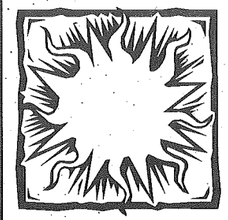
Five of *Health Care Without Harm's* goals include:

1. To work with a wide range of constituencies for an ecologically sustainable health care system.
2. To eliminate the nonessential incineration of medical waste and promote safe materials use and treatment practices.
3. To phase out the use of PVC (polyvinyl chloride) plastics and persistent toxic chemicals.
4. To phase out the use of mercury for the health care industry.
5. To develop health-based standards for medical waste management and to recognize and implement the public's right to know about chemical usage in the health care industry.

For more information, or to join the Health Care Without Harm campaign, contact one of three coordinators: Charlotte Brody at the Center for Health, Environment and Justice at 703-237-2249 or cbrody@essential.org; Jackie Hunt Christensen at the Institute for Agriculture and Trade Policy at 612-870-3424 or jchristensen@iatp.org; or Gary Cohen at 617--524-6018, gcohen@igc.apc.org. The website address is www.noharm.org.

CAW PREVENT CANCER CAMPAIGN:

This Canadian Auto Workers' program was established in the wake of longtime CAW health and safety activist Bud Jimmerman's death from workplace-related cancer in early 1998. In this campaign, CAW local union activists will:



1. Identify carcinogens in their workplaces – this is principally the responsibility of the health and safety activists.
2. Insist these carcinogens be removed and substituted with less hazardous substances (or at an absolute minimum that the process be enclosed). Again, this is principally the job of the CAW health and safety activists. Priorities need to be established.
3. Put in workers' compensation claims for all who are found to have cancer that might be related to work. This is the activity of the workers' compensation activists.
4. Enlist community support by ensuring that the public knows about air emissions and hazardous waste from their workplaces which may cause cancer. This is the activity of the environmental activists.

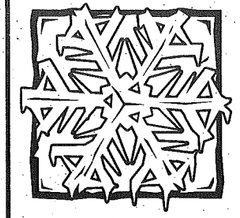
For more information, contact:

Health and Safety Division, Canadian Auto Workers
205 Placer Court, Toronto ON M2H 3H9
• Telephone 800-268-5763 • Fax 416-495-3785
• email: cawhse@caw.ca • website: www.caw.ca

