RoundupÒ at UBC:

The Road to a Pesticide-Free Campus at the University of British Columbia

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Users' Guide

Prior to a class discussion, students should be provided with discussion questions to assist them in the analysis of the case. Sample questions include:

- Who is the ultimate user of the campus?
- Is there any value associated with the use of pesticides or their prohibition?
- What are some of the human resources apparent in the case?
- How does one market the elimination of a pesticide while continuing to use several other pesticides?

One professor should assume the responsibility of facilitating the in-class case discussion. The discussion should begin with a look at the different elements of the case from the perspective of different specialities (i.e. strategy, marketing, finance, human resources and supply chain.) The discussion is an integral component of the learning process. To stimulate a discussion on *Roundup® at UBC* a forum setting should be established. This forum will illustrate the many perspectives that must be considered when dealing with multiple groups. The professor who is facilitating should moderate the forum. The forum panel will be comprised of students who will present their issues and answer questions from the audience. Forum participants shall include:

- City of Vancouver Councillor
- UBC Plant Operations Manager
- UBC Grounds Crew member
- UBC Board of Governor member

- UBC Student body member, and
- UBC Faculty member

The class should be split into groups of 5-6 people to discuss each perspective. From these groups, one member will be chosen to sit on the panel. The remaining students will assume the role of the general public. Hence, all parties will be represented. Discussion issues should include:

- Whether a reduction in pesticide use is necessary
- The importance of UBC's physical appearance
- The health risks associated with using pesticides
- The impact on the environment
- The identification of the elements of an Integrated Pest Management solution, and
- The assumptions and valuation of public policy to calculate a net present value, budget and social cost-benefit aspects

Executive Memorandum

TO: Mr. John Metras, Associate Director, Municipal and Business Services, UBC Plant Operations

FROM: Brett Potvin, Christina Li, Frank Fa, Meredith Kennedy, Prentice Durbin, and Uli Schulze Suedhoff

SUBJECT: Elimination of Roundup® on the UBC Campus

DATE: October 18, 2002

Issue

Over the past decade, UBC Plant Operations has greatly reduced the amount of pesticides used to maintain the university grounds. This decrease was accomplished by reducing both the number of pesticides and the total volume used. This department is further debating reducing the use of Roundup®, the pesticide currently used in the greatest quantity on campus. Currently, the three options available to UBC Plant Operations are:

- Maintaining the status quo and continuing to use Roundup® on campus
- Eliminating the use of Roundup® and investing in additional labour to maintain the grounds
- Reducing the amount of Roundup® used on campus by investigating alternative Integrative Pest Management (IPM) initiatives

Situational Analysis

If Roundup® is eliminated in 2003, Plant Operations will save on the costs of purchasing and applying Roundup®, and the relative labour and equipment expenses. However, additional costs will be incurred to hire six new employees and provide the required training, benefits and equipment. The result is an additional $296,000 in 2003 costs (see Exhibit G), which would represent an increase of 1.2% to the Plant Operations budget. A NPV analysis of the net budget

impact demonstrates an approximate loss of $2.1 million from 2003 to 2012 (see Exhibit H). At this time, limited information is available on the costs required to implement IPM initiatives. However, as a non-profit organization, UBC must consider social benefits such as the increase in UBC's reputation and the quality of the environment. An informal survey conducted on campus determined a median willingness to pay of $10 per respondent per year for the campus to be pesticide free. According to a social cost-benefit analysis, net benefit will reach $194,500 in 2003, and will grow to $1.41 million by 2012 (see Exhibit J). A sensitivity analysis indicated a break-even willingness to pay of $5.86. It is equally important to consider the current economic climate at UBC; the provincial government froze its funding and so tuition increases are currently UBC's primary means of increasing revenues.

As a global centre of research and learning with state-of-the-art facilities, UBC enjoys a strong reputation and attracts thousands of students from around the world. Its success is derived from its tangible and intangible resources including its location and the attractiveness of its campus. UBC has dedicated itself to enhancing its campus and promoting sustainability, which provides a competitive advantage in terms of its popularity and prosperity. As such, it is imperative that the quality of the grounds be maintained. Each of the alternatives under consideration would allow the grounds crew to maintain the landscaping at its current level. However, only the options of eliminating the use of Roundup®, or of pursuing IPM initiatives allow UBC to achieve its mandate of sponsoring sustainable initiatives on campus.

