



Prevention of
Occupational and Environmental Cancers
in Canada:

A Best Practices Review and
Recommendations

Executive Summary

National Committee on Environmental and Occupational Exposures
Primary Prevention Action Group
Canadian Strategy for Cancer Control

May 2006

This Report prepared by the members of the **National Committee on Environmental and Occupational Exposures**, a tripartite and multi stakeholder sub-committee of the Primary Prevention Action Group of the Canadian Strategy for Cancer Control. Original research and data gathered for this report completed by Ms. Anne Wordsworth, Environmental Consultant.

Funding for this publication was provided by the Public Health Agency of Canada. The opinions expressed in this publication are those of the authors/researchers and do not necessarily reflect the official views of the Public Health Agency of Canada.

Glossary of Acronyms:

ALARA	As Low As Reasonably Achievable
BP	Best Practices
CAREX	International Information System on Occupational Exposure to Carcinogens
CEPA	Canadian Environmental Protection Act
GHS	Globally Harmonized System for the Classification and Labeling of Chemicals
NPRI	National Pollutant Release Inventory
OELs	Occupational Exposure Limits
WHMIS	Workplace Hazardous Materials Information System

The prevention of occupational and environmental exposures associated with cancer has received limited attention in the arenas of research and public policy relative to exposures such as tobacco and the role of exercise and nutrition in cancer prevention.

Although the exact proportion of all cancers due to environmental and occupational exposures is the subject of debate, it is clear that for those people who are exposed the risk can be high and these exposures are preventable.

At its initial meeting on January 14, 2003, the National Committee on Environmental and Occupational Exposures (NCEOE) endorsed the application of the precautionary principle as part of an essential strategy in primary cancer prevention. The precautionary principle forms the basis for public policy addressing environment and human health and has been referenced in Canadian environmental legislation and throughout the European Community:

Whenever reliable scientific evidence is available that a substance may have an adverse impact on human health and the environment but there is still scientific uncertainty about the precise nature or the magnitude of the potential damage, decision-making must be based on precaution in order to prevent damage to human health and the environment.¹

The committee has also focused on confirmed and probable human carcinogens as classified by the International Agency for Research on Cancer (IARC). Evidence of carcinogenicity is based on thorough scientific reviews of epidemiologic and experimental data on carcinogenicity of chemicals, groups of chemicals, industrial processes, other complex mixtures, physical agents, and biologic agents to which humans are known to be exposed. See Table 1 for a list of Group 1 and 2A and some group 2B carcinogens.

This report describes best practices in the primary prevention of exposures to occupational and environmental cancer-causing agents (i.e., carcinogens) in Canada

and compares them with initiatives in the United States and Europe.

Best practices include: the identification and surveillance of hazards and exposed populations; the transmission of information through labeling and disclosure laws; education of the public, workers and communities; the reduction of exposures to carcinogens through substitution or process changes; and, legislation and regulation that contribute to cancer prevention.

The results of this review indicate that it is necessary to take action in the following key areas:

- To raise the profile of the primary prevention of the environmental and occupational exposures as a priority issue within provincial cancer control agencies/programs.
- To disclose the presence, use and release of classified carcinogens, as a necessary prerequisite to primary prevention in workplaces, the environment and the home.
- To develop further legislation, regulation and policy, as required for primary prevention.
- To focus efforts nationally and provincially more specifically on primary prevention of exposures to occupational and environmental carcinogens.
- To establish the elimination, when possible, and minimization of exposure at all times for Group 1 and 2A carcinogens as an objective for primary stakeholders and governments.
- To exploit opportunities for inter-sectoral collaboration in order to maximize our effectiveness and focus activity on primary prevention strategies

Furthermore, a 2003 analysis of IARC's reviews has identified the known and probable human carcinogens that are present in occupational settings.² The analysis found that occupational carcinogens account for 28 of the 89 definite human carcinogens, and 27 of 64 probable human carcinogens. The study also shows the occupations in which these carcinogens are used and the target organs. The identification of these occupational carcinogens could be used to prioritize chemicals or mixtures in the workplace for reduction or elimination.

¹Resolution of the European Council of Nice, December 2000, COM (2000) 1, 2.2.2000.

²Siemiatycki, J. et al., "Listing of Occupational Carcinogens", Environmental Health Perspectives, Vol. 112, 15, Nov. 2004.

Table 1. Occupation/industries evaluated by IARC as definitely (group 1), probably (group 2A), or possibly (group 2B) entailing excess risk of cancer among workers