ENDNOTES

[1] *National Pollutant Release Inventory Summary Report 1996*, Canadian Environmental Protection Act, Environment Canada, pp 41, 48.
[2] "PCBs in the Great Lakes, EPA: Deposition of Air Pollutants to the Great Lakes Waters," EPA-453/R-93-055 (Washington D.C.: EPA, 1994), x, 2.
[3] Canadian Cancer Society. For more statistics, see the C.C.S. website: http://www.cancer.ca/indexe.htm
[4] From *Canadian Cancer Statistics 1998*, National Cancer Institute of Canada. Toronto
[5] Public health researcher Devra Lee Davis has tried to address this question. See page 45, *Living Downstream: A Scientist's Personal Investigation of Cancer and the Environment*, by Sandra Steingraber, Vintage Books, Random House, 1998.
[6] Reliable Canadian statistics comparing trends in children's cancers over decades are not available, according to Cancer Care Ontario. These American statistics were cited at the U.S. EPA conference, *Preventable Causes of Cancer in Children*, September 15-16, 1997. For more information: http://www.epa.gov/children/document/minutes.htm
[7] *Canadian Cancer Statistics 1998*, National Cancer Institute of Canada. Toronto, page 52
[8] *Geographic Distribution of Cancer in Ontario*, Volume II: Atlas of Cancer Incidence, (1980-91), Ontario Cancer Registry, page 61.
[9] See Cancer Care Ontario website for "Cancer Incidence and Mortality in Ontario 1964-1996." It is available at http://www.cancercare.on.ca/ocr/report/
[10] *Canadian Cancer Statistics 1998*, National Cancer Institute of Canada. Toronto, page 20.
[11] *Geographic Distribution of Cancer in Ontario*, Volume II: Atlas of Cancer Incidence, (1980-91), Ontario Cancer Registry, pp 43-161.
[12] ibid, page 151. This calculation is made by using the Ontario Cancer Treatment and Research Foundation's figure of 9 per cent deaths from cancer attributable to occupation.
[13] Full text of story is available on-line at *The National Post* website: http://www.nationalpost.com/home.asp?f=990126/2215010.html. See also the *Journal of the Canadian Medical Association* article at http://www.cma.ca/cmaj/vol-160/issue-2/0213.htm
[14] Roberta Altman and Michael Sarg, *The Cancer Dictionary*, Facts on File, New York NY, 1992, Second Edition.
[15] Robert Proctor, *Cancer Wars: How Politics Shapes What We Know and Don't Know About Cancer*, BasicBooks (HarperCollins), New York, 1995, page 223.
[16] *Living Downstream*, page 242
[17] "Rachel's Environment & Health Weekly" #575, December 4, 1997, 'The Truth About Breast Cancer, Final Part.
[18] "Rachel's Environment and Health Weekly" #193, August 8, 1990.
[19] "Detection of Moncyclic Aromatic Amines, Possible Mammary Carcinogens, in Human Milk" Lillian S. DeBruin, Janusz Pawliszyn and P. David Josephy, Chemical Research in Toxicology, 1999, 12, 78 82. 3 Personal communication, February 1999.
[20] See these two websites for more information: 1) The International Agency for Research on Cancer (IARC): http://193.51.164.11/cgi/iHound/Chem/iH_Chem_Frames.html and 2) The U.S. National Toxcicology Program (NTP) 'Chemistry Health and Safety Search': http://ehis.niehs.nih.gov/ntp/docs/chem_hs.html
[21] For the full report, see the Environmental Defense Fund's website: http://www.edf.org/pubs/Reports/ToxicIgnorance/ Since this report was published, EDF has successfully encouraged industry to reveal more about many commonly used chemicals. And as part of an expanded "environmental right-to-know" program, the U.S. Environmental Protection Agency subsequently joined EDF's call for chemical companies to conduct basic health tests on about 3,000 widely used chemicals and make those data publicly available. EPA threatened to require such disclosures if the industry doesn't make them voluntarily.
[22] "Waste Not's" guide includes lists from the International Agency for Research on Cancer, the National Toxicology Program, (U.S. Department of Health and Human Services), the Environmental Protection Agency's "Pesticidal Chemicals Classified as Known, Probable or Possible Human Carcinogens," and 'The California List', Chemicals Known to the State to Cause Cancer or Reproductive Toxicity. (Connett included only carcinogens from the California list in her own). "Waste Not, the Reporter for rational resource management," 82 Judson, Canton NY, 13617. Telephone 315-379-9200 Fax 379-0448. Email: wastenot@northnet.org.