To date, no negative environmental effects from the use of pesticides have been detected at UBC. Though some literature suggests that Roundup® may have negative effects, the public's concern is largely due to historical media coverage. The proposal for a pesticide free campus is

intended to address these public concerns and is based on a precautionary principle. The public perceives the elimination of pesticides as the best alternative. By offering a campus that is perceived to be better by the students, staff and faculty, UBC can differentiate itself from other universities, increase its students' willingness to pay, and therefore, successfully add value to its value chain. It also allows UBC to substantiate its pledge of pursuing a sustainable campus.

The supply chain for Roundup® use at UBC is depicted in Exhibit L. Plant Operations is accountable to three groups of downstream users. The first group of users consists of individuals who have direct contact with the pesticide. These include the maintenance crew and those students, faculty, or staff who walk by recently sprayed areas. In an informal survey, 77% of students indicated that they agree or strongly agree that it is important to have an attractive campus. The union may support the reduction of pesticides, as they will benefit from additional hours of labour as well as reducing their members' exposure to chemicals. The grounds crew currently views Roundup® as an effective and efficient weed management tool. Reducing Roundup® will result in more physically demanding labour and an increase in risk of physical injury on the job (i.e. Carpal Tunnel Syndrome, back and knee injuries).

The second group of users in the supply chain is the decision-making group responsible for selecting the processes for landscaping and maintenance on campus. These decisions are based on budgetary, public policy, and public perception factors. This group is concerned with the attractiveness of the campus and its natural beauty, but would embrace an initiative which would provide UBC with a competitive advantage.

The final group of users includes parties that have little or no use of the campus on a regular basis, such as Vancouver residents, environmentalists, and politicians from across Canada and

the world. This group is potentially the most influential because of the importance given to the environment in the public arena. The City of Vancouver has committed itself to implementing an IPM policy on municipal property. As well, a resolute public opinion to ban pesticides on private property recently resulted in a debate in city council. The increase in public sentiment in Vancouver to ban pesticide use corresponds to a general trend in the public perception towards pesticide use in other Canadian cities and communities. Some municipalities have created by-laws limiting pesticide use (i.e. Hudson, Quebec). Though UBC is only bound by provincial and federal legislation, negative public perception could ensue if pesticides were banned in the City of Vancouver and UBC did not follow suit. A pesticide ban on campus would be in line with the perceptions and expectations of the general public, students and the UBC administration.

From a marketing viewpoint, the ultimate stakeholders include the students, faculty and staff of UBC, UBC Plant Operations, Board of Governors and the residents of Vancouver. For Roundup® to be banned on campus, the stakeholders must be given reasons to change, as well as reasons not to stay the same. Reasons to change include minimizing potential health and environmental impacts, and improving public perception. In addition, reasons not to stay the same include embracing innovation and sustaining competitive advantage by being a leader in the field. In terms of product, there is a negative public perception issue that must be addressed. Roundup® is touted as the most cost-effective method for weed control and is the most benign of all pesticides used. However, its elimination would send a clear message consistent with UBC's efforts to promote a sustainable campus. A similar benefit could also be realized through the additional promotion and use of IPM techniques.

Recommendations

A well-formulated strategy for resolving this issue will consider the following factors: financial implications (both implicit and explicit), environment and health risks, effects on Plant Operations and public perception. It is recommended that Plant Operations not ban Roundup® immediately, but rather, that it invests in IPM projects which would allow a gradual phase-out. Plant Operations would then incur costs gradually, be able to promote sustainability initiatives, demonstrate sensitivity to the current funding issue, and encourage innovation.

An important first step is ensuring that IPM techniques are applied to all new landscape designs and are reviewed by Plant Operations. Furthermore, partnerships should be developed with the City of Vancouver and York and Dalhousie Universities to create a forum for discussing the success and cost-effectiveness of different IPM strategies. It is imperative that the grounds crew be involved in this implementation, as their commitment is critical for its success. The grounds crew is in the best position to recognize and recommend areas on campus that are best suited for IPM. Initiatives that should be evaluated include: providing education for both regular campus users and visitors on efforts to reduce pesticide use; instituting a decision-making structure which reviews campus-wide pest control measures; developing a requirement for outside pest control contractors to follow IPM policy and procedures; and, ensuring IPM projects receive adequate funding and staff.

