



# ChemTRAC proves to be catalyst of change

## *City of Toronto policy and hospital demand stimulates green manufacturing and reduced toxics levels*

Thanks to an innovative safer chemical policy initiative by the City of Toronto, residents can breathe a little easier and easier breathing is good for everyone in the GTA. It is helping to focus attention on reducing potential health hazards from chemicals in common use throughout the city while stimulating research and creative solutions from manufacturers and distributors vying for our business.

### The Problems

Over 80,000 chemicals have been registered in commerce in North America since World War II. In Canada, 23,000 high-volume (greater than 100 kg/year) chemicals in use more than 20 years, but unevaluated for toxicity, were placed on the Domestic Substances List and 4,000 were categorized to be evaluated under the federal Chemicals Management Plan for inherent toxicity, bioaccumulative potential, persistence, or greatest potential for exposure. Examination of the highest

priority chemicals has confirmed many of these to be toxic and they are targeted for reduction/elimination under the Canadian Environmental Protection Act. But all this takes time!

On a daily basis, our lives are punctuated with exposures to chemicals, in the homes and workplaces we inhabit (building materials, paints, and furnishings), on the clothes we wear, in the personal grooming products we use, in contaminants or additives to the foods and beverages we ingest (including in the containers that house our processed foods), in the toys we play with, and in the cleaners keeping our surfaces free of dirt and unwanted bugs while keeping our air smelling “fresh.” All these exposures may be in addition to the air we breathe each day in the community which is polluted with pesticides, road dust, and emissions from industry and vehicles.

For example, findings from an Environmental Working Group study in the United States revealed the average adult uses nine personal care products every day, with 126 unique chemical ingredients. It further suggests one of every 13 women and one of every 23 men “are exposed to ingredients that are known or probable human carcinogens every day through their use of personal care products.”



Through these personal care products, one in five adults are potentially exposed to one of seven carcinogenic impurities - hydroquinone, ethylene dioxide, 1,4-dioxane, formaldehyde, nitrosamines, PAHs, and acrylamide. Some of these chemicals are absorbed through the skin; others may be ingested or inhaled, or all three, and they can result in multiple body systems being threatened.

Exposure to multiple, potentially hazardous products on a daily basis for some could result in no acute symptoms, or merely a few minutes of watery eyes or sneezing. For others, the experience is far from fleeting. In fact, rarely, it could be life threatening if exposure triggers anaphylaxis or an asthma attack. However, some people experience chronic symptoms, such as headaches (including migraines), trouble with concentration and coordination, depression, severe fatigue, stuffy nose, persistent asthma or bronchitis, nausea, upset stomach, intestinal disorders such as diarrhoea, eczema or other skin rashes, and musculoskeletal pains or burning sensations.

Being conscious of the hazards we expose ourselves to each day makes good sense. But unfortunately it is often impossible to determine the full extent of the chemicals we are eating, breathing, drinking or wearing, or which ones may be harmful. In many instances, manufacturers and producers are under no legal obligation to make public the list of chemical ingredients. For instance, the unregulated perfume industry strives to protect the proprietary details of their formulations from competitors by not labeling ingredients. However, there is a growing body of evidence linking exposure to some chemicals with serious human health and environmental problems. Of particular concern is the vulnerability of fetuses and children, who experience higher exposures and their still developing body systems are not as capable of metabolizing harmful chemicals. Impacts on underdeveloped organs may leave lifelong effects, and a recent scoping literature review by the Canadian Environmental Law

Association *et al* revealed evidence that early life exposures are linked with the development of later chronic diseases.

It makes sense to many in health care that manufacturers should be required to prove the chemicals being used are free from danger and all new chemicals should go through stringent testing before being released on an unsuspecting public. The public could then be better equipped to make informed decisions on what products they will purchase and bring into their homes and offices. Although, since 1994, federal evaluation of new chemicals is slowly improving, in the absence of nationally-mandated testing and disclosure, some jurisdictions are establishing their own safety guidelines to protect citizens.

## Solutions: The Toronto Experience

Premised upon the simple realities that chemicals are emitted into the air by businesses in the community, and are released from daily human activities and from many household products, as well as that there is convincing evidence linking chemicals to health effects ranging from respiratory problems to cancers, the City of Toronto did what any good community custodian would do. It explored, developed and initiated guidelines for reducing exposure to toxic substances released by facilities operating within the city in order to inform and help protect the health of its citizens. In so doing, it is fostering a better understanding of the merits of green business practices and the links between the environment and human health, while further providing a framework for industry to reinvigorate itself through the development of new and innovative earth-friendly products.