[23] "Waste Not," Issue #437, page 1.
[24] Ionizing radiation has sufficient energy to knock an electron out of an atom's orbit, creating an electrically-charged particle, or ion. When these ions strike the chromosomes in human cells, they can produce cancer-inducing mutations. (Dr. Rosalie Bertell, International Institute of Concern for Public Health, Toronto).
[25] *NIEHS Working Group: Assessment of the Health Effects from Exposure to Power Line Frequency Electric and Magnetic Fields*, NIEHS Working Group Report of National Institutes of Health, Christopher J. Portier, Ph.D. and Mary Wolfe, Ph.D., Editors, NIH Publication No. 98-3981, August 1998.
[26] An editorial dismissive of EMF/leukemia links in the New England Journal of Medicine in response to the article, "Residential exposure to magnetic fields and acute lymphoblastic leukemia in children" by Martha Linet et al., N Engl J Med 337:1-7 1997 has been countered by many experts: a meta-analysis of childhood leukemia studies following the" NCI/Linet debates" was commissioned by NIEHS in 1998 and undertaken by Dr. Dan Wartenburg of the Department of Environment and Community Medicine, Robert Wood Johnson Medical School, New Jersey. Including the Linet et al study results, this analysis showed a 63% excess of childhood leukemia. Thus, no matter what the outcome of the Linet argument, including it in the overall literature did not "undo" or negate the body of evidence showing an association.
[27] Bruce N. Ames, "Dietary Carcinogens and Anticarcinogens," Science 221 (1983): 1256-1264
[28] Bruce N. Ames, as quoted in *Cancer Wars*, page 139.
[29] Rachel Carson, *Silent Spring*, Houghton Mifflin, New York, 1962, page 242.
[30] John Wargo, *Our Children's Toxic Legacy: How Science and Law Fail to Protect Us from Pesticides*, Yale University Press, New Haven Connecticut, 1996.
[31] As quoted by Sandra Steingraber in the source notes for Chapter Five, *Living Downstream*, page 309.
[32] From the newsletter, "Waste Not" #436, December 1998, page 2
[33] From the February 25 '99 summary of news items OPPTS Newsbreak produced weekdays by the U.S. Environmental Protection Agency Office of Prevention, Pesticides, and Toxics Substances (OPPTS)
[34] Robert Proctor, *Cancer Wars: How Politics Shapes What We Know and Don't Know About Cancer*, page 27.
[35] Sandra Steingraber, *Living Downstream: A Scientist's Personal Investigation of Cancer and the Environment*, Vintage Books, Random House, 1998, page 65
[36] ibid, page 65
[37] *The Washington Post*, Friday, September 18, 1998, page D20
[38] ibid
[39] 'Everyday Exposure to Toxic Pollutants', *Scientific American*, February 1998. For the full text: http://www.sciam.com/1998/0298issue/0298ott.html
[40] David Steinman and Samuel Epstein, *The Safe Shopper's Bible: A Consumer's Guide to Nontoxic Household Products, Cosmetics and Food*, 1995, MacMillan, New York.
[41] 'Everyday Exposure to Toxic Pollutants', *Scientific American*, February 1998
[42] Theo Colborn, Dianne Dumanoski and John Peterson Myers, *Our Stolen Future: Are We Threatening Our Fertility, Intelligence and Survival? – A Scientific Detective Story*, Dutton, 1996 pp 92-93.
[43] E.G. Knox and E.A. Gilman, "Hazard Proximity of Childhood Cancers in Great Britain from 1953-1980," *Journal of Epidemiology and Community Health* 51 (1997): 151-59
[44] G.R Najem et al., "Clusters of Cancer Mortality in New Jersey Municipalities, with Special Reference to Chemical Toxic Waste Disposal Sites and Per Capita Income," *International Journal of Epidemiology* 14 (1985) 528-37.
[45] J. Melius et al, "Residence Near Industries and High Traffic Areas and the Risk of Breast Cancer on Long Island" (Albany: New York State Dept. of Health, 1994).
[46] M.A. Kettles et al., "Triazine Herbicide Exposure and Breast Cancer: An Ecologic Study of Kentucky Counties,": *EHP* 105 1997): 1222-27.
[47] Bureau of Environmental Health Assessment, "Woburn Childhood Leukemia Follow-Up Study" (Boston, Massachusetts Department of Public Health, May 1996).
[48] T Maugh, "Cancer and the Environment: Higginson speaks out", *Science*, 205 pp 1363-1366, 1979
[49] Ross Hume Hall, "The Medical Industrial Complex", *The Ecologist*, March-April, 1998, pp 62-63.
[50] Sandra Steingraber, *Living Downstream*, page 61.
[51] "The Causes of Cancer: Quantitative Estimates of Avoidable Risks of Cancer in the United States Today," *Journal of the National Cancer Institute*, Volume 66, No. 6, June 1981, pp 1193-1308.
[52] Rachel's Health & Environment Weekly, "The Truth About Breast Cancer" (Final Part), December 7, 1997.