The Road to a Pesticide-Free Campus at the University of British Columbia

As if mesmerised by the imposing view of the North Shore Mountains visible from his second floor office at the University of British Columbia (UBC) Plant Operations building, John Metras sat silently looking out the window, lost in thought. As the Associate Director of Municipal and Business Services, John managed the landscape crew who maintained the UBC grounds. Of late, he had been investigating the feasibility of eliminating the use of pesticides on campus. As a premier research institution in Canada that has characterised itself as a leader within the academic community, UBC has recently demonstrated itself as a leader in campus sustainability efforts. John felt that, given this image, a ban on pesticides would be appropriate. However, to provide the additional labour required to implement a pesticide ban, additional funding would need to be approved by the UBC Board of Governors.

To help him prepare a case to take to the Board of Governors, John enlisted the assistance of a group of first year MBA students. When one of the MBA students asked: "Do you want to save some money, or do you want to save the world?" John did not hesitate to reply. He explained that he would prefer to eliminate the use of pesticides on campus, but he was also concerned about the financial and human resources implications of doing so. Though eleven pesticides were currently being used on campus, it was decided that the students would focus their investigation on the reduction of Roundup®, the pesticide used in the greatest quantity. With his presentation date to the Board approaching, John began to review the students' report and recommendations more thoroughly.

The University of British Columbia

Established in 1915, UBC is the oldest university in British Columbia and the third largest in Canada. It is well respected both nationally and internationally for its tradition of academic excellence and leading edge research. Situated on 402 hectares of land at the tip of Point Grey in Vancouver, UBC is renowned for its spectacular campus and is regarded as one of the most beautiful universities in North America. For years, UBC has dedicated itself to enhancing the campus as demonstrated in its vision statement, "Make the campus more attractive as an integrated and vibrant community for those who live or work here. Upgrade and maintain our buildings, landscape and infrastructure so that UBC is seen as a model of a sustainable community and campus: safe, clean, liveable, and environmentally friendly."[1]

UBC has been a leader of Canadian universities in sustainable development and is a signatory to both the Talloires and Halifax Declarations, which state, "Human demands upon the planet are now of a volume and kind that, unless changed substantially, threaten the future well-being of all living species. Universities are entrusted with the major responsibility to help societies shape their present and future development policies and actions into the sustainable and equitable forms necessary for an environmentally secure and civilized world."[2] In 1997, UBC became the country's first university to implement a sustainable development policy.[3] According to this policy, UBC will "contribute to the protection of its environmental life support systems. This

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[1] http://www.vision.ubc.ca/principles.html

[2] http://www.policy.ubc.ca/policy5.htm

[3] UBC Campus Sustainability Office Brochure

means minimizing the pollution of air, water and soil."[4] Its Environmental Protection Compliance Policy also emphasizes its strong responsibility for protecting the environment both on and off campus.

In 1998, UBC opened Canada's first Campus Sustainability Office. Its vision is to "make UBC the leading Canadian university in demonstrating the means to a sustainable community through the fair, wise and efficient use of economic, social and ecological resources within the bounds of a finite planet."[5] Initiatives include education, waste reduction, composting, land use planning, green buildings, and energy and water use plans. Since inception, it has saved 3,109 trees through its recycled paper program, as well as 5,174,480 kWh of electricity through light retrofitting and energy awareness programs.[6]

The attractiveness and the location of the campus are key messages in the informational materials provided to prospective students. Each year, UBC produces over 90,000 copies of Viewbook, a promotional tool for student recruitment. In Viewbook 2003, Martha Piper, UBC's President and Vice-Chancellor, explains within the first two paragraphs of her welcoming letter how the student experience at UBC is "enhanced by [its] location in the great West Coast city and on the extraordinarily beautiful campus." UBC's campus is the second of the top ten reasons for attending UBC. "It's the only campus in Canada that has an ocean on one side, a mountain

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[4] http://www.policy.ubc.ca/health.htm