Occupation or industry	Suspected substance	IARC Monograph Volume (year)*	Group	Site(s)
Aluminum production	Pitch volatiles, aromatic amines	Suppl. 7 (1987)	1	Lung ^b , bladder ^b
Auramine manufacture	2-Naphthylamine, auramine, other chemicals, pigments	Suppl. 7 (1987)	1	Bladder ^b
Boot & shoe manufacture/repair	Leather dust, benzene & other solvents	Suppl. 7 (1987)	1	Leukemia ^b , nasal ^b , paranasal sinuses ^b , bladder ^b
Carpentry & joinery	Wood dust	Suppl. 7 (1987)	1A	-
Coal gasification	Coal tar, coal-tar fumes, PAHs	Vol. 34 (1984)	1	Skin (incl. scrotum) ^b , bladder ^b , lung ^b
Coke production	Coal-tar fumes	Suppl. 7(1987)	1	Skin(scrotum) ^b , lung ^b , bladder ^c , kidney ^c
Dry cleaning	Solvents & chemicals used in "spotting"	Vol. 63 (1995a)	2B	-
Furniture & cabinet making	Wood dust	Suppl. 7 (1987)	1	Nose & sinonasal cavities ^b
Hairdressers & barbers	Dyes (aromatic amines, amino-phenols with hydrogen peroxide), solvents, propellants, aerosols	Vol. 57 (1993b)	2A	Bladder ^c , lung ^c , non-Hodgkin lymphoma ^c , ovary ^c
Hematite mining	Radon daughters, silica	Suppl. 7 (1987)	1	Lung ^b
Iron & steel founding	PAHs, silica, metal fumes, formaldehyde	Suppl. 7 (1987)	1	Lung ^b
Isopropanol manufacture, strong-acid process	Diisopropyl sulfate, isopropyl oils, sulfuric acid	Suppl. 7 (1987)	1	Paranasal sinuses ^b , larynx ^b , lung ^c
Magenta manufacture	Magenta, <i>ortho</i> -toluidine, 4,4'-methylene bis (2-methylaniline), <i>ortho</i> -nitrotoluene	Vol. 57 (1993b)	1	Bladder ^b
Painters		Vol. 47 (1989c)	1	Lung ^b , bladder ^c , stomach ^c
Petroleum refining	PAHs	Vol. 45 (1989b)	2A	Bladder ^c , brain ^c , leukemia ^c
Printing processes	Solvents, inks	Vol. 65 (1996)	2B	-
Production of art glass, glass containers, and pressed ware	Lead, arsenic, antimony oxides, silica, asbestos, other metal oxides, PAHs	Vol. 58 (1993a)	2A	Lung ^c
Rubber industry	Aromatic amines, solvents	Suppl. 7 (1987)	1	Bladder ^b , stomach ^c , larynx ^c , leukemia ^c , lung ^c
Textile manufacturing industry	Textile dusts in manufacturing process, dyes and solvents in dyeing and printing operation	Vol. 48 (1990b)	2B	-

^a Most recent IARC evaluation; for those referenced as Supplement 7 (IARC 1987), it is possible that the 1987 review was quite perfunctory and that the essential evidence was accumulated at an earlier date.

^b Authors judged that evidence for an association with this site was strong.

^c Authors judged that evidence for an association with this site was suggestive.

The NCEOE has developed 7 priority recommendations, which seek to begin to address the main gaps in Canadian practice. These recommendations cover a broad range of activities, and will require our sustained commitment, concerted efforts, and resources. In addition, future activities, articulated in 12 additional recommendations, continue to target the key areas of surveillance, public disclosure, community education, and government policy. The NCEOE looks forward to working towards the implementation of these recommendations, in collaboration and partnership with governments, non-governmental and community organizations, industry, and labour organizations.

Surveillance

Gaps
<ul style="list-style-type: none"> • Limited funding for occupational and environmental cancer/ carcinogen research • Provincial cancer treatment centres do not routinely record information about the occupational histories or environmental exposures • No central agency responsible for disseminating information to affected occupational groups and communities • No systematically collected publicly available information on current occupational exposures to classified carcinogens in Canadian workplaces • No registry of chemical carcinogens in the workplace comparable to the National Dose Registry for radiation or the Finnish ASA

Surveillance is the tracking and forecasting any health event or health determinant through the ongoing collection of data, and the integration, analysis and integration of the data, for the purposes of planning intervention.

The surveillance of confirmed cancer cases is one approach that can help identify carcinogens and their role in causing cancer, be it in an occupational or environmental setting. However, because of the long latency period for cancer, these examinations of cancer cases reflect exposures that were experienced as much as twenty to forty years ago. The surveillance of cancer cases, therefore, does not lend itself readily to primary cancer prevention.

In contrast, the exposure surveillance of carcinogens offers an opportunity to intervene to prevent cancer. This process collects information on exposure to carcinogens. The extent of exposures is monitored, and the information on worker or community exposure

to carcinogens is collected in registries or databases.

Recommendations
<ol style="list-style-type: none"> 1. In order to properly identify individual cases of environmental and occupational cancer it is necessary to collect a thorough occupational and environmental history. Provincial cancer control agencies/ programs should actively promote the collection of this information. (This will assist in documentation where association to carcinogen exposure is both known and for further work regarding ongoing research into possible new associations.) 2. Encourage the development and application of an International Information System on Occupational Exposure to Carcinogens (CAREX) and carcinogen exposure worker registry program in Canadian jurisdictions. <ol style="list-style-type: none"> 2.1 Workplace monitoring and collection of data should be required by regulators for all Group 1 and 2A carcinogens listed in Table 1, in use or produced. 2.2 There should be a harmonization of exposure limits for Group 1 and 2A carcinogens (listed in Table 1) in workplaces throughout Canada. The ALARA principle should be applied.³

In Canada, the best ongoing hazard surveillance program of this kind in the occupational health area is the National Dose Registry, which monitors workers' exposure to

³ The NCEOE sent a letter to the OELs Update Project, Ministry of Labour in November 2004 recommending that the Ontario government harmonize its occupational health legislation with British Columbia's by incorporating requirements for substitution where Group 1, 2A and 2B carcinogens are used and by adopting the ALARA principle (as low as reasonably achievable) for exposures to carcinogens.

