



**EVALUATION OF INTEGRATED PEST MANAGEMENT IN CALGARY
PESTICIDE TOXICITY, IMPACTS ON HUMAN HEALTH
AND THE ENVIRONMENT, AND BEST PRACTICES**

Submitted by:

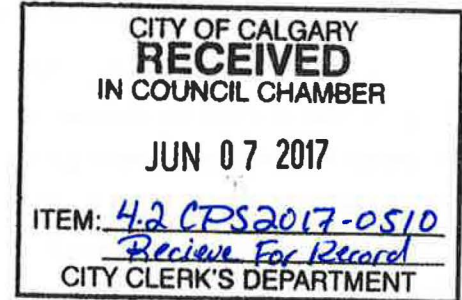
**COALITION FOR A HEALTHY CALGARY
AND
PREVENT CANCER NOW**

**TO
THE CITY OF CALGARY**

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This submission was prepared in response to an email solicitation to the *Coalition for a Healthy Calgary* dated December 7, 2016.

About Us

The *Coalition for a Healthy Calgary* (Healthy Calgary) is a registered, nonprofit society incorporated under the Societies Act of Alberta. It was formed in April 2007 in response to concerns regarding the use of pesticides, particularly in areas where children play. A coalition of citizens, health care professionals, scientists, landscaping and horticultural professionals and health and environmental organizations, Healthy Calgary continues the work of two previous organizations, Lawns for Kids and Pesticide Free Yards of the Sierra Club, that were active through the 1980s to the early years of 2000.

Prevent Cancer Now (PCN) is a national civil society organization, incorporated in 2007. It is broad-based, including scientists and medical professionals, labour, educational representatives, as well as concerned citizens from all walks of life, working to eliminate contributors to cancer (and other chronic conditions). PCN Chair, Meg Sears PhD, has twice addressed Calgary councillors to discuss pesticides and least-toxic options for landscaping, and is grateful to Healthy Calgary for notice of this consultation.

INTRODUCTION

Healthy Calgary and PCN welcome the opportunity provided by Councillor Pincott's motion in Council to direct Administration to include health organizations and expertise in the review of the City of Calgary's Integrated Pest Management Plan (IPMP). This is the first review of the plan since adoption in 1998, and we look forward to active participation in the review.

Healthy Calgary and PCN prepared this joint submission to City of Calgary, Parks. Both of our organizations share a common goal – to see adopted “common sense measures” whereby only the least-toxic pest control strategies are used on public and private green spaces in Calgary, while pesticides not identified as least-toxic can be used only if alternative methods have been exhausted and their application is deemed necessary to address an imminent threat to public health.

Pesticides are devised and used specifically to disrupt biological processes, so achieving pest control using least-toxic options in highly populated environments is “low hanging fruit” to protect public health. Thus, we commend Calgary Council for considering human and ecological health in the current review of Integrated Pest Management (IPM) on City Lands, and welcome the opportunity to contribute our perspectives.

In this joint submission Healthy Calgary offers the local and historical context of the mission to adopt least-toxic measures to manage landscapes in Calgary. PCN brings a depth of experience and scientific expertise on the evaluation of pesticide toxicity and human health impacts.

Two limitations of this submission are that the City of Calgary's pesticide use has not been reported and only limited information was provided; and that full review of health and environmental impacts of these chemicals (and probable but undisclosed combinations) would be

a more lengthy endeavor than is possible here.

Thus this joint submission is to provide the City of Calgary, as requested in the solicitation of December 7, 2017, an expert opinion and rationale (while acknowledging the above caveats) regarding:

1. The current perceptions and practices of pesticides as a tool to control legislated weeds and pests, to protect City assets and to ensure human health and safety in an urban environment;
2. Pesticide toxicity, as it relates to human and environmental health; and
3. Measures that can be employed to shift to least-toxic pest control options.

SECTION 1

CURRENT PERCEPTIONS AND PRACTICES OF PESTICIDES AS A TOOL TO CONTROL LEGISLATED WEEDS AND PESTS, TO PROTECT CITY ASSETS AND TO ENSURE HUMAN HEALTH AND SAFETY IN AN URBAN ENVIRONMENT

Pesticides as a tool to control legislated weeds and pests to protect city assets and human health and safety – perceptions and practices

In 1998 the City of Calgary adopted Integrated Pest Management (IPM) as a program of practice to manage and protect City assets from pests. IPM requires quantitative monitoring of pests, with various strategies to achieve targets. Horticultural practices (informed by soil testing) are used to optimize growing conditions for desired species, while conditions are made less favourable for undesired species. Careful records are maintained to identify more and less successful strategies, and to track progress year to year. More toxic pesticides are used only when necessary to protect public health (Ontario permits glyphosate or glufosinate only to protect public health, for example from poison ivy).

Low standard of integrated pest management application and implementation

Without reports on targeted, relevant pests, it is difficult to gauge the City's use of pesticides to control legislated weeds and pests while ensuring human health and safety. Lack of response to repeated information requests as to how much of which pesticides have been sprayed when and where, suggests that key data collection and analysis is lacking. The only complete data set received, many years ago, was for 2005. Calls to 311 and to the City's IPM leads, formerly James Borrow, and currently Lincoln Julie, have gone unheeded.

Making pesticide data available to the public is a basic feature of an excellent IPM program. Past history of pesticide use should be readily available upon request without resorting to a Freedom of Information Request. The only conclusions that may be drawn is that either the City records

are in disarray contrary to IPM and provincial regulations, and/or the City is reluctant to inform the citizens of Calgary, thereby denying them their right to know.