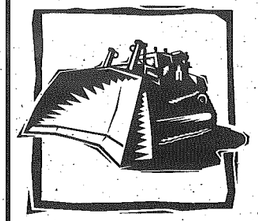
[53] Dr. Philip Landrigan, from a guest editorial, *New Solutions*.
[54] "Geographic Distribution of Cancer in Ontario," The Ontario Cancer Treatment and Research Foundation, 1995, page 151.
[55] Personal communication, March 8, 1999.
[56] This statistic is American. Cancer Care Ontario believes its own statistics for children's cancers over decades may be bedevilled with inconsistencies and other weaknesses that could make comparisons misleading.
[57] Sandra Steingraber, *Living Downstream*, page 39.
[58] ibid, page 264
[59] A good reference re immune dysfunction and other adverse health effects of synthetic substances, particularly those that mimic hormones, is *Our Stolen Future: Are We Threatening Our Fertility, Intelligence and Survival? – A Scientific Detective Story*, by Theo Colborn, Dianne Dumanoski and John Peterson Myers, Dutton, 1996
[60] "EPA to Hunt Dangerous Chemicals in Everyday Products." New York Times, August 31, 1998, p A1, A14.
[61] "The Causes of Cancer: Quantitative Estimates of Avoidable Risks of Cancer in the United States Today," *Journal of the National Cancer Institute*, Volume 66, No. 6, June 1981, pp 1193-1308.
[62] More information is available from the EPA website: http://www.epa.gov
[63] Sandra Steingraber, *Living Downstream*, page 110.
[64] Ross Hume Hall, "The Medical-Industrial Complex," *The Ecologist*, Vol. 28, No. 2 March/April 1998, page 66.
[65] "Recommendations for the Primary Prevention of Cancer," March 1995, Ministry of Health, Queen's Printer for Ontario, page 32.
[66] "Taking Action for a Healthy Future", a guide for the film *Exposure: Environmental Links to Breast Cancer*, The Women's Network on Health & Environment, Toronto, 1997.
[67] From the film *Exposure*, a Butterfield and Zuckerman Production, in association with the Women and Environments Education and Development Foundation, Toronto, 1997.
[68] "Toronto's Drinking Water: A Chemical Assessment," a report prepared by the City of Toronto Department of Public Health by Katherine Davies, PhD and Joan Campbell, PhD, page 6.
[69] Don Wigle, Laboratory Centre for Disease Control, personal communication, January 1999. The full report can be accessed from the LCDC website: www.hc-sc.gc.ca/main/lcdc/web/publicat/cdic/cdic193/cd193c_e.html
[70] "State of Knowledge Report on Environmental Contaminants and Human Health in the Great Lakes Basin," Health Canada 1997, page 1.
[71] "Treading Water: A Review of Government Progress Under the Great Lakes Water Quality Agreement." A Summary Report to the International Joint Commission, October 1997, Canadian Environmental Law Association, Great Lakes United and the National Wildlife Federation.
[72] Personal communication, February 1999.
[73] From a speech by Karen DeKoning, co-founder of the Breast Cancer Prevention Coalition, to the First World Conference on Breast Cancer, Kingston, Ontario July 13, 1997.
[74] From studies by Parfett et al, 1994; Feely 1994, as quoted in "The Health and Environment Handbook for Health Professionals," prepared by the Great Lakes Health Effects Program, Health Canada and the Public Health Branch, Ontario Ministry of Health, October 1997, page 125.
[75] ibid, page 30
[76] Paul Muldoon, personal communication, February 23, 1999
[77] "American Union Lobby Results in Lower Permissible Exposure Levels for Methylene Chloride: Ontario Workers Remain Without a Regulatory Review Process." Workers Health and Safety Centre (WHSC), November 23, 1998. For full text, see WHSC website: http://whsc.on.ca/News/Nov23.htm
[78] Personal communication (with Charmaine Condy), January 19, 1999.
[79] Personal communications, January 11, February 22, 1999
[80] For the Ontario Federation of Labour's critique on the Ontario Health and Safety Act, see "Submission of the review of the OHSA by the OFL, April 1997: http://www.ofl-fto.on.ca/ftp/ohsaap97.txt. The government has not moved forward with a review of OHSA since the OFL submitted this review.
[81] Personal communication, February 19, 1999
[82] Ontario's Interim Cancer Report Card, page 10, Cancer Care Ontario, April 24, 1998
[83] Ray Anderson, Chairman of Interface, Inc., Atlanta, Georgia, from the company's Sustainability Report, 1994.

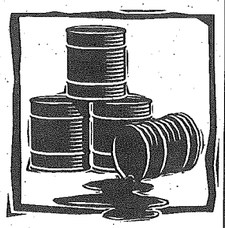
Appendix A: Occupational Risks for Cancer

(Source: Encyclopaedia of Occupational Health & Safety)

Section 1: Industries, occupations and exposures recognized as presenting a carcinogenic risk