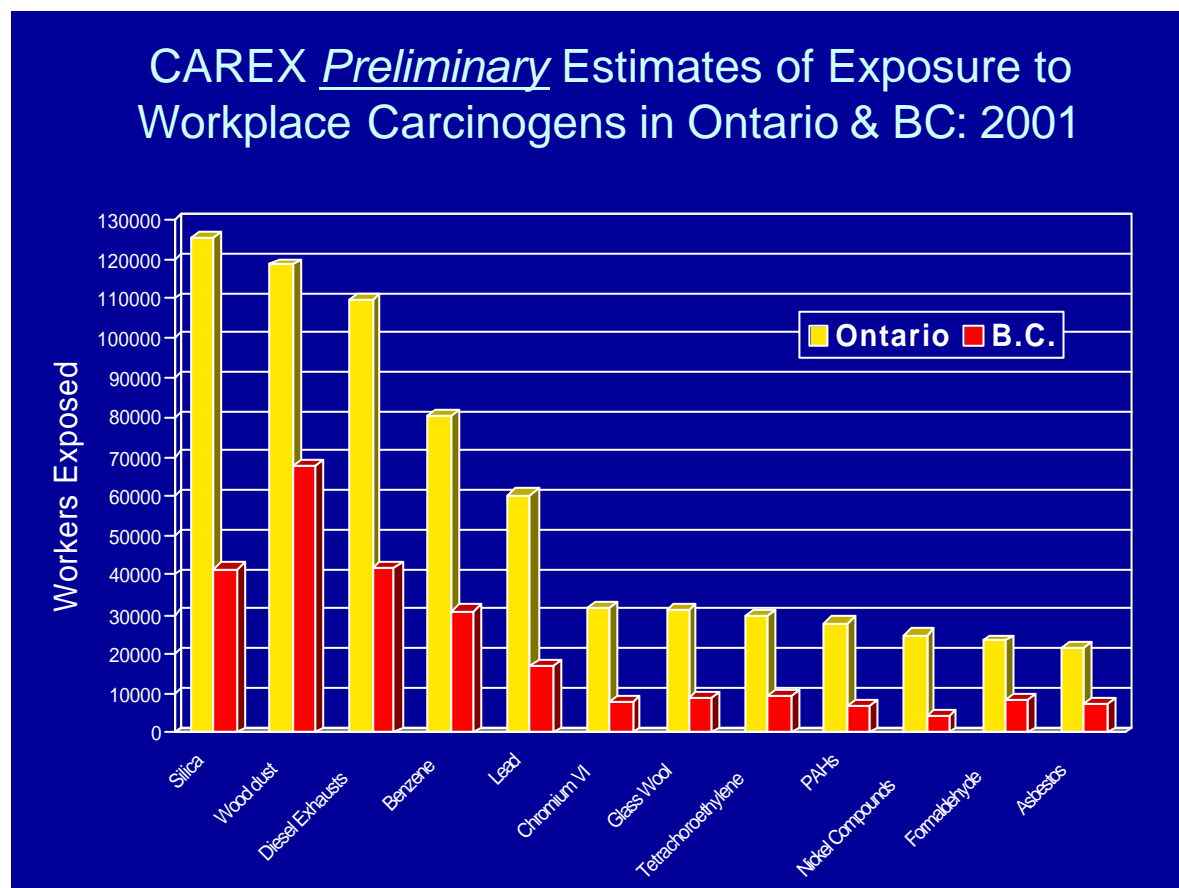
ionizing radiation, a confirmed carcinogen. It tracks, among others, healthcare workers, uranium miners and nuclear power workers. In Europe, Finland has a registry (the ASA) that documents workers' exposures to classified and listed carcinogens. The intention of these registries is to monitor trends in levels of exposure, to take action to reduce them and to ensure that workers are not exposed to levels of carcinogens above the allowable limits.

In the European Union, the Finnish Institute for Occupational Health developed the International Information System on Occupational Exposure to Carcinogens (CAREX) to estimate exposures to occupational carcinogens in different occupations and industries. The NCEOE has identified the lack of systematic hazard surveillance as a major gap in Canadian practice. We have supported current studies to estimate occupational exposure to carcinogens in Ontario and British Columbia, using this system, which are underway. Preliminary data from these studies indicate that there are thousands of workers at risk of exposure to

classified human carcinogens. This is of concern, requires our attention, and further intervention. (See recommendation #2 above) Prevention of exposures now will result in fewer cancer cases in the future.

Environmental databases – such as the Northern Contaminants Program and the Alberta Community Exposure and Health Effects Assessment Program – also provide information on health indicators and environmental carcinogens that can be used for preventive intervention.

Examples of best surveillance practices in the United States and Europe – SENSOR, THOR, and the Centers for Diseases Control and Prevention biomonitoring studies -- are not focused on cancer, but show the possibilities of monitoring and reporting that can be used to identify emerging problems. These programs for reporting illnesses provide models that could be adapted to focus on or include cancer. In the case of national biomonitoring studies, this research can indicate trends in chemical exposures over time.



From the UBC School of Occupational and Environmental Hygiene/Cancer Care Ontario Project

Information Disclosure and Labeling

Gaps
<ul style="list-style-type: none"> • Consumer Chemical Regulations do not require carcinogen disclosure • No central repository or audit for workplace MSDSs • No community and limited first responder information disclosure • Limited NPRI data (Thresholds, exemptions pesticides, transport, maintenance) • See Government Intervention: Legislation/Regulation and Policy recommendations addressing these gaps

A number of laws providing for information disclosure have been developed over the last 20 years, particularly in the United States. Information disclosure laws provide access to information held by government and industry, and, where they identify carcinogens, give the public and workers knowledge that may enable them to avoid or reduce exposures.