Outdated and hazardous pesticides still used

A plethora of least-toxic alternatives have been identified within Ontario's pest control product lists (Appendix 1), but Calgary continues to use many chemicals that pose extensive health and environmental hazards – these include persistent chemicals that Health Canada only permits in remote areas, away from populations (e.g. picloram, aminopyralid, clopyralid, amitrol). Without fundamental features of true IPM, it is unclear how Calgary's program meets the standard. We can only conclude that the fundamentals of IPM are not followed by the City of Calgary, given the inability of staff and contractors to make least-toxic choices for pest control.

Inappropriate responses to innocuous plants – “cosmetic” pesticide use

The question is posed regarding “legislated” weeds and pests, whereas the focus of Calgary's public opinion survey and Administration's report is on dandelions. Dandelions are not included on the Alberta Provincial Weed List as a prohibited or restricted noxious weed. It was determined that dandelions do not pose an economic, health or environmental risk, which is consistent with other Canadian jurisdictions. If dandelions are not an economic, health or environmental risk, then spraying dandelions fits the definition of *cosmetic use of pesticides*; the use of pesticides to improve the aesthetics of the landscape with no countervailing health benefit.

Claims by Administration that cosmetic and blanket spraying does not occur are countered by well-documented observations of trucks equipped with sprayers along roadways in particular, and in parks. Councillor Pincott noted the amount of roadway spraying at the Meeting of Council November 28, 2016, and was curious as to the process/steps undertaken to arrive at the use of toxic chemicals to control a non-regulated weed under the City's Integrated Pest Management Program (IPMP). Similar to Councillor Pincott, Healthy Calgary and PCN are also curious as to the occurrence of plant counts, soil testing, soil amendment applications, deeper and quality topsoil additions, over-seeding, slit seeding, aeration and watering to promote and establish more “desirable” vegetation. Spraying without horticultural follow-up amounts to simply clearing the surface for another round of germination.

Thus the perception exists that pesticides are the first line of defense in the City's IPM tool kit. The proliferation of signage beginning late spring through to October points to the City doing little more than applying herbicides to control weeds. Although this perception may be erroneous, awareness of alternative least-toxic methods of pest control has taken the form of small trials (e.g. goats) rather than instituting alternative practices as the status quo. Signage, plus the lack of information to the contrary, leaves the public to conclude the obvious – reliance on pesticide spraying.

Calgary uses herbicides banned elsewhere

It is clear to Healthy Calgary, citizens of Calgary and particularly visitors from other provinces, that the City of Calgary does *not* use pesticides to control *only* legislated weeds that pose

immediate risks to human health and the environment. The City is perceived to rely heavily on herbicides to control dandelions, despite serious concerns for health when these toxic chemicals are used in an urban environment. In fact a call to IPM revealed that the dandelion is used as a proxy for broadleaf weeds. It is not known, however, whether the proxied, broadleaf weeds require control or eradication under the Alberta Weed Control Act. The chemicals of choice are 2,4-D, mecoprop and dicamba which are banned for “cosmetic” uses for a majority of Canadians.

Dandelions are a concern of a minority of Calgarians

The City’s commissioned survey on Citizens Attitudes towards Dandelions (August 2016) revealed that only 36% of the population is concerned about dandelions. The survey indicates that that segment of the population tend to be older, retired and homeowners. The same survey found that 25% of Calgarians don’t care about dandelions and 34% of Calgarians are neutral regarding dandelions. This illustrates that Administration is responding to a small minority of the population using, more often than not, toxic chemicals to control dandelions – not legislated weeds. Although 50% of Calgarians believe that the City uses chemicals to control dandelions, when provided with a choice of techniques, 80% to 87% of respondents preferred less harmful methods such as naturalization, goats, and turf removal.

An August 2016 Alberta Pesticide Survey, by OraclePoll Research, commissioned by PCN and the Canadian Association of Physicians for the Environment, supports the above. Two-thirds of Albertans responded that pesticides used for lawns and gardens pose a threat to children’s health. A majority of Albertans, 62%, said they would support a law that phases out the use and sale of all but the safest pesticides for lawns and gardens in Alberta. The youngest residents of the Province (18-34 years) were most likely to support the proposed legislation at 70%.

Dandelions have become politicized, science dismissed

Counting complaint calls is a most unscientific method to determine the use of chemicals that may harm human health and the environment. Politicians are responding to citizen complaints and votes – not science. There is no mechanism available to record dandelion complaints, specifically, when calling 311. The Community Standards Bylaw 5M2004 refers to long grasses and herbaceous plants with no specification except for height. Administration equated 311 bylaw complaints with dandelions, with no methodology to validate this conclusion. Direct complaints to Councillors were also included in the overall numbers but not made public. On the other hand, complaints about spraying were not mentioned.

Despite informed advice from Administration that a \$1.7 million dollar extra mowing program would do little to control dandelions Council voted in favour of the program. After one extra mowing cycle the program was cancelled.

Pesticides are registered for use by Health Canada so they must be ok

Many people believe that Health Canada’s Pest Management Regulatory Agency (PMRA) is protecting the health of Canadians via the assessment and registration of pesticides. As long as directions are followed the risks associated with pesticide use are reduced to an “acceptable” level. Some directions may prove difficult to achieve (e.g. prolonged periods before re-entry of a

sprayed property, prohibition of soil disturbance for prolonged periods following use of some pesticides, and personal instructions to avoid skin contact and inhaling); however IPM practitioners, pesticide applicators and the pesticide industry are quick to assert that Canada has one of the best regulatory agencies in the world.