Industry	Occupation/Process	Cancer site/type	Known (suspected) causative agent
• Agriculture, forestry & fishing	• Vineyard workers using arsenic insecticides	Lung, skin	Arsenic compounds
	• Fishermen	Skin, lip	Ultraviolet radiation
• Mining & quarrying	• Arsenic mining	Lung, skin	Arsenic compounds
	• Iron ore mining	Lung	Radon decay products
	• Asbestos mining	Lung, pleural, and peritoneal mesothelioma	Asbestos
	• Uranium mining	Lung	Radon decay products
	• Talc mining/milling	Lung	Talc w/asbestiform fibres
• Chemical	• Bis(chloromethyl) ether/BCME and chloro-methyl-methy/ether/CMME production workers and users	Lung (oat-cell carcinoma)	BCME, CMME
	• Vinyl chloride production	Liver angiosarcoma	Vinyl chloride monimer
	• Isopropyl alcohol manuf.	Sinonasal	Not identified
	• Pigment chromate prod.	Lung, sinonasal	Chromium (VI) compounds
	• Dye manuf./users	Bladder	Benzidene, 2-napthylamine, 4-aminobiphenyl
	• Auramine manufacture	Bladder	Auramine and other aromatic amines used in the process
	• p-chloro-o-toluidine production	Bladder	p-chloro-o-toluidine and its strong acid salts
• Leather	• Boot and shoe manufacture	Sinonasal, Leukemia	Leather dust, benzene
• Wood and wood products	• Furniture and cabinet makers	Sinonasal	Wood dust
• Pesticides and herbicides production	• Arsenical insecticides production & packaging	Lung	Arsenic compounds
• Rubber industry	• Rubber manufacture	Leukemia Bladder	Benzene Aromatic amines
	• Calendering, tire curing & tire building	Leukemia	Benzene
	• Millers, mixers	Bladder	Aromatic amines
	• Synthetic latex production, tire curing, calender operatives, reclaim, cable makers	Bladder	Aromatic Amines
	• Rubber film production	Leukemia	Benzene
• Asbestos production	• Insulated material prod. (pipes, sheeting, textile, clothes, masks, asbestoc cement products)	Lung, pleural & mesothelioma	Asbestos



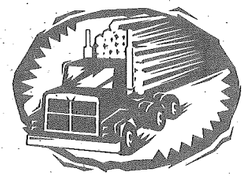


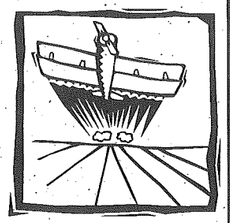
Industry	Occupation/Process	Cancer site/type	Known (suspected) causative agent
• Metals	Aluminum production	Lung, bladder	Polycyclic aromatic hydrocarbons, tar
	• Copper smelting	Lung	Arsenic compounds
	• Chromate production, chromium plating	Lung, sinonasal	Chromium (VI) compounds
	• Iron and steel founding	Lung	Not identified
	• Nickel refining	Sinonasal, lung	Nickel compounds
	• Pickling operations	Larynx, lung	Inorganic acid mists containing sulphuric acid
	• Cadmium production & refining, Ni-cad battery manufacturing, Cadmium pigment manufacturing, electroplating, zinc smelters, PVC compounding	Lung	Cadmium & cadmium compounds
	• Beryllium refine/machine, production/beryllium prods.	Lung	Beryllium and beryllium compounds
• Shipbuilding, motor vehicle & RR equipment manufacture	• Shipyard, dockyard, motor vehicle & RR manufacture workers	Lung, pleural, mesothelioma	Asbestos
• Gas	• Coke plant workers	Lung	Benzo[a]pyrene
	• Gas workers	Lung, bladder, scrotum	Coal carbonization products, 2-napthylamine
	• Gas-restart house workers	Bladder	Aromatic amines
• Construction	• Insulators/pipe coverers	Lung, pleural, mesothelioma	Asbestos
	• Roofers, asphalt workers	Lung	Polycyclic aromatic hydrocarbons (PAHs)
• Other	• Medical Personnel	Skin, leukemia	Ionizing radiation
	• Painters (construction auto industry and others)	Lung	Not identified

Section 2: Industries, occupations and exposures reported to present a cancer excess, but for which the assessment of the risk is not definitive.