The two most important information disclosure laws in Canada are the Workplace Hazardous Materials Information System and the National Pollutant Release Inventory.

The Workplace Hazardous Materials Information System, known as WHMIS, is a system of integrated provincial and federal laws that require disclosure of hazard information to workers through material safety data sheets, labeling requirements and training programs. Material safety data sheets (MSDSs, in particular, can be used by workers to find out whether a substance causes cancer.

However, MSDSs do not always accurately describe all properties of hazardous ingredients in a product. The Hazardous Materials Information Review Commission, which reviews requests for trade secret exemptions, reports on the violations regarding information disclosure requirements in the MSDS it reviews. Errors in disclosure of toxicological properties such as carcinogenicity are of particular concern.

Under the Canadian Environmental Protection Act, the federal government established the National Pollutant Release Inventory (NPRI), a national inventory of chemicals released by large

Recommendations
<ol style="list-style-type: none"> 1. Health Canada's WHMIS Division should develop a national program for auditing the accuracy and completeness of MSDS in collaboration with HMIRC and the provinces. <ol style="list-style-type: none"> 1.1 Regulators must look at better enforcement of WHMIS requirements for accurate MSDS, and training of the workforce regarding the significance of MSDS disclosure information pertaining to classified carcinogens. (See p. 12 for additional recommendations)

facilities to land, air and water, and shipped off-site for disposal, treatment or recycling. Facilities are required to report the releases and transfers of 324 key pollutants, including many confirmed and probable carcinogens. This reporting is made public. Community groups, such as the Toronto Environmental Alliance, have used NPRI reporting to identify carcinogens present in the City of Toronto. The NCEOE has recommended that systematic hazard mapping, using the NPRI, be done for all Canadian communities to determine which areas are subject to exposures of concern.

MSDS Violations 2004-2005 (HMIRC Reviewed Claims Only)

	Number of Violation Occurrences		
	Original	Refiled	Total
Total	1815	288	2103
# of Claims	191	54	245
Average # of Violation occurrences per claim	9.5	5.3	8.6
Hazardous ingredients			
Chemical identity	47	7	54
CAS and PIN	24	6	30
Concentration	59	19	78
Concentration ration	87	5	92
Acute lethality values	157	35	192
Toxicological Properties			
Route of entry	13	2	15
Acute exposure	113	6	119
Chronic exposure	114	13	127
Exposure limits	74	11	85
Irritancy	13	3	16
Corrosivity	21	-	21
Sensitization	9	3	12
Carcinogenicity	11	5	16
Embryotoxicity	1	-	1
Teratogenicity	12	-	12
Reproductive toxicity	14	3	17
Fetotoxicity	36	6	42
Mutagenicity	58	9	67
Synergism	10	8	18

In addition, some provincial legislation provides the public with information on carcinogens. Ontario has established a regulation that requires large facilities to report air emissions. This information is publicly available on the Ministry of Environment's OnAIR website. The OnAIR registry lists more air contaminants than the NPRI, and, in some instances, at lower thresholds. Ontario also legislates the right of the public to information on drinking water testing. In Ontario, and throughout the United States, safe drinking water laws require drinking water operators to report annually on a proscribed list of chemicals, including carcinogens such as trihalomethanes, which have been detected in drinking water.



for all cosmetic products sold in Canada as well. However, carcinogens are not identified by hazard phrases, pictograms or any specific markings to make consumers aware of their presence in cosmetics. Consumers are only able to identify carcinogens used in these products if they know which chemicals are listed carcinogens. The Globally Harmonized System of Classification and Labeling of Chemicals (GHS) has recommended

that countries use plain language labeling that describes potential hazards, such as carcinogenicity, and uses standardized phrases and hazard symbols. In Europe, no known or suspected carcinogens are allowed in cosmetic products under the Cosmetics Directive.

In the United States, the most important federal information disclosure law is the Emergency Planning and Community Right to Know Act (EPCRA). This Act ensures that firefighters and communities know what hazardous materials are used and stored in facilities near them. It also set up the U.S. Toxics Release Inventory, after which the NPRI was modeled. The Toxics Release Inventory (TRI) is more comprehensive than the NPRI, covering approximately 660 listed chemicals. An analysis of air toxics between 1988 and 1991 found that plants whose emissions generated higher numbers of expected cancer cases reduced their emissions more than other companies.⁴

States, such as California and New Jersey, have legislated expanded rights to information. California's Proposition 65 is the most directly relevant to primary cancer prevention. This legislation requires the identification of cancer-causing chemicals in drinking water. It also requires that businesses that knowingly expose people to carcinogens give them "clear and reasonable" warning. This legislation led directly to manufacturers reformulating their products and eliminating carcinogens in order to avoid warning labels. Makers of fine china and plumbing supply manufacturers, for example, reduced or eliminated lead from their products.⁵

The City of Eugene, Oregon, has established a Toxics Right-to-Know program through a voter-initiated amendment to the Eugene City Charter. As a result, large companies in Eugene are required to do materials accounting and report all toxic emissions. The information is made publicly available. This program captures more information on toxic chemicals than the TRI.

Although there is a system of labeling hazardous products in Canada with symbols, carcinogenicity, unlike flammability or corrosivity, is not a criterion for hazard labeling. Confirmed carcinogens like silica in abrasive cleaners, or suspected carcinogens such as the pesticide, lindane, would not have to be identified.