Unfortunately we cannot rely upon Health Canada's PMRA, as experience has identified important gaps regarding protection of public health and pesticides.

Scientific limitations of Canadian federal pesticide regulation

The Pest Management Regulatory Agency (PMRA) regulates products that destroy or control pests, under the Pest Control Products Act (PCPA).¹ A "pest" is an organism that is "harmful, noxious or troublesome."

The PMRA and the health and medical community reach opposite conclusions regarding pesticides and human health. The doctors, who urge precautionary minimization of exposures, rely upon the real-life human epidemiological research rather than the confidential industry-produced animal test data relied upon by the PMRA. The PMRA conducts virtually no testing itself. Rather, it conducts a paper audit of data submitted by the pesticide manufacturers.

Unfortunately, its assessment of human risk is flawed, for the following reasons:

1. **High dose animal testing in labs is of limited relevance for people.** Testing determines the maximum dose that does not make an animal (usually a rodent such as a rat or mouse) seriously ill. Rodents are different from humans, in that they have enzymes that help them metabolize poisons. Humans do not have the same enzymes and, of course, tests are not conducted on humans. That would be unethical.
Also, tests do not generally cover the animal's lifespan. In humans, exposures that may cause no symptoms in the mother can cause life-long harm to her unborn child, and childhood exposures can cause symptoms in adulthood. Some effects may be passed through generations due to changes in gene expression, called epigenetic effects.
2. **Tests do not address low dose or cumulative effects, as they build up with multiple exposures and over time.** In fact, the regulatory system actually dissuades companies from doing low dose, environmentally relevant testing, because any positive findings would preclude the product being registered. This highlights the need for independent research. Some health effects occur at doses commonly encountered in the environment, effects that may predispose people to cancers as well as other major chronic diseases. One important mechanism by which this happens is endocrine disruption.
3. **No testing is done on endocrine disruption – an important mechanism behind many pesticides' chronic toxicities.** Many pesticides disrupt the endocrine, or hormone systems.² Hormones orchestrate every step of development from gestation through the entire lifespan. They act at extremely low concentrations in the body, and endocrine disrupting chemicals can have different, even opposite effects at higher doses.³ Alterations to hormone levels

during critical windows of development can cause permanent changes to children's lives, affecting their intelligence and behaviour, and making them more susceptible to infections, asthma, obesity, diabetes, reproductive failure, cardiovascular disease and cancers. One 2011 study reviewed endocrine effects of 91 pesticides.² A second study confirmed previously known androgen effects of some pesticides,⁴ while among previously untested pesticides nine were anti-androgenic and seven were androgenic. The US Environmental Protection Agency and the European Union are screening pesticides for effects related to actions of estrogen, androgen, thyroid and other hormones. A 2012 review of 845 scientific papers showed evidence that endocrine-disrupting chemicals have adverse health impacts at very low doses in animals and humans.⁵

4. **Only active ingredients are tested.** Additives or “formulants” are used in pesticide products to slow metabolism of the active ingredient (i.e., prolong its effect), and to improve spreading and absorption of the active ingredient. Additives can do the same when pesticides contact humans. A 2014 study found that 8 of 9 common commercial products tested were hundreds of times more toxic to human cells than just the pesticide active ingredient without formulants.⁶
5. **Pesticides are not tested in combination.** While we know that chemicals can act very differently in combination, only single chemicals are assessed in isolation.
6. **Pesticide registration is based on all directions being followed.** Even if people make the effort to access the label fine print, instructions are extremely difficult to follow. For example: “avoid inhaling”; “avoid contact with the skin or eyes”; and “apply only when there are no children, pregnant women, elderly persons, pets or animals present.”
7. **The PMRA does not take into account much of the medical literature.** Real-life study of the effects of pesticides is difficult, and the PMRA dismisses all of this information as showing only correlation but not the level of causation required before taking action. The PMRA is of the opinion that it is virtually impossible to *prove* that chronic pesticide exposures cause harm to humans. This leaves the federal regulator relying upon industry-supplied high dose animal testing.
8. **A perverse effect of the regulatory framework is that companies are dissuaded from testing at ecologically relevant levels.** Pesticide registration hinges upon application of several “extrapolation factors” and environmentally relevant testing may result in denial of registration.

Federal audits of Health Canada's pesticide management

The Federal Commissioner of the Environment in the 2015 audit of pest control products found glaring deficiencies and concerns regarding pesticide registration.⁷ Some concerns are as follows:

- PMRA had made little progress since the 2008 audit to limit the duration of some conditional registrations (when pesticide sales are permitted pending further information

to complete the assessment). Eight of nine products that had been registered conditionally for a decade or more were neonicotinoids, a class of neurotoxic insecticides that have been linked to Bee Colony Collapse Disorder and the death of other pollinators and aquatic species.