[5] http://www.sustain.ubc.ca/

[6] http://www.sustain.ubc.ca/, October 10, 2002

range on the other, and a forest on the third." [7] Further information is provided via the UBC Student Services website, which receives over one million hits per day.[8]

In 2000-2001, UBC earned revenues of $873.9 million with 49.0% received from government grants and funding, 21.9% from sales, service and other, 12.5% from student fees, 9.8% from non-government grants, contracts, and donations, and 6.8% from investment income.[9] [See Exhibit A.] From 1996 to 2001, the Province of British Columbia froze university tuition fees, but in February 2002, the freeze was lifted and the UBC Board of Governors was empowered to set and increase tuition levels. However, the Province also announced that operating grant support to UBC would be held at 2001-2002 levels for the next three years. Hence, funds will have to be carefully managed to support the university's needs. In 2001, UBC enrolled over 38,000 students in both part-time and full-time programs and employed over 9,200 full-time staff and faculty.[10]

UBC Plant Operations

The maintenance of the university grounds is the responsibility of UBC Plant Operations. Its mandate is to provide comprehensive operations and maintenance of, and improvements to, the lands and buildings owned and operated by the university while remaining financially and operationally viable.[11] The 2001 operating budget for Plant Operations was $40.2 million (See

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[7] Viewbook 2003, The University of British Columbia

[8] James Kim, Web Analyst for UBC, telephone interview

[9] http://www.publicaffairs.ubc.ca/annualreports/01/financial.html

[10] http://www.publicaffairs.ubc.ca/ubcfacts/index.html

[11] http://www.plantoperations.ubc.ca/about_us.htm

Exhibit E) and it currently employs over 600 employees. 90% of the employees are members of the Canadian Union of Public Employees (CUPE) Local 116, 5% are members of the International Union of Operating Engineers (IUOE) Local 882, and 5% are management and professional staff.

UBC Plant Operations' operational strengths lie in its well-qualified, dedicated, and experienced workforce, its detailed knowledge of the buildings, its municipal-style infrastructure, and the quality of its maintenance facilities and equipment. It provides both core and charge back services. Core services, which include activities such as grounds maintenance, are the largest segment of Plant Operations' services and are paid for by the General Purpose Operating Fund (GPOF). [12] Meanwhile, individual faculties and departments may order additional services from Plant Operations on a charge-back basis. Services can be billed on an hourly, time-and-materials, or fixed-price basis at the client's option. However, some clients, faculties and departments, perceive Plant Operations to be expensive and slow because of its heavily unionized workforce. As a result, potential clients often award charge-back contracts to outside contractors.

The Grounds Maintenance division of the Municipal & Business Services of Plant Operations is charged with landscaping the 142 hectares of soft landscape area at UBC, which includes planted, lawn, and forest areas, as well as playing fields. Services currently include pest control, fungi and mildew control, and weed control using pesticides.

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[12] http://www.policy.ubc.ca/

Using Pesticides

Insects, weeds, and rodents are undesirable residents of any campus because they damage buildings and magnify waste problems. They can also sting or bite which can result in severe human allergic reactions. Traditionally, pesticides, any substance or mixture intended to prevent, destroy, repel, attract or mitigate pests[13], have been the first line of defence against pests. Pesticides may refer to insecticides, herbicides, rodenticides, or fungicides. Not only are pesticides used when an actual pest problem exists, but they also prevent future pest problems from occurring.

Public perception of pesticides declined in the 1960s when the health effects of products such as DDT proved to be harmful. The degree of an individual's reaction to a pesticide depends on the toxicity of the product used and the individual's exposure time to that product. Some pesticides cause acute poisoning at higher doses and cause symptoms which include headaches, sleep disturbances, diarrhoea, vomiting, nausea and, in extreme cases, death. Suspected long-term effects include cancer, birth defects and reproductive problems.[14] Children are at the greatest risk from exposure to pesticides as they are most likely to come into direct contact by playing on newly sprayed areas. As well, they are more susceptible to the negative symptoms as their bodies' immune system is still developing.