The Environmental Reporting and Disclosure Bylaw (Municipal code chapter 423) now forms part of the city's Chemicals in Toronto: Reduction and Awareness in our Community initiative, otherwise known as ChemTRAC ([www.toronto.ca/health/chem-trac/index.htm](http://www.toronto.ca/health/chem-trac/index.htm)) which requires facilities and businesses within the City of Toronto to annually report on the use, manufacture and release of any chemical substance found in the City's priority substance list.

ChemTRAC is of importance to the city's health care facilities. The medical and diagnostic laboratories sector is made up of hospitals that are responsible for providing diagnostic and medical treatment to in-patients subject to a wide variety of diseases or medical conditions. These facilities also provide a number of additional services that include diagnostic x-ray series, clinical laboratory services, pharmacy services and out-patient services.

This sector joins others such as automotive repair and maintenance, funeral services, food and beverage manufacturing, printing and publishing, manufacturing, power generation, water and wastewater treatment, and waste management and remediation services in efforts to improve public health and support a green



## The City of Toronto

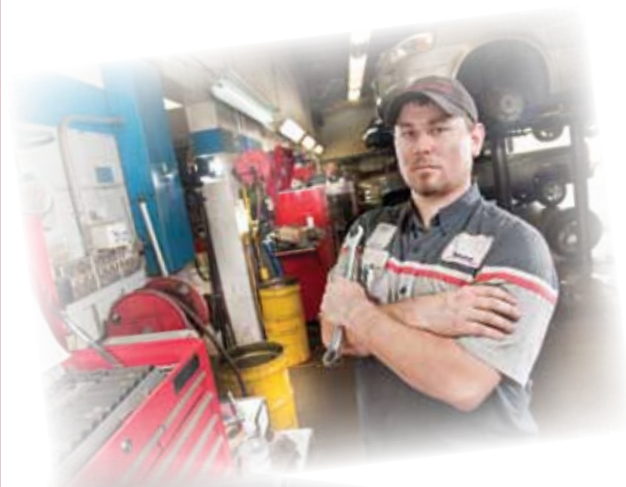
### Working together for a healthier city

The City of Toronto's Environmental Reporting and Disclosure Bylaw lists the following 25 priority substances because each has been found to be present in Toronto's environment and has known health risks. These chemicals may be used or released in a variety of operations, including chemical manufacturing, food and beverage production, automotive repair and laboratories.

Acetaldehyde  
Acrolein  
Benzene  
1, 3-Butadiene  
Cadmium  
Carbon tetrachloride  
Chloroform (also known as Trichloromethane)  
Chromium (non-hexavalent)  
Chromium (VI) (also known as hexavalent chromium)  
1,4-Dichlorobenzene (also known as para-Dichlorobenzene)  
1,2-Dichloroethane (also known as Ethylene dichloride)  
Dichloromethane (also known as Methylene chloride)  
Ethylene dibromide (also known as Dibromoethane)  
Formaldehyde  
Lead  
Manganese  
Mercury  
Nickel compounds  
Nitrogen oxides (NO<sub>x</sub>)  
Particulate matter 2.5 (PM<sub>2.5</sub>)  
Polycyclic aromatic hydrocarbons (PAHs)  
Tetrachloroethylene (also known as perchloroethylene)  
Trichloroethylene  
Vinyl chloride  
Volatile organic compounds (VOCs)

A facility must report any amount equal to or above the threshold level for the chemicals as set out in the bylaw.

Toronto Public Health staff is available to answer technical inquiries about the Environmental Reporting and Disclosure Bylaw and the ChemTRAC program. Phone: Call 3-1-1 within Toronto city limits or 416-392-CITY (2489) outside Toronto  
Email: [chemtrac@toronto.ca](mailto:chemtrac@toronto.ca)



local economy by reducing hazardous chemicals from the environment. Tracking and reporting use and release of priority substances forms part of the framework which ultimately will improve worker health and safety, enhance community relations, meet consumer demand for greener options, and lower operating costs.

Toronto's health care facilities, like health care facilities everywhere, deliver compassionate care to those in need. The delivery of that care can involve, either directly or indirectly, the use of complex and sometimes toxic chemicals with which health care workers must deal on a daily basis. Health care professionals are now focused on the safest methods to handle, store, use and dispose of these compounds, thanks in part, to ChemTRAC.