- Under conditional registrations the PMRA permits use of the pesticide without having received and assessed the risk and value assessments to determine the impacts on human health and the environment. At the time 80 out of 7,000 pesticide products were conditionally registered. None of industry studies are available to the public until the pesticide is fully registered, and even then an individual must personally visit offices in Ottawa and record relevant information with pen and paper.
- PMRA has never exercised its authority to cancel a conditional registration when a registrant has failed to satisfy conditions of registration, within a five-year period.
- Re-evaluations of older pesticides are behind schedule.
- Cumulative health impacts have not been addressed when required in the re-evaluations of pesticides.
- It took the filing of a lawsuit before the PMRA began to consider whether special reviews were deemed necessary for pesticides banned since 2013 in OECD countries.
- PMRA has not promptly cancelled the registrations of some pesticides when risks were deemed unacceptable. In one case it took 11 years to cancel the registration of a pesticide after it was determined the risks posed to human health were unacceptable.
- Lengthy phase-out periods have been allowed to occur despite the risks posed to human health of continued use.

Clearly, we cannot afford to hide behind Health Canada's PMRA and believe our health is not at stake. Least-toxic landscaping is the norm for the majority of Canadians, and Calgarians deserve no less.

Further discussion is provided in the Prevent Cancer Now submission to the Parliamentary Committee that examined the Pest Control Products Act in 2015, Appendix 2.

SECTION 2

PESTICIDE TOXICITY AS IT RELATES TO HUMAN HEALTH AND THE ENVIRONMENT

The second area that Parks expressed interest in receiving expert opinion and rationale was pesticide toxicity as it relates to human health and the environment. The very young, our future, are most vulnerable to harms from pesticides. Indeed, adverse exposures early in life can change the course of development, with life-long ramifications. Food and water may be sources of pesticides for the young, but studies of exposures from dust reveal that applications in the neighbourhood – not necessarily by the parents – can result in the highest dose for the very young who are crawling, mouthing objects and sucking their fingers.⁸

Human health

As no data was provided in the email solicitation of December 7, 2016 a website search was undertaken to locate annual reports from either Calgary Parks or Environment and Safety Management. In the past these annual reports included statistics on yearly herbicide use; however, after an extensive search, several calls to 311 and finally a call to the City Clerk's office it was discovered that these types of reports have not been done since 2013. Subsequently three requests were made to Parks requesting pesticide data from the initiation of the City's IPMP in 1998 to 2015, including a list active ingredients and amounts used, intensity of use, and mixtures of herbicides and/or insecticides used along with adjuvants (chemicals added to increase toxicity to target plants or insects).

In response a list of active ingredients, in name only, from the year 2015 only, was received on December 22, 2016 and are reviewed in Table 1. This includes 4 chemicals that possibly or probably cause cancer, according to the International Agency for Research on Cancer (IARC). Eight pesticides are listed as endocrine disruptors according to The Endocrine Disruptor Exchange. Only a few of the many least-toxic herbicides and insecticides that have become the norm in Ontario (Appendix 1) are found on Calgary's pesticide list. Extensive review of each pesticide, as well as combinations, would require more time and resources than available for this consultation. Reviews by authoritative groups of Canadian researchers have found numerous adverse outcomes from exposure to pesticides that are used in landscaping.^{9,10}

Environmental Health

In our search for expertise regarding environmental impacts of pesticides, we contacted Dr. Pierre Mineau of Pierre Mineau Consulting. Dr. Mineau was formerly a Senior Researcher Scientist with the Science and Technology Branch of Environment Canada and continues as an Emeritus Scientist with Environment Canada. He has collaborated with international agencies as well as governmental and non-governmental organizations in Canada and abroad. Dr. Mineau's current

projects include pesticide impacts, indicators of agricultural sustainability, nature conservation and integrated pest management.

When asked if he could assist Healthy Calgary and PCN with pesticide toxicity as it relates to environmental health he responded,

“...to write a detailed and cogent analysis of that large list of pesticides is a huge undertaking. Even without the time pressure, I would be loathe to take this on, at least without a solid contract and 3-4 months of free time to do it.”

Clearly, Calgary Parks’ unpublicized consultation, effectively over a one-month period (given holidays) is going to receive limited current information.

Nevertheless, some health effects and classification information regarding the target pesticides is summarized in Table 1.

Table 1. Information regarding City of Calgary pesticides, including carcinogenicity, endocrine disruption, Ontario classification for cosmetic uses, and other information

Pesticide	IARC designation re. human carcinogenicity	Endocrine Disruption (TEDX) endocrinedisruption.org	Ontario Classification – Class 11 (permitted) ¹¹ or Class 9 (banned)	Comments, including from pesticide labels – the legally binding document approved by Health Canada, describing hazards, emergency response and directions for use.
Turf and Selective Herbicides				
2,4-D (phenoxy)	Possible (2B) 2016	✓	Banned	Chlorophenoxy herbicides, long-time herbicides, may be contaminated with highly toxic dioxins if manufactured with poor controls, and quickly. 2,4-D and pesticide assessment was reviewed, concluding much must change to protect public health. ¹²
Mecoprop	Possible (2B) 2016	✓	Banned	
Dicamba	Possible (2B) 2016	✓	Banned	
Clopyralid	-	Not listed on TEDX	Banned	Clopyralid persists in the environment and in compost, damaging crops. It is permitted only on rough, unfertilized, unirrigated turf on rights of way etc. It is banned for fine turf. ¹³