The U.S. Fair Packaging and Labeling Act requires the listing of ingredients by chemical name on the labels of personal care products. As of November 2006, new regulations will make ingredient labeling mandatory



Another way for the public to avoid products containing carcinogens is to look for ecolabeling. This labeling identifies products, such as household cleaners, that are free of hazardous chemicals, including carcinogens. This is a much more popular practice in Europe than in the United States or Canada.

⁴ Hamilton, J., "Exercising Property Rights to Pollute: Do Cancer Risks and Politics Affect Plant Emission Reductions?", *Journal of Risk and Uncertainty*, Vol. 18, 2, August 1999.

⁵ Clifford Rechtschaffen, "How to Reduce Lead Exposures With One Simple Statute: The Experience of Proposition 65", *Environmental Law Reports* 29, 10581-10591.

C Community Education and Action Gaps

Gaps
<ul style="list-style-type: none"> • Lack of infrastructure and linkage between community organizations • Few expert resources and funding sources • Secondary focus on primary cancer prevention: multiple issues, weak priority setting • Little media attention and poor linkage between “health care crisis” and primary prevention

Community groups, environmental organizations and committed groups of cancer survivors, particularly organizations of women affected by breast cancer, have initiated public education and action campaigns related to primary cancer prevention.

Often working with minimal financial support and volunteer labour, they have raised awareness of the link between exposures to environmental carcinogens found in food, automobile exhaust, schools, air, water, and products such as cosmetics and household cleaners, and their possible health effects. In doing so, they have helped the public identify carcinogens and reduce their personal exposures to them.

Groups such as the Labour Environmental Alliance Society who have published the Cancer Smart Consumer Guide, the Environmental Health Association of Nova Scotia who developed a web-based Guide to Less Toxic Products, and the Saunders-Matthey Cancer Prevention Coalition publish reports, maintain websites, and conduct conferences and workshops. The Toronto Cancer Prevention Coalition works directly with the City of Toronto Public Health to restrict or remove carcinogens from the environment and the workplace.

One of the most effective prevention strategies, intended to reduce the risk of exposure to a number of toxicants, has been the ban or phase out of the “cosmetic” use of pesticides initiated by community activists in a significant number of Canadian cities and towns. In persuading municipalities to adopt bylaws restricting pesticide use, community-based coalitions have received broad support not only from labour and environmental groups but also from physicians’ groups, women and children’s health groups, and the Canadian Cancer

Recommendations
<ol style="list-style-type: none"> 1. Municipalities should develop and implement primary prevention activities, such as: <ol style="list-style-type: none"> a) Community exposure profiles should be developed in collaboration with NPRI and community organizations. b) Support for collaborations such as that between the Toronto Department of Health and the Toronto Cancer Prevention Coalition should be encouraged. c) Community pollution prevention bylaws should be encouraged and BP examples disseminated.

Society. Although some communities in other parts of the world have restricted pesticides, the momentum behind this movement is unique to Canada. The NCEOE believes that a similar focus on priority carcinogens, such as the top 20 occupational carcinogens identified in the CAREX studies mentioned above, is needed in Canada.

In both Europe and the United States the most effective environmental groups and community organizations have similarly focused their efforts on raising public awareness and the relationship between environmental carcinogens and cancer. U.S. groups like The Breast Cancer Fund have campaigned for legislation such as biomonitoring in California and toxics reduction in Massachusetts. In Europe, groups such as Greenpeace and Friends of the Earth have done their own monitoring of carcinogens and other toxins as a way to support the need for stronger chemicals regulation. At the same time they lobby for legislation, these groups have also mounted consumer campaigns aimed at retailers.



Worker Education and Action

Gaps

- Lack of resources and technical expertise to evaluate chemicals in use and to find information on safer substitutes
- Little knowledge of best practices in Canada and EU and lack of harmonization across provinces
- Different regulatory regimes prevent common prevention efforts
- Most collective agreements do not address primary prevention and occupational cancer controls.

In the 1990s, disturbed by the apparent sustained prominence of cancer in their friends and co-workers, unions initiated cancer prevention campaigns.

As a result, many health and safety activists and unions -- the Canadian Auto Workers, the United Steelworkers of America, the Communications, Energy and Paper workers representing workers in the chemical industry, as well as a broad range of public and service sector unions such as Public Service Alliance of Canada, Canadian Union of Public Employees, and United Food and Commercial Workers -- focused their efforts on removing or reducing carcinogens in the workplace. These cancer prevention campaigns are examples of best practices in the workplace.

The campaigns started with intensive education programs, including workshops and training programs conducted by the unions. Strategies for the reduction or elimination of carcinogens were developed, followed by action in the workplace.

Unions and health and safety activists worked with employers through joint health and safety committees and through collective bargaining to achieve improvements. They were able to use provisions in existing health and safety laws that gave them the right to know about hazards in the workplace and the right to refuse unsafe work. They were also able to reduce their exposures by working with employers to replace dangerous substances with less hazardous ones, to make process modifications, or through process substitution. Legislation in British Columbia and Quebec with substitution provisions has facilitated this.

In Ontario, through the collective bargaining process unions and the big 3 auto makers agreed to reduce exposures to metalworking fluids by setting their own level of exposures in the plants, well below the provincial standard. In some working areas of the plants, the automakers agreed to replace metalworking fluids with canola oils. In addition, the collective agreements banned several carcinogens, among them asbestos and vinyl chloride.