Roundup®

Roundup®, a herbicide used to eliminate undesirable weeds, is one of the most popular pesticides in the North American market. Its active ingredient, glyphosate, attacks the treated

[13] Pesticide Use Options for Private Property Vancouver, Vancouver Coastal Health Authority, July 2002

[14] Pesticide Use Options for Private Property Vancouver, Vancouver Coastal Health Authority, July 2002

weed's roots and interferes with the plant's ability to create amino acids, which are imperative for growth. This causes the plant to die within 2-4 days. As a non-selective herbicide, it can attack most species of green plants so it must be applied directly to the weed of interest.

Roundup® is produced by Monsanto Company, a public company based in St. Louis, Missouri. It develops and sells products that aid agricultural production. In 2001, Monsanto posted net sales of $5.46 billion and spent more than $1 million per day on research and development. The agricultural productivity segment of Monsanto's products, of which Roundup® is the predominant product, accounts for $3.78 billion of sales. Global sales of Roundup® exceed that of the six leading herbicides combined and it is currently registered in more than 130 countries.[15] Monsanto has followed a cost leadership strategy ever since its patent for Roundup® expired in 1991. The use of Roundup® is growing at 20% per year, partially due to Monsanto's development of genetically modified crops that are resistant to its effects. [16]

The Material Safety Data Sheet indicates that Roundup® may be harmful if inhaled and can cause temporary irritation through eye contact. It is recommended that goggles and chemical resistant gloves be worn when handling the product. [17] Short-term effects of ingestion include irritation, nausea, vomiting and diarrhoea, while long-term effects may include increased fluid in lungs and decreased blood pressure. Proponents claim that when handled and used properly, Roundup® is one of the most benign pesticides available on the market.

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[15] http://www.monsanto.com/monsanto/layout/about_us/ataglance.asp

[16] http://www.monsanto.com/monsanto/layout/products/productivity/Roundup/default.asp

[17] http://www.farmcentral.com/s/labels/pdf_msds/ru_trans_800.pdf

Conversely, opponents advocate that Roundup® is more dangerous than indicated. These critics claim that testing has not been sufficient and that Roundup® can be linked to non-Hodgkin's lymphoma and increased risk of birth defects and pre-mature births[18]. It has been proposed that the adverse effects of ingesting Roundup® result from the inactive ingredients rather than the glyphosate. The so-called "inert" ingredients contained in Roundup® include ammonium sulphate, methyl pyrrolidinone, perlargonic acid, sodium sulfite, sorbic acid, and isopropylamine. These chemicals are associated with skin irritation, and gastric and respiratory problems.[19] Though these claims are largely dismissed in the academic community, they have had an affect on public perception.

Roundup®'s reputation has been further tainted by the negative press received by Monsanto's "Roundup® ready crops." Monsanto has developed genetically engineered corn and canola seeds that are resistant to Roundup®, allowing farmers to liberally apply Roundup® to their fields. The result has been public outrage and numerous farmers practicing organic farming have launched lawsuits against Monsanto. In Saskatchewan, a class action lawsuit was launched on behalf of an estimated 1,500 Saskatchewan organic farmers asking for damages for lost canola markets. These events have received considerable attention within the Canadian media.

Regulatory Framework

Pesticides are carefully regulated in Canada through a program of pre-market scientific assessment, enforcement, education and information dissemination. These activities are shared

[18] Journal of Pesticide Reform, Fall 1998, Volume 18, No. 3, Updated 09/02

[19] http://www.beyondpesticides.org/main.html

among federal, provincial/territorial and municipal governments, and are governed by various acts, regulations, guidelines, directives and by-laws.

Federal Law

Pesticides imported into, sold, or used in Canada are regulated nationally under the *Pest Control Products Act and Regulations* (PCP Act). The Pest Management Regulatory Agency (PMRA) of Health Canada has a mandate to protect human health, safety and the environment by minimizing risks associated with pesticides while providing Canadians access to the pest management tools they require for agriculture, forestry, industry and personal use. The PMRA is responsible for administering the PCP Act, registering pest control products, re-evaluating registered products, and setting maximum residue limits under the *Food and Drugs Act* (FDA).

Companies producing pest control products must provide all the scientific studies necessary for determining that the product is acceptable in terms of safety, merit and value. Depending on the complexity of the submission, a complete evaluation can take anywhere from a number of weeks to over a year. The evaluation results in the product being either granted registration, in which case it is allowed for sale and use in Canada, or in the product being refused registration.