The names of many of these toxics are familiar to us such as lead, formaldehyde, mercury, nickel, and volatile organic compounds (VOC); others perhaps not so familiar including 1,4-Dichlorobenzene, Tetrachloroethylene (Perchloroethylene) and Dichloromethane (Methylene chloride), but regardless of whether we know the names, or can even pronounce them, they can pose serious health threats to those who are exposed to them.

In 2004, Toronto Public Health reported exposure to five common smog pollutants, including ozone, contributed to approximately 1,700 premature deaths and 6,000 hospitalizations of Toronto residents each year.



## Behind the scenes

Consider for a moment what lies behind the scenes in a typical hospital including its mechanical and building infrastructure filled with pipes, pumps, motors, emergency generators, carpentry equipment and supplies, laundry machines, research laboratories, and housekeeping and infection control chemicals.

The following section profiles some of the many ChemTRAC priority substances found in health care. For information on use, methods of exposure, health and environmental effects, please refer to the Chemical Facts at the end of this paper.

**Maintenance products** such as sump treatment chemicals and drain openers can contain **1,4-Dichlorobenzene**, (also known as **para-Dichlorobenzene**) which is believed to be carcinogenic to humans, having been linked to increased risk of cancerous kidney and liver tumours.

Individuals may experience this increased risk as a result of chronically breathing contaminated air where 1,4-dichlorobenzene is used in sumps and in everyday products such as deodorants and fumigants.

**Lubricants, solvents** such as paint strippers and removers, and **de-greasers** often contain **Dichloromethane** (Methylene chloride), also believed to be carcinogenic to humans. It is similarly linked to increased risk of cancers in the liver and kidneys as a result of chronically breathing contaminated air containing Dichloromethane. This toxin is also used as a process solvent in the manufacture of drugs, pharmaceuticals, and film coatings.

**Polycyclic Aromatic Hydrocarbons (PAHs)** are complex mixtures that result from the incomplete burning of organic substances, including **heating oil and diesel fuel**, and are difficult to measure and identify. Some are believed carcinogenic while others are not. Since PAHs are a more potent carcinogen when inhaled than ingested, the risk of lung cancer due to inhalation exposure may be higher than the risk of stomach cancer from oral intake.

**Trichloroethylene**, often found in **pipe wrap** and **degreasing agents**, is probably carcinogenic to humans. Individuals, who are chronically exposed to low levels of **trichloroethylene** by inhalation, may experience an increased risk of liver, kidney or lung cancer. Chronic exposure may also lead to liver injury and acute central nervous system effects such as headaches and fatigue.

The men and women who labour in health care's **diagnostic and research laboratories** also encounter their share of toxic substances as they fulfil their role in the patient healing experience. **Formaldehyde**, used routinely in labs as a preservative, is a carcinogen. It is considered a weak initiator of cancer and a strong promoter of cancer. This highly reactive substance can irritate the nose, eyes, skin, throat and lungs at fairly low levels of chronic exposure. People with asthma may be more sensitive to the irritating effects of inhaled formaldehyde. Individuals may be at an increased risk of these health conditions after being chronically exposed to formaldehyde in the air.

**Volatile Organic Compounds (VOCs)** are a group of organic chemicals that easily evaporate into the air from their direct use, from products containing them, or as a by-product of other processes. They react with other pollutants to create ozone, which has been associated with acute symptoms like coughing and wheezing as well as more chronic conditions such as asthma and chronic obstructive pulmonary disease (COPD), which includes chronic bronchitis and emphysema.

While VOCs can act as precursors of outdoor smog, they can also impact directly on human health indoors. People who chronically breathe air contaminated with VOCs may experience an increased risk of cardiovascular and respiratory problems.



## ChemTRAC can encourage greener manufacturing

“As a result of Toronto’s sewer bylaw, we had to now find new products with the same high level of efficacy but without the toxic chemicals. We saw this as a great opportunity to review our standard operating procedures and make them as sustainable as possible. Nonylphenol Ethoxylates (NPE) was one of the chemicals we had to eliminate.

As a result of demand by our hospital and others, industry was convinced to reformulate certain products which led to growth in the number of EcoLogo-certified green cleaning products available to Canadians. It was a win for everyone including being a catalyst to galvanize cleaning product manufacturers into action. Hospitals were able to continue using their products, we were able to provide a safer environment for our patients, staff and our community, and the cleaning industry now had new product knowledge to turn into growth opportunities. We expect that the ChemTRAC initiative can result in the same kind of push on manufacturers to make greener products.”