Recommendations for Future Proposed Activities

1. Information bulletins should be developed to address cancer prevention and toxic use exposure/ reduction (TUR), substitution arrangements and best available technology.
2. The Mass. Toxic Use Exposure/ Reduction model should be further investigated and funding for a Canadian Federal or Provincial counterpart considered.

Other workplaces have replaced solvents with water to clean metal parts. Less hazardous paints were substituted for paints with heavy solvents in British Columbia after workers became ill. Unions representing mineworkers have made progress in reducing diesel exhaust emissions underground, and in substituting grease for lubricating oil in underground equipment. Workers in western Canada have been educated about cleaning products and many have switched to safer products in long-term care facilities, processing plants, hotels, restaurants, offices and schools.

In Europe, workers face the same hazards and are similarly looking for substitutes to carcinogens in their workplaces. Directives of the European Union, and national occupational health and safety legislation facilitate this. For example, the Occupational Carcinogens Directive stipulates that "the employer shall reduce the use of a carcinogen or mutagen at the place of work, in particular by replacing it, in so far as is technically possible, by a substance, preparation or process which, under its conditions of use, is not dangerous or is less dangerous to workers' health or safety, as the case may be." (Article 4)

Carcinogens Eliminated from Ford and Chrysler plants by Collective Agreement:

Asbestos
 Bis(choloromethyl)ether (BCME)
 Carbon tetrachloride
 Halons
 Hydrobromofluorocarbons (HBFCs)
 Methyl bromide
 Methyl chloroform
 Polybrominated biphenyls(PBBs)>0.001%
 Polychlorinated biphenyls(PCBs)>0.001%
 Polyclorinated terphenyls(PCTs)>0.001%
 Tris (1-aziridinyl) phosphine oxide
 Tris (2,3-dibromopropyl) phospate (TRIS)
 Vinyl chloride monomer 0.001%

Non-Governmental Organizations' Work in Cancer Prevention

Organizations such as the Occupational Health Clinics for Ontario Workers (OHCOW)] and the Canadian Cancer Society not only help people with cancer but they also try to prevent the exposures that might have caused the disease.

The Occupational Health Clinics for Ontario Workers (OHCOW) offer inquiry services, medical diagnoses by doctors trained in occupational medicine, group services for workplace health and safety committees, and conduct research on occupational illness and injury. For instance, the Windsor OHCOW clinic has initiated the collection of occupational histories of cancer patients in collaboration with the Windsor Regional Cancer Centre since 1994. Currently there is a research project to collect the occupational histories of over 1000 women with breast cancer and 1000 community controls to determine whether occupational and environmental factors are contributing to breast cancer risk⁶.

The Canadian Cancer Society has publicly supported the use of the precautionary principle, and, on this basis, took part in the campaign to ban the ornamental use of pesticides on lawns and gardens. They have also called for the discontinuation of pressure-treated lumber for decks and playgrounds because of its potential to expose children and families to arsenic, and promoted the reduction of exposures to environmental carcinogens.

Provincial cancer societies have also promoted cancer prevention. The Alberta Cancer Board, for example, has co-sponsored and organized a national conference on primary cancer prevention with the NCEO. The BC & Yukon Division (CCS) has initiated a BC Primary prevention Action group with an important focus on documenting and reducing occupational & environmental exposures.

⁶ Brophy JT, Keith MM, Gorey KM, Luginaah I, Laukkanen E, Hellyer D, Reinhartz A, Watterson A, Abu-Zahra H, Maticka-Tyndale E, Schneider K, Beck M, Gilbertson M. (2006). Occupation and breast cancer: a Canadian case-control study. *Annals of the New York Academy of Sciences* (in press).

Employer/Industry Reductions of Carcinogens

Gaps

- Limited focus by employer/industry associations
- Limited information sharing regarding alternatives and substitutes
- Limited technical assistance programs to assist companies to make substitutions for particular chemicals or processes.
- Weak coordination with OSH agencies or Ministries of the Environment: elimination and substitution
- Limited financial incentives or fiscal policies promoting pollution prevention for carcinogens

Recommendations for Future Proposed Activities

1. Employer/Industry should audit MSDSs for Group 1 and 2A carcinogens to ensure they comply with WHMIS information disclosure requirements.
2. Employers/Industry should audit their procedures/policies regarding the handling of carcinogens.
3. Incentives for Toxic Use Reporting Programs at all three levels of government should be investigated.

Many Canadian companies have eliminated or made significant reductions in the levels of carcinogens they release in the workplace or to the environment, as a result of both government regulation and pollution prevention programs.

Although government regulations are the most effective means of implementing broad-based environmental improvements, the federal government and many provincial governments have chosen to emphasize voluntary pollution prevention programs. Pollution prevention is defined as processes or practices that avoid or minimize the creation of pollutants and reduce the overall risk to human health and the environment.

The public interest in safer products has also stimulated some companies to create products such as heat-treated wood and industrial cleaners that do not contain carcinogens or other toxins.