• Agriculture forestry & fishing	• Farmers, farm workers	Leukemia, lymphoma	Not identified
	• Herbicide application	Malignant lymphoma, soft-tissue sarcomas	Chlorophenoxy herbicides, chlorophenols (presumably contaminated with dioxin)
	• Insecticide application	Lung, lymphoma	Non-arsenical insecticides
• Mining & quarrying	• Zinc-lead mining	Lung	Radon decay products
	• Coal	Stomach	Coal dust
	• Metal mining	Lung	Crystalline silica
	• Asbestos mining	Gastrointestinal tract	Asbestos
• Food industry	• Butchers & meat workers	Lung	Viruses, PAHs (polycyclic aromatic hydrocarbons)
• Beverage industry	• Beer brewers	Upper digestive tract	Alcohol consumption

Industry	Occupation/Process	Cancer site/type	Known (suspected) causative agent
• Textile industry	• Dyers	Bladder	Dyes
	• Weavers	Bladder, sinonasal, mouth	Dusts from fibres, yarns
• Leather	• Tanners & processors	Bladder, pancreas, lung	Leather dust, other chemicals, chromium
• Wood and wood products, pulp & paper industry	• Lumbermen & sawmill workers	Nasal cavity, Hodgkin's lymphoma, skin	Wood dust, chlorophenols creosotes
	• Pulp/papermill workers	Lymphopoietic system, oral, lung, kidney	Not identified
	• Carpenters, joiners	Nasal cavity, Hodgkin's	Wood dust, solvents
	• Woodworkers, unspecified	Lymphomas	Not identified
	• Plywood/particleboard production	Nasopharynx, sinonasal	Formaldehyde
• Printing	• Rotogravure workers, binders, printing pressmen machine-room workers	Lymphocytic, hemata-poietic system, oral, lung, kidney	Oil mist, solvents
• Chemical production	• 1,3-Butadiene production	Lymphocytic, hemata-poietic system	1,3 Butadiene
	• Acrylonitrile production	Lung, colon	Acrylonitrile
	• Vinylidene chloride	Lung	Vinylidene chloride (mixed exposure with acrylonitrile)
	• Isopropyl alcohol manufacture (strong acid)	Larynx	Not identified
	• Polychlorprene production	Lung	Chloroprene
	• Dimethylsulphate production	Lung	Dimethylsulphate
	• Epichlorohydrin production	Lung, lymphatic and hemopoietic system,	Epichlorohydrin
	• Ethylene oxide production	Lymphatic and hemo-poietic system, stomach	Ethylene oxide
	• Ethyline dibromide prod.	Digestive system	Ethyline dibromide
	• Formaldehyde production	Nasopharynx, sinonasal	Formaldehyde
	• Flame retardant and plasticizer use	Skin (melanoma)	Polychlorinated
	• Benzoyl chloride prod.	Lung	Benzoyl chloride
• Herbicides Production	• Chlorophenoxy herbicide	Soft-tissue sarcoma	Chlorophenoxy herbicides
• Petroleum	• Petroleum Refining	Skin, leukemia, brain	Benzene, PAHs, untreated/ mildly treated mineral oils
• Rubber	• Various occupations in rubber manufacture	Lymphoma, multiple myeloma, stomach, brain lung	Benzene, MOCA (4,4'-methylene-bis-2-chloroaniline
	• Styrene-butadiene rubber production	Lymphatic and hematopoietec system	1,3-Butadiene
• Ceramic, glass & refractory brick	• Ceramic and pottery workers	Lung	Crystalline silica
• Asbestos	• Insulation material , production	Larynx, gastrointestinal tract	Asbestos





Industry	Occupation/Process	Cancer site/type	Known (suspected) causative agent
• Metals	• Lead smelting cadmium prod./refining, ni-cad battery production, cadmium alloy production, electroplating, zinc smelting, brazing & PVC compounding	Respiratory, digestive systems Prostate	Lead compounds Cadmium, cadmium compounds
	• Iron, and steel founding	Lung	Crystalline silica
• Shipbuilding	• Shipyard, dockyard workers	Larynx, digestive system	Asbestos
• Motor vehicle manufacturing	• Mechanics, welders	Lung	PAHs, welding fumes, engine exhaust
• Electricity	• Generation, production, distribution, repair	Leukemia, brain tumours, Liver, bile ducts	Extremely low frequency EMFs, Polychlorinated biphenyls (PCBs)
• Construction	• Insulators, pipe covered • Roofers, asphalt workers	Larynx, gastrointestinal tract Mouth, pharynx, larynx, esophagus, stomach	Asbestos PAHs, coal tar, pitch
• Transport	• RR workers, filling station attendants, bus & truck drivers excavator operators	Lung, bladder	Diesel exhaust
• Other	• Service station attendants	Leukemia, lymphoma	Benzene
	• Chemists, laboratory workers	Leukemia, lymphoma, pancreas	Not identified (viruses, chemicals)
	• Embalmers, medical personnel	Sinonasal, nasopharynx	Formaldehyde
	• Health workers	Liver	Hepatitis B
	• Hairdressers,	Bladder, leukemia, lymphoma	Hair dyes, aromatic amines
	• Radium dial workers	Breast	Radon