*Ed Rubinstein, Manager of Energy & Environment, University Health Network, Toronto*

Exposure to **lead** can lead to health effects in almost every organ and system in the human body, including adverse effects on the reproductive, gastrointestinal, renal, cardiovascular, hematopoietic, immune and nervous systems, regardless of whether the route of exposure is inhalation or ingestion. Chronic exposure mainly affects the nervous system. Symptoms/signs of exposure may include a decrease in neurological function, fatigue, and increased blood pressure.

Children are particularly vulnerable to lead poisoning. Recent science shows that even low levels of exposure have adverse impacts on intelligence and behaviour in children and on blood pressure in adults. Lead is probably carcinogenic to humans. Exposure may lead to an increased risk of cancer of the kidneys. Lead is found in radiation shielding, protective x-ray vests, and instrument and equipment batteries.

**Mercury**, routinely found in **sphygmomanometers, dental amalgams, thermometers, lubricating oils, switches and thermostats**, is known as a potent human neurotoxin; however, exposure has also been linked to an increased risk of reproductive toxicity and cardiovascular disease. Adverse effects on the nervous system are of increased concern for the fetus, infant and child as these subgroups are particularly vulnerable.

In terms of patient care environments, there is probably no place more critical than an operating room yet it too has its share of chemical concerns, the most significant being **anaesthetic gases** (**Desflurane, Sevoflurane and Isoflurane**) of which 95% are typically vented to the atmosphere, through both machine leakage and patient exhalation. This category of gases, often referred to as **halogenated gases**, is noted as being up to 3,766 times more powerful than carbon dioxide when it comes to greenhouse gas potential.

Halogenated gases are typically blended with a carrier gas such as nitrous oxide (N<sub>2</sub>O) during the anaesthetic process before delivery to the surgical patient. When these gas mixtures are vented to the atmosphere, they add to other oxides of nitrogen (NO<sub>x</sub>), emitted from vehicles and power plants, which pollute the outdoor air and expose the community at large. Exposure to NO<sub>x</sub> leads to a decrease in the lungs' ability to fight infection, and is associated with daily mortality and hospital admissions as a result of respiratory disease. People with asthma and bronchitis, young children and adults with heart and respiratory disorders are especially sensitive to NO<sub>x</sub> exposure.

Health care workers are also particularly vulnerable to the harmful effects of overexposure to nitrous oxide (N<sub>2</sub>O). Exposure to more than 50 ppm of nitrous oxide can have serious cognitive effects including the reduction of motor and audiovisual skills, dizziness, headaches and reproductive difficulties.

The Ontario Occupational Health and Safety Act sets a safe exposure limit for (nitrous oxide) N<sub>2</sub>O at 25 ppm, but studies have shown that many health care workers, especially those who work in the OR, or in postoperative care, can be exposed to 12-40 times this amount. Safer chemical policies and work practices, staff education and improved anaesthetic technology, including recovery protocols, can all help to reduce the risks involved with N<sub>2</sub>O.



## SUCCESS STORIES

### Greening the OR

University Health Network, located on Toronto's busy downtown hospital row, was one of Canada's first health care organisations to lend its support to an innovative anesthetic gas recovery technology developed by Blue-Zone Technologies of nearby Concord, ON. Through the use of its Deltasorb® Anesthetic Recycling Technology, halogenated gases are collected through the use of inline canisters (mounted on the anaesthetic gas machines) containing an absorbent that traps the anaesthetic gas preventing release to the atmosphere thereby helping to protect both human health and the environment.

The Blue-Zone technology has now been deployed at a number of Toronto health care facilities including the Toronto General Hospital, Toronto Western Hospital, Sunnybrook Health Sciences Centre, Princess Margaret Hospital, Mount Sinai Hospital, Trillium Health Centre and The Scarborough Hospital.

“The removal of these waste halogenated anaesthetic gases from Toronto hospitals and our other southern Ontario pioneering partners (Peterborough, Ottawa, Kingston, Barrie, Hamilton and Halton), amounts to an annual impact of preventing over 33,600 tonnes of CO<sub>2</sub> from entering the atmosphere. This is equivalent to taking 8,400 cars off the road or planting 2,625,000 trees every year. The process is a globally-innovative ‘cradle to cradle’ solution as it allows for the saved anaesthetics to also be used as a raw material for new product. It's simply the right thing to do,” says Dusanka Filipovic, President of Blue-Zone.