Companies with pollution prevention programs that are good examples of best practices include:

- Novopharm, a pharmaceutical manufacturing company in Scarborough, modified their manufacturing process, switching from a solvent-based pill coating process using dichloromethane, a suspect carcinogen, to an aqueous-based process.
- Interface, the world's largest flooring company, adopted an objective worldwide of zero emissions to air and water. In Belleville, where it manufactures nylon carpet tiles, it eliminated the need for dyes that were the products of heavy metals through process changes.
- The Campbell River Gold Mine, in northwestern Ontario, prior to 1992 operated a roaster to separate the gold from the ore, releasing high levels of arsenic into the air. The company replaced the roaster with an autoclave that reduced its discharges of arsenic into the air and water by 99 per cent.
- Alcan Quebec introduced a new low-level PAH coal tar pitch for its Soderberg plants. The new coal tar pitch reduced PAH levels inside their Quebec plants by 30 to 70 per cent and reduced emissions to the outside by 35 to 50 per cent.
- The Ottawa Hospital stopped incinerating its biomedical waste, replacing it with a hydroclave system that is considered the best environmental technology for the decontamination and reduction of biomedical waste.
- The Carriage Trade Cleaning Centre was one of the first large cleaning plants in Canada to convert completely from using perchloroethylene for dry cleaning to wet cleaning.

However, for the most significant examples of practices that have a broader impact on reducing carcinogens, it is necessary to look beyond Canada.

In the United States, the Massachusetts Toxics Use Reduction Act has led to dramatic reductions in the use, emission and disposal of toxic chemicals. These reductions are the result of the statewide introduction of mandatory pollution prevention planning. The Massachusetts experience also demonstrates the importance of technical advice and support programs in helping industries make those reductions. There are very few programs in Canada that offer this kind of help. In Sweden, the principle of substitution is an example of a best practice that has become an integral part of all industrial and commercial activity in the country. Swedish companies, such as the construction company, Skanska, or the retailer, Hennes and Mauritz (H&M) have practiced it for many years. The European Union has also incorporated the principle of substitution into several important pieces of legislation.

Moreover, Europe has recently introduced legislation that makes industry responsible not only for the way in which they manufacture products but for taking the products back at the end of their useful life. Based on the principle of extended producer responsibility, European directives require manufacturers of vehicles and electric and electronic equipment to take back used products. Complementary legislation also restricts the electric and electronics industry from using certain toxic chemicals in the manufacturing process. This has led to the elimination of carcinogens such as cadmium and hexavalent chromium in electric and electronic equipment either through substitution of less hazardous chemicals or process changes.

Government Intervention: Legislation/Regulation and Policy

Gaps

- Substitution and ALARA requirements lacking in most jurisdictions
- No harmonization of exposure limits and implementation of the precautionary principle in establishing Canadian limits for carcinogens
- No registration and evaluation prior to import or sale (PMRA exception)
- No requirement to report and audit workplace use of carcinogens
- Toxic Use Reduction Planning is not mandatory
- CEPA enforcement and regulatory tools unclear or voluntary
- No requirement to disclose carcinogens in consumer products labeling or domestic use pesticides
- Consumer Chemical Regulations do not require carcinogen disclosure
- Limited NPRI data (Thresholds exemptions pesticides, transport, maintenance)

Legislation and regulation are key tools for reducing or eliminating exposure to carcinogens.

There are three occupational health and safety legislation statutes in Canada that have explicit provisions for substitution -- the federal Labour Code, the British Columbia's Workers Compensation Act and Quebec's Act Respecting Occupational Health and Safety. The substitution provisions in these Acts are a direct way in which workers, unions and companies can work towards the use of less harmful alternatives in the workplace. These three occupational health and safety laws represent the best practices in Canada because of their potential application to the reduction or elimination of carcinogens.

In some instances, these provisions have been very effective. For example, a Quebec inspector successfully convinced Domfoam International in Montreal to replace an adhesive containing dichloromethane, a suspect carcinogen, with water-based glue in order to protect the workers manufacturing polyurethane foam. However, overall it is difficult to evaluate the effectiveness of these provisions because little is known about their application or enforcement. The NCEOE has recommended that the federal and provincial governments focus strongly on applying these provisions. They recommend workplace audits be done to determine the use and presence of carcinogens and the opportunities for substitution.

Recommendations
<ol style="list-style-type: none">1. Federal legislation should require disclosure of all Group 1 and 2A carcinogens (listed in Table 1) through labeling on all consumer products, including pesticides. i.e. Hazardous Products Act (Health Canada (CCCR)), Pest Control Products Act (PMRA) etc.<ul style="list-style-type: none">• Use of standard hazard phrase and symbols should be adopted which indicate a product contains classified carcinogens, as recommended by the GHS. The use of a standard symbol to indicate a product does not contain classified carcinogens should be explored. There should be an expansion of the environmental choice program of Environment. Canada and its application in the consumer field.2. CEPA 1999 should be updated and require pollution prevention programs for federally regulated sites using or

<p>producing Group 1 and 2A carcinogens.⁷</p> <ol style="list-style-type: none">3. There should be a public review and gap analysis of the EU Directives and proposed REACH legislation with ongoing Canadian activities. The Federal government should pursue international harmonization concerning disclosure, use, registration, authorization, and prohibition of classified carcinogens.

“We have called upon governments and regulatory agencies to seek to harmonize their approach to exposure control in this critical area, and seek to eliminate or minimize exposures to recognized carcinogens whenever possible...” There should be a harmonization of exposure standards in workplaces throughout Canada. ALARA (as low as reasonably achievable) and substitution requirements should be generalized for classified 1 and 2A carcinogens.” Your annual review of OEL’s is an opportune time to seek to implement a harmonized approach, and to consider a generic substitution and ALARA requirement in Ontario.”