Pesticide	IARC designation re. human carcinogenicity	Endocrine Disruption (TEDX) endocrinedisruption.org	Ontario Classification – Class 11 (permitted) ¹¹ or Class 9 (banned)	Comments, including from pesticide labels – the legally binding document approved by Health Canada, describing hazards, emergency response and directions for use.
Triclopyr	-	Not listed on TEDX	Banned	"This product is highly toxic to fish, aquatic plants and aquatic invertebrates and is not labelled for application to water surfaces. Keep out of wetlands, lakes, ponds, streams, rivers and wildlife habitats at the edge of bodies of water." "...for the control of undesirable woody plants and annual and perennial broadleaved weeds in pastures and rangelands, and in non-crop areas, including: rights-of-way, electrical power lines, communication lines, pipelines, roadsides and railroads, fencerows and around farm buildings, military bases, industrial, manufacturing and storage sites."
Amitrol	Not Classifiable (3) due to lack of human data. High incidences of thyroid and liver cancers in animal studies. ¹⁴	✓	Banned	"Do not use in residential areas. Residential areas are defined as sites where bystanders including children may be potentially exposed during or after spraying. This includes around homes, school, parks, playgrounds, playing fields, public buildings or any other areas where the general public including children could be exposed."

Pesticide	IARC designation re. human carcinogenicity	Endocrine Disruption (TEDX) endocrinedisruption.org	Ontario Classification – Class 11 (permitted) ¹¹ or Class 9 (banned)	Comments, including from pesticide labels – the legally binding document approved by Health Canada, describing hazards, emergency response and directions for use.
Picloram	Not Classifiable (3) due to lack of human data, in 1991. Rodents had dose-related increases in thyroid and liver cancers and pre-neoplastic lesions, mostly in females. ¹⁵	✓	Banned	Potential dermal sensitizer (affects the immune system so may contribute to chronic diseases). Not registered for use in residential areas. Large buffers (e.g. 5 m) required from waterways and public areas. Very persistent; Maximum once per year; Don't disturb or move earth for several years; Contaminated with persistent, carcinogenic, endocrine disrupting hexachlorobenzene.

Pesticide	IARC designation re. human carcinogenicity	Endocrine Disruption (TEDX) endocrinedisruption.org	Ontario Classification – Class 11 (permitted) ¹¹ or Class 9 (banned)	Comments, including from pesticide labels – the legally binding document approved by Health Canada, describing hazards, emergency response and directions for use.
Aminopyralid	-	Not listed in TEDX	Banned	"Do not enter or allow worker entry to treated area for 12 hours following application ... "Apply only when the potential for drift to areas of human habitation or areas of human activity such as houses, cottages, schools and recreational areas is minimal. Take into consideration wind speed, wind direction, temperature, application equipment and sprayer settings. ... "Toxic to non-target terrestrial plants and to aquatic organisms ... "The use of this chemical may result in contamination of groundwater particularly in areas where soils are permeable (e.g. sandy soil) and/or the depth to the water table is shallow. ... cannot be applied on domestic or commercial turf grass. Clippings or hay from vegetation which has been treated with aminopyralid should not be used for composting or mulching. Aminopyralid residues pass through animals unchanged and are still herbicidally active."

Pesticide	IARC designation re. human carcinogenicity	Endocrine Disruption (TEDX) endocrinedisruption.org	Ontario Classification – Class 11 (permitted) ¹¹ or Class 9 (banned)	Comments, including from pesticide labels – the legally binding document approved by Health Canada, describing hazards, emergency response and directions for use.
Non-selective Herbicide				
Glyphosate	Probable (2A) This has been highly contested by Monsanto. Recently reviewed by international scientists, glyphosate can cause non-Hodgkin's lymphoma. ¹⁶	✓	Generally banned, but glyphosate and glufosinate are Class 10, ¹⁷ permitted under health and safety exemption (e.g. for poison ivy)	Glyphosate is strongly correlated with cancer, as well as kidney disease and developmental problems. It is an antibiotic, so disrupts soil microbes necessary for breakdown of dead plant materials. Glyphosate also mobilizes minerals, including toxic elements such as lead and cadmium, making them available in the soil and water, and thus potentially increasing levels in plants.
Insecticides				
Mineral oil	-	Not listed on TEDX	Permitted	GRAS
Potassium salts of fatty acids	-	Not listed on TEDX	Permitted	GRAS
Imidacloprid	-	✓	Banned	A “bee-killing” neonicotinoid insecticide that is also highly toxic to aquatic insects. Parent compound and degradation products persist for years. Persistent, toxic, potentially carcinogenic breakdown product 2-chloropyridine not considered in PMRA (Health Canada) and other assessments.

Pesticide	IARC designation re. human carcinogenicity	Endocrine Disruption (TEDX) endocrinedisruption.org	Ontario Classification – Class 11 (permitted) ¹¹ or Class 9 (banned)	Comments, including from pesticide labels – the legally binding document approved by Health Canada, describing hazards, emergency response and directions for use.
Azadirachtin (Neem seed extract)		Not listed on TEDX	Permitted	Neem seed extract – a mixture of compounds; Insufficient toxicity and persistence data for ECHA; Extremely toxic to aquatic organisms; Persistent and very mobile in soil and water; Untested, but complex multi-ring chemical structures as here often disrupt hormone actions and cause cancer.
Spinosad (from soil bacteria; unusual action on insect nervous system)	-	Not listed on TEDX	Banned	Highly toxic to bees, other beneficial insects in IPM programs, and aquatic organisms. Apply late evening; early morning to avoid bees. For sod webworm.
Pyrethrins	-	✓	Banned	Pyrethrins affect nerve impulse transmission along the length of the nerve, and are linked to neurological harms in many studies, particularly among the young. Pyrethrins are also endocrine disruptors, potentially contributing to cancers and other adverse effects.
Spirotetramat	-	Not listed on TEDX	Not listed	Toxic to beneficial insects. Do not apply during flowering or when flowering plants are present. Minimize spray to habitat such as hedgerows. Toxic to some non-target plants. NOT REGISTERED FOR TURF.