To further reduce its ecological footprint, UHN and its anaesthetic specialists are also investigating alternatives to nitrous oxide as a carrier gas for the safe and effective delivery of halogenated gases during surgical procedures. This will further add to the growth of sustainable health care delivery in Toronto's downtown core.

Class 1 Inc., a leading Canadian manufacturer of medical vacuum and medical air systems, medical supply units, and medical gas pipeline components, is likewise committed to a parallel programme to add the collection and destruction of nitrous oxide carrier gas to its existing centralized anaesthetic gas recovery systems. The addition of this process into Toronto's operating rooms will add significantly to improved air quality surrounding the city's many hospitals.

*Pictured right, Blue-Zone's silver Deltasorb anaesthetic gas collection canister affixed to an electric piston ventilator in one of Toronto's many hospital operating rooms.*



*Class 1 Inc. medical air system in Toronto area hospital.*



“At UHN we are concerned about expelling operating room anaesthesia gases into the environment where, as they are metabolised over 10-20 years, they contribute to climate change and the formation of smog. UHN was the first hospital to pilot the capture of halogenated anaesthetics with Blue-Zone, a global pioneer located in Ontario. This is now an increasingly common practice across Ontario. As an anaesthesiologist working in these ORs, I also recognize the benefits of moving away from nitrous oxide as a carrier gas for our halogenated anaesthetic agents, and moving towards a more oxygen-rich mixture which not only helps reduce the emissions we introduce into our community air, but more importantly improves patient recovery.”

*Dr. Gerald O’Leary, Anesthesiologist in Chief, University Health Network, Toronto*

## Green in the Laundry

With an eye towards both a healthier workplace for staff and a healthier environment for all, Booth Centennial Healthcare Linen Services, one of North America’s largest providers of linen and laundry services, began to review their wash process and the chemicals they utilized.

In 2008, Booth Centennial worked with their suppliers to transition from a chlorine bleach oxidizer to a peroxide/paracid-based oxidizer. As a result, they have achieved a number of benefits which translate into a reduced ecological footprint for this Mississauga-based company which services numerous Toronto area hospitals and long-term care homes.

Their laundry facility and wash process is now completely chlorine-free. “Chloroforms, which are listed in Toronto’s Environmental Reporting and Disclosure Bylaw, are a direct result of the high use of chlorine in the laundry process,” says Maria Ash, Booth Centennial’s Director Corporate Services, who proudly adds, “previous to our change in process, we were using approximately 80,000 litres of chlorine annually. Now we use zero.”

Due to the ability to successfully wash in lower pH levels, this further reduced the overall pH in the waste effluent which is also of regulatory concern. Treatment to meet the cities compliance levels is now at a much reduced rate.

“All chemicals used in our laundering processes are well within municipal regulatory controls” says Ash, “and we have been completely free of phosphates and Nonylphenol Ethoxylates (NPEs) for approximately six years. Toronto was the first jurisdiction to implement these restrictions and we were ahead of the date of implementation. As a bonus, we’ve been able to reduce our wash temperatures from 160°F to 130°F resulting in approximately a 25% reduction in therms\* per pound. There was also a reduction in our total water usage from 0.8 gallons per pound to 0.7 resulting in a 20% decrease in overall water usage.

\* Therm = Unit of heat equal to 100,000 British thermal units (1.054 × 10<sup>8</sup> joules).



*Production line and sterilizer facilities at Booth Centennial Healthcare Linen Services. From their plant in Mississauga, Ontario, they service many of the Toronto hospitals.*





## Polystyrene phase out in Princess Margaret Hospital's Radiation Therapy Department

Finding more environmentally-friendly containers for foods and medications has posed a challenge for many health care organisations with cost of purchase and disposal often being cited as reasons for deferring adoption.

At University Health Network's Princess Margaret Hospital, they realized they had to push a little harder to find a solution that was both economically feasible and would match their internal stewardship goals when it came to replacing foamed polystyrene, (usually referred to by the Dow Chemical Company brand name Styrofoam®) with suitable alternatives.

Styrene is classified as a possible human carcinogen by the International Agency for Research on Cancer (IARC)\*, yet it remains in use throughout patient and office areas in many health care facilities.