Letter from the NCEOE to The OELs Update Project, Ontario Ministry of Labour, November 23, 2004

⁷ The NCEOE prepared a submission to the House of Commons Standing Committee on Environment and Sustainable Development, with respect to the review of the Canadian Environmental Protection Act, recommending that all IARC Group 1 and 2A carcinogens be designated as CEPA Toxic and placed in Schedule 1, that CEPA move towards mandatory substitution for designated human carcinogens and that updated IARC 1, 2A and 2B lists be reviewed.

In the environmental field, the Canadian Environmental Protection Act and its regime for managing toxic chemicals is the most effective legislative tool in Canada for controlling carcinogens in the environment, and another example of a best practice. Once a substance is declared toxic, the federal government has a range of control options available to them. Options include controlling chemicals through mandatory pollution prevention plans or by regulation. Although very few carcinogens have been regulated, regulations directed at specific carcinogens have reduced releases to the environment and, in some cases, almost eliminated them from designated sources. Dioxins and furans, for example, have been almost completely eliminated from the effluent of pulp and paper mills.

Even municipalities have legal powers that can be used to control carcinogens. The City of Toronto has used its Sewer Use By-law to require toxics use reduction planning, modeled after Massachusetts' Toxics Use Reduction Act. As a result of this bylaw, for example, cadmium releases to the sewage treatment plant from metal finishing companies have been reduced.

“CEPA should be updated and require pollution prevention programs for federally regulated sites using or producing Group 1 and 2A carcinogens”.

Submission from the NCEOE to the House of Commons Standing Committee on Environment and Sustainable Development on the Review of the Canadian Environmental Protection Act (CEPA, 1999), October 4, 2005

In Europe, the Nordic countries, Sweden and Denmark in particular, have led the way in efforts to eliminate carcinogens. They have instituted bans or restrictions on carcinogens such as cadmium, and have influenced the policies of the European Union. The Swedish government has adopted a policy objective of achieving a non-toxic environment by 2020, and this has stimulated many innovative programs aimed at eliminating hazardous chemicals.

The most important new chemicals legislation is the regulation proposed by the European Union, known as REACH -- the Registration, Evaluation and Authorization of Chemicals.

Although it is not expected to be in force until April 2007, REACH will require, for the first time, companies importing or manufacturing chemicals to register them. For the more hazardous chemicals and for those used in large volumes, companies will have to submit safety testing with their registrations. This requirement will shift the burden of proof from government to industry to demonstrate the safety of chemicals. Companies using certain extremely hazardous chemicals will have to show that risks are adequately controlled, that social and economic benefits outweigh the risks or that no suitable alternative exists before they are granted an authorization to use them. For more information:

<http://europa.eu.int/comm/environment/chemicals/reach.htm>

Europe is the one of the largest producers of chemicals in the world and REACH will likely have a far-reaching impact. It is anticipated that REACH will result in improved understanding of the chemicals in use and better management of their risks: "...To estimate the number of cancer cases requires information on the dose received, the potency of the carcinogen, the presence of other exposures (notably tobacco smoking) and the susceptibility of the group at risk. REACH is a response to a gap in knowledge regarding the intrinsic properties of substances already on the market and exposure to them."⁸ Although the estimates of the number of cancer cases that would be avoided by implementing REACH is wide-ranging, a study of occupational health benefits prepared for the European Commission estimated that REACH would result in a reduction of between 17,000 and 54,000 cancer deaths in Europe over 30 years.⁹



⁸ Commission of the European Communities' Staff Working Paper, REACH Extended Impact Assessment, Nov. 10, 2003

⁹ Risk & Policy Analysts, "Assessment of the Impact of the New Chemicals Policy on Occupational Health", prepared for the European Commission-Environment Directorate-General, March 2003.

Conclusion

In the course of their lifetimes almost all Canadians will encounter carcinogens either in their workplace or through contaminated air, water, soil or food.

Identifying the actual number of cancers caused by occupational or environmental exposures is difficult for a number of reasons. With rare exceptions, cancers with different causes look the same. In other words, there is no test that can be performed to identify the cause of a cancer. In addition, it is now recognized that the great majority of cancers have multiple causes, such as a combination of genetic, lifestyle and environmental factors. The implications of this for prevention are that if any one cause is removed, the risk of cancer may be significantly reduced. It is for this reason that the NCEOE has emphasized importance of primary cancer prevention through reducing or eliminating carcinogens, particularly for vulnerable groups. The recommendations that appear in this summary seek to address both environmental and occupational exposures to carcinogens.

Occupational exposures to carcinogens are targeted through a number of recommendations:

- The application of ALARA occupational exposure limits to these substances;
- Surveillance recommendations which seek to begin to profile current occupational exposures to these substances;
- Worksite audits conducted by prevention agencies and employers;
- Regulatory action including MSDS audits and exposure notification (CAREX is one program being piloted now); and,
- Occupational histories, particularly targeting potential exposure to IARC group carcinogens and the associated cancers

Environmental exposures are targeted through:

- Linkage to CEPA NPRI data;
- Pollution prevention programming through CEPA; Provincial and Municipal governments;
- Control of cosmetic pesticide use and exposures through municipal bylaws; purchasing policies; public education; and,
- Labeling of consumer products containing known Group 1 and 2A carcinogens.

The NCEOE believes that, if these recommendations were acted upon, exposures to occupational and environmental carcinogens and the risks of cancer from these exposures would be reduced.

Full Report "Prevention of Occupational and Environmental Cancers in Canada: A Best Practices Review and Recommendations" available online at www.cancercontrol.org