Pesticide	IARC designation re. human carcinogenicity	Endocrine Disruption (TEDX) endocrinedisruption.org	Ontario Classification – Class 11 (permitted) ¹¹ or Class 9 (banned)	Comments, including from pesticide labels – the legally binding document approved by Health Canada, describing hazards, emergency response and directions for use.
Additional Ingredients				
Siloxylated polyether (surfactant)	-	Not listed on TEDX	Not listed	Surfactants are added to improve spreading and penetration of pesticides on pests. Surfactants do the same on human skin, and in the nose, throat and lungs when inhaled.
Surfactant mixture	-	Not listed on TEDX	Not listed	
Dried whole blood (vertebrate – e.g. deer – repellent)	-	Not listed on TEDX	Permitted	

- Search for Pesticide Labels here: <http://pr-rp.hc-sc.gc.ca/lr-re/index-eng.ph>
- Ontario Class 11 (permitted for “cosmetic” purposes) pesticides are here: <https://www.ontario.ca/page/class-11-pesticides>

2,4-D = 2,4-dichlorophenoxy acetic acid; ECHA = European Chemicals Authority; GRAS = generally regarded as safe; TEDEx = The Endocrine Disruption Exchange

SECTION 3

MEASURES TO REDUCE TOXICITY OF PEST CONTROL

Upgrade IPMP standards, implementation, certification, training and education

An overhaul of the City's IPMP is long overdue. Healthy Calgary and PCN look forward to participating in the review of the IPMP to ensure standards and implementation are at levels of excellence.

It is interesting to note that IPM was originally devised as a step-wise approach to all aspects of pest control, including landscaping. It was proposed as an alternative to pesticide restrictions in Ontario, but since this approach had not resulted in demonstrable improvements in pesticide choices and uses in municipalities, it was rejected by the provincial government. Golf is the single sector that is committed to improving pesticide choices and intensity of uses using IPM, and Ontario courses are required to report annually online on the IPM Council of Canada website.

IPM courses and certification are offered through the University of Guelph. Once again it is interesting to learn that the original practitioners moved on to organic practices, as experience demonstrated that more risky choices were unnecessary. Of course there are a myriad of other courses and training that can be undertaken to learn the latest in soil science, plant phenology and health, the soil food web, permaculture, and climate change adaptation strategies.

Clean out the cupboard

There are several pesticides on the City's list which are outdated and not permitted in urban situations due to their toxicities and persistence in the environment. These chemicals include picloram, aminopyralid, clopyralid and amitrol. Dr. Mineau referred to picloram and amitrol as "dinosaurs" and was astounded that the City was still using such relics. Disposed of responsibly, there will be no temptation to continue their use. Doubtless review of the IPMP will identify others currently used, to join their ranks.

Adopt measures of other progressive municipalities and provinces

Calgary continues to be Canada's largest municipality without any protection from pesticide use. Seven provinces have enacted pesticide legislation to protect citizens and the environment from the toxic effects of pesticides. The Ontario *Cosmetic Pesticide Act* (2008) is the gold standard for provincial legislation. The *Act* was modelled on bylaws for the municipalities of Toronto and Peterborough; these also represent best practices for other jurisdictions which have adopted cosmetic pesticide bylaws across the country.

At the very least, we would like to see the City adopt and enforce a "white list" of least-toxic pesticides for use on green spaces in Calgary, mirroring Ontario's Class 11 (Appendix 1).

The preferred solution recommended by Healthy Calgary and PCN is a cosmetic pesticide bylaw to protect human health and the environment from toxic pesticide exposures. Voluntary adoption has never been as effective as regulation combined with education.

Resurrection of least-toxic pesticide committee

In the absence of an imminent cosmetic pesticide bylaw, Healthy Calgary would like to see the resurrection of a committee with regular meetings similar to the Pesticide sub-committee of the now disbanded Environmental Advisory Council. The pesticide sub-committee was created in 1999, after a proposed cosmetic pesticide bylaw failed to pass the Standing Policy Committee on Community and Protective Services. This would ensure that pesticide data is received on a timely basis, trends are ascertained, strategies and techniques are evaluated, standards are upheld and implementation of least toxic-methods of pest control are ongoing.

Hire knowledgeable weed inspectors

Move the focus, time, energy and toxic pesticides from non-legislated weeds to the restricted noxious weeds on the Alberta Weed List, using of course the least-toxic methods of control. Rapid detection and response by qualified and knowledgeable weed inspectors will reduce the occurrence and proliferation of regulated invasive plants before they become a problem, thereby reducing the amount of pesticides used. The last-known and sole weed inspector in Calgary retired some years ago.

Conclusion

Once again Healthy Calgary and Prevent Cancer Now commend the City of Calgary for inviting participation in the review of the City's Integrated Pest Management Plan (1998). For over 30 years concerned citizens in Calgary have been working tirelessly and diligently in efforts to reduce known human health and environmental impacts from many of the very pesticides that the City regularly uses. It is time to adopt "common sense measures" to protect the health and future of our children.