Provincial Law

The provinces and territories regulate the sale, use, storage, transportation, and disposal of registered pesticides in their jurisdictions as long as the measures adopted are consistent with any conditions, directions, and limitations imposed under the PCP Act or other federal legislation. For example, a province or territory may prohibit the use of a registered pesticide in its jurisdiction, or it may add more restrictive conditions on the use of a product other than those

established under the PCP Act. It may not, however, authorize the use of a product that has not been approved under the PCP Act, and may not relieve the user of the obligation to comply with the conditions, directions, and limitations imposed under the PCP Act. In addition, provinces and territories administer pesticide management programs that include education and training programs, the licensing and certification of applicators, vendors and growers, and the issuing of permits for certain pesticide uses. Other important roles, carried out in co-operation with PMRA regional offices, are those of enforcement and compliance monitoring, and response to spills or accidents.

In British Columbia, the *Pesticide Control Act* applies to the sale, transportation, storage, preparation, application and disposal of pesticides in British Columbia. This Act falls within the responsibilities of the Pesticide Management Program of the BC Ministry of Environment. Staff in six regional offices examine and issue permits to pesticide vendors and applicators, inspect premises of vendors and applicators, and investigate complaints of pesticide misuse. The *Pesticide Control Act* is an enabling rather than a prohibitive legislation; it does not require that pesticides be used in the first place. However, in the case of an emergency, such as an outbreak of exotic insects or disease, the Lieutenant Governor has the authority to authorize the application of pesticides to contain a significant provincial threat, especially to forestry and agriculture, regardless of municipal by-laws.

There have been instances where pesticides were initially approved under the Pesticide Management Program and then later restricted. Ureabor and Hyear were both used at UBC until the toxicity levels of these pesticides were reviewed and subsequently banned by the Province.

Municipal Law

Provincial and territorial jurisdictions may allow cities, towns and municipalities to enact by-laws that set further conditions on the use of pesticides, such as when and where certain types of pesticides (usually lawn, turf and garden products) may be used. Hudson, Quebec was the first municipality in Canada to enact a by-law banning the use of pesticides. Though it was challenged by the pesticide industry, the Supreme Court of Canada upheld the by-law.[20] Since then, numerous municipalities in Quebec and Halifax, Nova Scotia implemented similar by-laws. When Halifax implemented its by-law on August 15, 2001, the use of pesticides was immediately banned on municipal lands and by 2003, the use of pesticides will be banned on all lands within the municipality.

The City of Vancouver currently has a by-law administered by the Vancouver Coastal Health Authority (VCHA) that requires the posting of information notices prior to pesticide being applied whether indoors or outdoors. Vancouver City Council has the authority to introduce a pesticide reduction by-law under section 330 of the *Vancouver Charter*.[21]

There are several groups and lobbyists who advocate abandonment of all pesticide usage.[22] On September 20, 2002, Vancouver City Council reviewed a proposal for reducing the use of pesticides within the city. The proposal called for a two-year phase out of pesticide use within Vancouver. However, the council determined that the cost of monitoring a pesticide ban in

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[20] *114957 Canada Ltee (Spraytech, Societe d'arrosage)* v. *Hudson (Town)*, [2001] S.C.J. No. 42.

[21] (Part XV):330. The Council may make health by-laws for providing for the care, promotion and protection of the health of the inhabitants of the city and for that purpose, for regulating, controlling and restricting persons and their activities;

Vancouver would be prohibitive. Instead, the City decided to invest in a pesticide education program to increase public knowledge of the dangers of pesticides. It is, however, important to note that UBC is a separate legal entity from the City of Vancouver and is not bound by the city's by-laws; however, it must comply with provincial or federal regulations.