Whether in solid or foamed formats, it makes its way into food containers in the form of disposable cutlery, take-away food containers, packaging such as yogurt containers, and drink containers. And while few would argue the merit of its convenience, of concern is the benzene component which is listed on Toronto's list of 25 priority substances under discussion in this paper.

Leaders at Princess Margaret have responded by discouraging the purchase of beverage cups using styrene in the manufacturing process and much of the staff have become committed to a complete phase-out piloted by Lue-Ann Swanson, the manager of Radiation Therapy at Princess Margaret, along with her department's Green Team. She has stopped the supply of polystyrene cups by removing all orders from her department's supply requests and staff is now using reusable cups which are easily cleaned and disinfected thanks to a generous supply of dishwashing soap maintained in the department. Paper cups are available instead of foam for patients.

\* IARC Monographs on the Evaluation of Carcinogenic Risk to Humans, Vol 82, World Health Organization. <http://monographs.iarc.fr/ENG/Monographs/vol82/mono82-9.pdf>

As you can imagine, the total number of single-use cups used across the University Health Network would be staggering; in fact an estimated 1.9 million cups per year. The good news is over 197,000 eight-ounce cups and nearly 155,000 sixteen-ounce cups have already been replaced.

A significant number of departments have already made the switch from Styrofoam cups. UHN's Energy & Environment department continues to work with all areas to find alternatives.

## What it all means

### Learning from past successes

In much the same way Toronto's hospitals became subject to stringent new water pollution regulations under the city's Sewer Use Bylaw in 2000, so too have they been integrated into Toronto's new Environmental Reporting and Disclosure Bylaw (Municipal code chapter 423), otherwise referred to as Chemicals in Toronto: Reduction and Awareness in our Community initiative, or ChemTRAC.

The sewer use bylaw was struck to regulate the quality of storm and sanitary discharges into the city's storm and sanitary sewers, to improve bio-solids quality, and to afford environmental protection and long-term health to receiving waters. The health care sector was quick to respond to their new obligations by sourcing cleaning products that were free of the banned substances.

Because of their massive purchasing power within the city of Toronto, health care organisations were able to clearly guide manufacturers towards more sustainable manufacturing. In effect, demand for new, more earth-friendly cleaning products prompted manufacturers to reformulate their products or risk losing very lucrative health care accounts. The sector's response helped to cultivate a new insight into cleaning protocols and helped drive the cleaning industry to become more sustainable.



There is every expectation that what Toronto's sewer bylaw did to bring about more sustainable practices and products in the cleaning sector, the new ChemTRAC initiative will do for the hundreds of other products health care facilities consume on a daily basis in the delivery of compassionate health care.

Through its concern for the health of its citizens and that of the environment, the city has put forth a tremendous opportunity for businesses to engage in a deeper level of sustainable thinking and to be at the forefront of the provision of less toxic products for use in health care, retail and manufacturing, and in homes.

According to the Canadian Coalition for Green Health Care's Linda Varangu, who conducted research on behalf of Environment Canada, "I interviewed several manufacturers of cleaning products following the introduction of Toronto's sewer bylaw and one in particular said they never would have developed a greener product if it had not been for the demand imposed by their health care clients. The result was a new, EcoLogo-certified product, specifically because of demand from Toronto-based clients, including a number of hospitals. It became apparent that the city's hospitals were some of the first to demand these new safer products and they began to rely upon third-party EcoLogo certifications to reduce their liability and to easily meet compliance requirements.

The key message here is that the city of Toronto's bylaw was able to stimulate greener businesses so the bylaw in itself is a success story. There were tremendous successes that resulted in improved manufacturing processes and the reduction of hazardous chemicals. It worked for sewer emissions, it has a very strong potential to be replicated for air emissions and likewise foster similar growth and product pioneering in the green chemicals industry."



## The Safer Chemical Policy Alliance Building a Green Economy

The Canadian Coalition for Green Health Care, in partnership with the University Health Network's Ed Rubinstein, is bringing together leaders in safe chemicals to show support for greener chemicals through the **Safer Chemical Policy Alliance**. A safer chemical policy limits the use of products and services that contain toxic chemicals, often as a part of an environmentally-preferable purchasing policy.

Safer chemical policies are becoming increasingly prevalent as organisations realize the harmful effects of many ubiquitous chemicals and opt to use safer, greener products and services. Fundamentally, safer chemical policies are commitments to ensuring better health. But they can affect more than the environment of a single institution: they can also encourage the development of a 'green economy.'