We look forward to next steps, for a healthier Calgary.

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Appendix 1. Least-toxic options permitted for “cosmetic” uses under Ontario’s Pesticides Act (<https://www.ontario.ca/page/class-11-pesticides>). Ingredients used by Calgary are in bold.

Ingredients contained in pesticide products that are biopesticides or certain lower risk pesticides. Licensed exterminators and persons who perform land exterminations in non-residential areas that use Class 11 pesticides are required to post a notice sign to provide public notice of the use of these pesticides, unless exempt from posting under Ontario Regulation 63/09.

Number	Active Ingredient Name
1	Acetic acid
2	Ammonium soaps of fatty acids
3	Ammonium soaps of higher fatty acids
4	Aureobasidium pullulans strain dsm 14940
5	Aureobasidium pullulans strain dsm 14941
6	Azadirachtin
7	Bacillus subtilis mbi 600
8	Bacillus subtilis qst 713
9	Bacillus thuringiensis kurstaki
10	Bacillus thuringiensis tenebrionis
11	Boracic acid (boric acid)
12	Borax
13	Brassica hirta white mustard seed powder
14	Capsaicin
15	Castor oil
16	Chondrostereum purpureum strain pfc2139
17	Citric acid (present as fermentation products of lactobacillus rhamnosus strain r-11, lactobacillus casei strain r215, lactococcus lactis ssp. cremoris strain m11/csl, lactococcus lactis ssp. lactis strain ll102/csl, and lactococcus lactis ssp. lactis strain ll64/csl)
18	Codling moth and leaf roller pheromone
19	Copper as elemental, present as tribasic copper sulphate
20	Copper as elemental, (from picro cupric ammonium formate and tannate complex)
21	Copper, present as copper octanoate
22	Copper as elemental, present as copper oxychloride
23	Corn gluten meal
24	Diallyl disulfide and related sulfides
25	Dried blood
26	Dried whole eggs
27	Extract of reynoutria sachalinensis
28	Fatty acid
29	Fish meal mixture
30	Fish oil mixture
31	Garlic
32	Hydrogen peroxide
33	Iron (present as fehedta)
34	Iron (ferrous or ferric) phosphate
35	Iron (ferrous or ferric) sulfate
36	Iron (ferrous or ferric) sodium
37	Kaolin
38	Lactic acid (present as fermentation products of lactobacillus rhamnosus strain r-11,

Number	Active Ingredient Name
	lactobacillus casei strain r215, lactococcus lactis ssp. cremoris strain m11/csl, lactococcus lactis ssp. lactis strain ll102/csl, and lactococcus lactis ssp. lactis strain ll64/csl)
39	Lime sulphur or calcium polysulphide
40	Liquid corn gluten
41	Meat meal mixture
42	Metarhizium anisopliae strain f-52
43	Methyl-anthranilate
44	Mono-and di-potassium salts of phosphorous acid
45	Mono-and dibasic sodium, potassium, and ammonium phosphites
46	Mineral oil (herbicidal or plant growth regulator or insecticidal or adjuvant)
47	Nuclear polyhedrosis virus of douglas fir tussock
48	Nuclear polyhedrosis virus of the gypsy moth
49	Nuclear polyhedrosis virus of red-headed pine sawfly
50	Oil of black pepper
51	Pantoea agglomerans strain c9-1
52	Pantoea agglomerans strain e325
53	Phoma macrostoma strain 94-44b
54	Piperine
55	Putrescent whole egg solid
56	Sclerotinia minor
57	Silicon dioxide -present as diatomaceous earth - salt water fossils
58	Soap (alkanolamine salts of fatty acid)
59	Soap (potassium salts of fatty acid)
60	Sodium chloride
61	Sodium alpha-olefin sulfonate
62	Streptomyces acidiscabies strain rl-110t and thaxtomin a
63	Sulphur
64	Trichoderma virens strain g-41
65	Trichoderma harzianum rifai strain krl-ag2
66	Trichoderma harzianum rifai strain t22
67	Typhula phacorrhiza strain 94671
68	Verticillium albo-atrum strain wcs850
69	Wintergreen oil

Appendix 2. Dr. Sears' recommendations to the Parliamentary Standing Committee on Health regarding the *Pest Control Products Act (2002)*