Appendix B: Everyday carcinogens at home

One of the original goals of this background report was to demystify what can be - for a lay person - the very daunting lists of carcinogenic substances. That is, we set out to take a recognized list of carcinogens (for example, from the International Agency for Research on Cancer; see below), then beside each chemical or substance name - such as benzene - to identify its principal applications.

- Benzene: occurs in tobacco smoke (consumer exposure); used as an additive in gasoline (consumer and occupational exposures), in making other chemicals and plastics and as a solvent (occupational exposures); also released into the atmoshphere as an emission from coke ovens (environmental exposure, including 2 tons per day emitted from the steel mills in Hamilton).

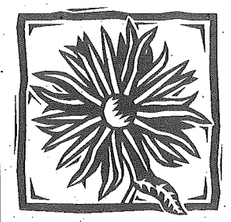
Next, to suggest safer alternatives for products containing each chemical or substance, especially those with applications in consumer goods; further, to name brand names of the carcinogen-free and toxic ones, particularly those available readily in Canada.

But almost as daunting as the carcinogen list is the complexity of the task - cancer-causing agents don't fall into neat categories - they are usually minute fractions of products made from - in some cases - hundreds of different chemicals. Don Wigle, Project Director at the Laboratory Centre for Disease Control in Ottawa has worked to help simplify the IARC list. Three students in the

CLASSIFYING CARCINOGENS: THE IARC RANKINGS

Several agencies, such as the U.S. Environmental Protection Agency and National Toxicology Program, have ranking systems for carcinogens. The most widely recognized listing is issued by the International Agency for Research on Cancer (IARC) of the World Health Organization, based in Lyon, France.

- Group 1: *Known human carcinogens:* This chemical, group of chemicals, industrial process or occupational exposure is carcinogenic to humans. 'Sufficient evidence from epidemiological studies to support a cause/effect association between exposure and cancer.'
- Group 2: Studies in experimental animals play an important role in assigning the Group 2 classification, especially those in 2B, possible carcinogens.
- Group 2A: *Probable human carcinogens:* The chemical, group of chemicals, etc.which are probably carcinogenic to humans. Requires at least some evidence of carcinogenicity to humans.
- Group 2B: *Possible human carcinogens:* The chemical, group of chemicals, etc. for which there is 'sufficient' evidence in animals but not enough data in humans usually results in this ranking.
- Group 3: *Cannot be classified* as to carcinogenicity to humans. Some suspicion as to cancer causing potential, but despite investigation, a definitive conclusion cannot be made.
- Group 4: *Not carcinogenic to humans*. The agent is not suspected of being a carcinogen based on human and animal studies.



environmental program at Innis College, University of Toronto - Cecilia Kim, Asra Aziz and Shirley Teng - undertook to identify toxic products typically used at home, and more benign alternatives.

The range of problem commodities is dizzying, including some brands of each of the following: children's plastic toys, cleaning agents; polishes and varnishes; paints and paint removers; shoe polishes; liquid paper; pesticides for indoor/outdoor use and on pets; other pet supplies such as cat litter and flea collars; auto cleaners and waxes; art supplies; 'health' and beauty products including a whole range of make-ups, toothpastes, skin and hair care products (including dyes); fruits and vegetables contaminated with pesticide residues; hormones in meat and milk; plastic sandwich wrap...The list indeed goes on.

The task of integrating these pieces of information still lies ahead. Meanwhile, there are many excellent sources, including the following:

- *The Safe Shopper's Bible: A Consumer's Guide to Nontoxic Household Products, Cosmetics and Food*, David Steinman and Dr. Samuel Epstein, MacMillan, New York, 1995.
- *Clean and Green: 485 Ways to clean, polish, disinfect, deodorize, launder, remove stains without harming yourself and the environment*, Annie Berthold, Bond, Ceares Press, Woodstock, NY, 1990
- *Taking Action For a Healthy Future, Educational Resource Guide & Community Handbook* for the film, *Exposure: Environmental Links to Breast Cancer.* The Women's Network on Health & Environment, Toronto. Telephone: 416-516-2600.