For more information and to show support for a green economy visit the Safer Chemical Policy Alliance at [www.greenhealthcare.ca/saferchemicals](http://www.greenhealthcare.ca/saferchemicals)

For manufacturers and suppliers of green products to health care, you can list your product(s) in the Canadian Coalition for Green Health Care's Green Products and Services Directory, a database designed to more easily facilitate the green purchasing process on the part of health care facility staff. Details available at: [www.greenhealthcare.ca/resources/directory](http://www.greenhealthcare.ca/resources/directory).

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University Health Network, Toronto  
[www.uhn.ca](http://www.uhn.ca)

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## Chemical Facts



**Chemical Name:** *1,4-Dichlorobenzene (para-Dichlorobenzene)*

**Use:** *Sump treatment chemicals, drain openers, deodorants, fumigants*

**Exposure:** *Inhalation of contaminated air*

**Health Effects – Acute:** *Upper respiratory irritation*

– Chronic: *Linked to increased risk of kidney and liver cancers*

**Environmental Effects:** *Can contaminate air, water, soil, and food*

**Chemical Name:** *Dichloromethane (Methylene chloride)*

**Use:** *Dental molding/bonding, paint removers, refrigerants*

**Exposure:** *Inhalation of contaminated air, skin contact*

**Health Effects – Acute:** *Altered sleep time, change in heart rate, general depressed activity*

– Chronic: *Probable human carcinogen*

**Environmental Effects:** *Can contaminate air, water, soil, and food*

**Chemical Name:** *Formaldehyde*

**Use:** *Disinfectants, sterilizers, floor finishers, fumigants*

**Exposure:** *Inhalation of contaminated air, skin contact*

**Health Effects – Acute:** *Respiratory irritation, eye, nose and throat irritation, headaches, dermatitis*

– Chronic: *Probable human carcinogen*

**Environmental Effects:** *Can contaminate air and water*

**Chemical Name:** *Lead*

**Use:** *Paints, solder*

**Exposure:** *Inhalation of contaminated air*

**Health Effects – Acute:** *Gastritis (inflammation of stomach lining), headaches, abdominal pain*

– Chronic: *Multi-system damaging effects*

**Environmental Effects:** *Can contaminate air, water, soil, and food*

**Chemical Name:** *Mercury*

**Use:** *Dental amalgam, released by fuel combustion and refuse incineration*

**Exposure:** *Inhalation of contaminated air; skin, subcutaneous and intravenous contact*

**Health Effects – Acute:** *Headaches, shortness of breath, numbness, diarrhea, pulmonary embolism*

– Chronic: *Broad ranging damage to the central nervous system*

**Environmental Effects:** *Can contaminate air, water, soil, and food*

**Chemical Name:** *Polycyclic Aromatic Hydrocarbons (PAHs)*

**Use:** *Released by fuel combustion and in cooking*

**Exposure:** *Inhalation of contaminated air, ingestion*

**Health Effects – Acute:** *Respiratory irritation*

– Chronic: *Skin disorders, some PAHs are probable human carcinogens*

**Environmental Effects:** *Can contaminate air and food*

**Chemical Name:** *Trichloroethylene*

**Use:** *Anesthetic gases, cleaners*

**Exposure:** *Inhalation of contaminated air*

**Health Effects – Acute:** *Hallucinations, distorted perceptions, headaches, dizziness, sleepiness*

– Chronic: *Probable human carcinogen, kidney, ureter and bladder disease*

**Environmental Effects:** *Can contaminate air, water, soil, and food*

**Chemical Name:** *Volatile Organic Compounds (VOCs)*

**Use:** *Many different products including refrigerants, solvents, disinfectants, cleaners, fumigants*

**Exposure:** *Inhalation of contaminated air*

**Health Effects – Acute:** *Eye, nose, and throat irritation, headaches, loss of coordination, nausea*

– Chronic: *Damage to liver, kidneys, and central nervous system, some VOCs are carcinogenic*

**Environmental Effects:** *Can contaminate air*

*Information above extracted from United States National Library of Medicine, through the ChemIDplus dictionary and the Hazardous Substances Data Bank, both accessible at <http://toxnet.nlm.nih.gov>. Additional information on VOCs extracted from the U.S. Environmental Protection Agency at [www.epa.gov/iaq/voc.html](http://www.epa.gov/iaq/voc.html), accessed December 6, 2011.*