1. **The Precautionary Principle and Substitution Principle are necessary in risk management.** The *PCPA* requires a two-stage process: to assess the risk, then to manage it (e.g. by requiring gloves and a mask, or by restricting use to commercial applicators, or to agriculture). The Precautionary Principle is currently mentioned for risk assessment. Responsible risk management would include demonstrating the need for a product and its superiority in terms of health and environmental impacts, over other means to achieve the end.
2. **Public notice, involvement and access to information are necessary before an assessment is basically complete.** Interested and concerned members of the public are asked to provide comment following near-finalization of the assessment, but during a window of time when they cannot access the actual data upon which the assessment is based. Information in the Reading Room is inaccessible prior to final registration. This also means that data is not available on pesticides under temporary registrations (too many pesticides, for too long, as others have undoubtedly indicated).
3. Information availability is illogical. The minutiae of pesticides data is available only after the fact and only to someone equipped with pencil, paper and affidavit and able to visit in person at Riverside and Heron (to use old computers with unsearchable files). The leap from minutiae to the conclusions—the PMRA's actual data evaluation—is not available, not even in the Reading Room. I visited Health Canada three times to examine data on 2,4-D, and I was one of the Reading Room trial group. The reason the data evaluation is not provided is that it is not considered to be the "data" as prescribed in the *Act*. **The *PCPA* should be amended to prescribe public access to data evaluations, at the time the public is being asked for comment.** This information should properly be publicly available online, but at least available in the Reading Room. I have asked the infoserve how many individuals have visited the Reading Room, how many times; the infoserve has not yet responded.
4. Whether the Reading Room information is sufficiently available to be considered *publicly* accessible is debatable. I cited information from the Reading Room in an article for peer review, and the *Canadian Medical Association Journal* determined that data from the Reading Room was too inaccessible for peer review. **Accessibility of information in the Reading Room should be improved, to the extent that it can contribute to public science.**
5. I work in systematic review of scientific evidence, and the PMRA (indeed, much of Health Canada) does not have the mandate, expertise, infrastructure or informational support to properly, systematically review epidemiological evidence, using modern methods and according to modern standards. Doing this properly would probably be more efficient, faster and less expensive than present methods, as they can be discerned from outside. **Scientific best practices – modern systematic scientific review and reporting methods – should be required under the *PCPA*.**
6. The PMRA should, but does not, require complete environmental breakdown information, to CO₂, H₂O etc. For example, neonicotinoid breakdown is truncated at 6-chloronicotinic acid, just short of the highly problematic 2-chloropyridine. **Comprehensive environmental and metabolic fate data should be required under the *PCPA*.**
7. The PMRA does not comprehensively consider toxicity of breakdown products. This is not captured in animal toxicology, because the breakdown products are cleaned out of animals' cages; obviously, the breakdown products are present in the environment. **Comprehensive assessment of the toxicity of breakdown products should be required under the *PCPA*.**
8. Contaminants resulting from manufacturing processes such as dioxins in phenoxy herbicides, that are modifiable using process controls (e.g. slightly lowering the temperature), must be measured independently. You cannot rely on the proponent to provide contaminant/purity information that will reflect what is on the shelf (e.g. an Australian Broadcasting Corp. analysis of the herbicide 2,4-D found high dioxins just like the "bad old days," but data submitted by manufacturers to the PMRA and their Australian counterpart – analyses of selected production runs – was evidently acceptable. Dioxin analyses were inexplicitly

classified as confidential business information. **Independent analyses of off-the-shelf products should be required under the PCPA.**

9. Issuing permission to spread a toxic material in the environment essentially poses a public/environmental health hypothesis that this will not result in adverse effects. Health Canada has a moral, and should have a legal, obligation to follow up when it registers a pesticide. Determination that a pesticide poses an "acceptable risk" is inevitably based upon data with some substantial uncertainties and limited applicability to "real life." Health Canada should be required to have in place tracking of pesticide sales and use, levels of parent and breakdown products in "real life" soil, water, air, foods, wildlife and people, and comprehensive health and environmental data to allow the verification or refutation of this hypothesis that is embodied in the registration. Data should be reported by the PMRA, and should be publicly available so that epidemiologists can do their work. **Pesticide and breakdown product environmental, food and human ongoing data collection and reporting, along with outcomes (e.g. bee die-offs, birth defects etc.), should be mandatory under the PCPA, to validate or refute the PMRAs hypothesis that risk is indeed "acceptable."**

An example is how to explore emerging public health concerns related to pesticide use. One issue of particular importance to Canada is mobilization of toxic elements as a result of the chelating action of glyphosate herbicide (in the commercial product "Roundup"). Mobilization of toxic elements such as lead, cadmium, mercury and others, into water and foods, is of increasing concern because glyphosate use escalated with "roundup ready" crops, and glyphosate is now being used to kill and dry down wheat, pre-harvest. There are high levels of cadmium in some areas of the prairies, as well as fertilizer, and grains tend to hyperaccumulate cadmium even without glyphosate added to the mix. Unlike much of the world, Canada lacks standards for cadmium in foods, and our wheat cannot always meet European standards. Epidemic kidney disease (an organ greatly affected by cadmium) is affecting Sri Lanka and other areas with this mixture of exposures. Cadmium exerts a broad range of toxic effects and is very potent even at low levels. *Without data, we cannot detect potential problems before a health epidemic ensues.*

10. Genetically modified crops are in fact pesticides, or produce novel proteins to withstand high doses of pesticides. **Genetically modified crops should be examined under the PCPA.**
11. **Pre-mixed pesticide products** (e.g. phenoxy herbicide/glyphosate/glufosinate mixes to deal with the debacle of resistant weeds) **should undergo a complete assessment.** Interactions are well known in medicine and toxicology, and cannot always be predicted. The testing has to be carried out.
12. I, and others, have **strong concerns regarding access to information, and timely response to information requests, objections and requests for review.** I wait for months for responses, and some questions are never answered despite repeated requests. The PMRA took a year to respond, in a limited fashion, to an objection I filed. At the same time, information such as pdfs of reports is only available via email. It is odd to pay employees to forward documents that should rightfully be posted online.
13. **Scientific review requires information and library services.** One example of a cut to information services that directly affects the PMRA, as well as scientists and civil society organizations, is discontinuation of the Homologa subscription. This may yield a small savings but represents another in the series of disabling cuts to federal scientific information services. This makes it impossible for federal civil servants to do their job, ultimately to ensure a healthy, productive population. Safeguarding health is essential, in order to avoid the economic and social drag of disability, and costly healthcare for chronic illnesses and cancer.

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