GLOSSARY

• BIOMAGNIFY: to concentrate persistent toxic substances as they move up the food chain. Top predators, herring gulls, for example, have PCB (polychlorinated biphenyl) levels up to 25,000,000 times higher than the water where they catch their food. For lake trout, second on the chain, PCB levels can reach 2,800,000 times the background water level. Humans, also top predators, experience levels similar to herring gulls.

• CANCER: multiple diseases (more than 100) characterized by the partial or complete loss of control of cellular division, and the development of tumour masses that invade locally, spread within the region of the body affected, and often spread to distant organs through a process called metastasis.

• PERSISTENT TOXIC SUBSTANCE: The International Joint Commission adopted the definition of a persistent toxic substance as "any toxic substance that bioaccumulates, or any toxic chemical that has a half-life greater than eight weeks in any medium - water, air, sediment, soil, or living things." The 'half life' of a substance is the time it takes for half of it to disappear. For example, DDT has a half-life of about 20 years in soil; if a pound of DDT is released into soil today, half of it will still exist 20 years from now.

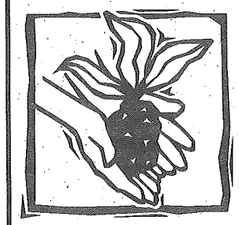
• POLLUTION PREVENTION: Pollution prevention is defined as elimination of hazards and environmental releases of pollution at every stage: extraction, manufacturing & processing, incorporation into products, product use, and

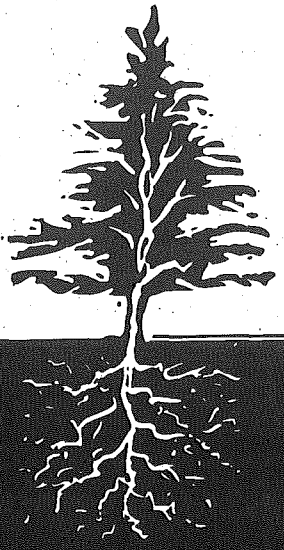
disposal. This is in contrast to end-of-pipe pollution control, which attempts to reduce pollutants after they have been created.

• PRECAUTIONARY PRINCIPLE: When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context, the proponent of an activity, rather than the public, should bear the burden of proof. (Wingspread Statement on the Precautionary Principle, 1998)

• PRIORITY SUBSTANCES UNDER CEPA
The Canadian Environmental Protection Act (CEPA) was established in 1988 to provide a means of identifying, evaluating and managing toxic chemicals. CEPA is administered jointly by Health Canada and Environment Canada. The act is designed to protect human health and the environment by reducing or eliminating toxic substances from the environment, and controlling the entry of new substances into Canada that may pose a threat to health and the environment. For more information on the Priority Substances identified for action under CEPA, see the Health Canada website: www.ec.gc.ca/cceb1/eng/psap.htm.

• WEIGHT OF EVIDENCE
The weight of evidence approach to human health risks from exposure to environmental contaminants recognizes the limitations of science and takes into account the combined results of many kinds of research investigating harm or the potential harm to living organisms. In this approach, evidence is collected across a wide range of circumstances and from a variety of research areas. Conclusions about the risks posed by a contaminant are based on data collected from laboratory animal studies, wildlife studies, human epidemiologic studies of acute exposure, studies of more subtle effects on humans from chronic low-level exposures, and socio-economic data and research as well.





THE GOLDEN OPPORTUNITY

"The long promised 'breakthrough,' when or if it comes, cannot be expected to be a panacea for all types of malignancy. Although the search must be continued for therapeutic measures to relieve and to cure those who have already become victims of cancer, it is a disservice to humanity to hold out the hope that the solution will come suddenly, in a single master stroke. It will come slowly, one step at a time. Meanwhile, as we pour our millions into research and invest all our hopes in vast programs to find cures for established cases of cancer, we are neglecting the golden opportunity to prevent, even while we seek to cure."

Rachel Carson, *Silent Spring*, 1962

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