Legal Action

For the most part, pesticide lawsuits have not come to the forefront of litigation in Canada. Even in the United States, "pesticide manufacturers… already benefit from federal pre-emption under the [Environmental Protection Agency's] *Federal Insecticide, Fungicide, and Rodenticide Act*… Such pre-emption protects those industries from many tort suits."[23] In Canada, the *Pest Control Products Act*[24], and the *Pesticide Control Act*[25] protect the users and distributors of pesticide products from any litigation that might arise. To date, case law has respected this liability exemption and no cases of distributors' or users' liability have been reported. However, distributors and users could still be held liable by the courts if it is determined that constitutional values override statute or case law. Case law is limited regarding improper usage of pesticides that has resulted in harm to people or pets.[26]

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[22] http://www.gordsteeves.com/freepress%20pesticides.htm

[23] Bernstein, David E., *Procedural Tort Reform: Lessons from Other Nations*, Regulation, *1996, Vol. 19, No. 1.*

[24] R.S.C. 1985.

[25] R.S.B.C. 1996, Chapter 360.

[26] As an example, in *Cape Breton Landowners, Et. Al.* v. *Stora Kopparbergs Berglags Aktiebolag, Et. Al*., 53 N.S.R. (2d) 278, [1982] N.S.J. No. 59, the plaintiff sought a permanent injuction for herbicide spraying by the defendant. The application was allowed but subsequently reversed.

The City of Vancouver

The City of Vancouver supports the use of an Integrated Pest Management (IPM) approach to managing pests on public and private property. For public property, Vancouver and most major BC municipalities (e.g., Vancouver, Victoria, Burnaby, Coquitlam, Nanaimo, Penticton, and Kelowna) have IPM policies for their landscapes.[27] In 1987, the Vancouver Parks Board adopted an IPM policy to reduce the use of chemical pesticides and to develop a holistic approach to plant care. When chemical use is required, the least toxic chemical control is selected. For the past decade, overall pesticide use in the Vancouver Parks Board system has steadily decreased and no cosmetic pesticides are being used on any of the playground, sports field or turf areas.[28] Furthermore, no loss of playability or decrease in the quality of the sports fields has been observed over this period of time.[29]

The Parks Board's IPM horticulture staff has developed non-chemical approaches to control pest problems in the parks system. These include tree banding programs with neighbourhood volunteers to control the spread of winter moth, hand weeding of purple loosestrife in park ponds by volunteers, tree base flower planting initiatives by residents to reduce aphids and increase street tree health, and development of monitoring protocols for key urban insect pests.

Despite these initiatives, careful use of some pesticides continues to be necessary to preserve the assets of the Parks Board and the City. Biological control and improved cultural practices have greatly reduced the need for chemical pesticides at the Sunset greenhouses, Bloedel

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[27] http://wlapwww.gov.bc.ca/epd/epdpa/eripm/landshtm/Chap1.htm

[28] http://www.city.vancouver.bc.ca/ctyclerk/cclerk/020912/pe5.htm

[29] The Vancouver Sun, Karen Gram Advertisement, July 24th, 2002

Conservatory, and VanDusen Gardens, but very small amounts of low and medium toxicity pesticides have occasionally been required to protect propagation stock and high value exotic specimens. Also, pesticides such as insecticidal soap and trapping glue, and biological control agents such as ladybird beetles are used on street trees to control high public nuisance problems such as aphids.

A survey conducted in the Greater Vancouver Regional District found that two thirds of households use pesticides for lawn and garden maintenance.[30] There is currently no data available about the perceptions of Vancouverites on the use of pesticides. However, a recent survey conducted in Waterloo, Ontario provides some insights into the public perceptions of pesticides. The 300-person survey indicates that 60% defined pesticides as poisons/chemicals. While 61% felt that pesticide use on lawns was either very necessary (20%) or somewhat necessary (41%), 71% were either very (27%) or somewhat (44%) concerned about pesticide use. 34% cited health related concerns, while 27% stated that pesticides were harmful to children/adults and 23% were concerned about impacts on pets/wildlife. [31]

Pesticide Use at UBC

A UBC Pest Control Policy was approved in March 1993 and revised in December 1996. The purpose of the policy is "to promote the use of biological techniques for pest control and to regulate [the] use of pesticides on land sites and buildings under the control of the university." It stipulates, "Pests will be controlled whenever possible through Integrated Pest Management

[30] http://www.safe2use.com/ca-ipm/02-07-25a.htm

[31] www.pestinfo.org

[IPM], a combination of cultural and biological techniques and selective chemical methods." In terms of pesticide use, the policy states, "Pesticides may be used on University land sites and buildings by employees of the University or contractors to the University provided procedures for safety, environmental protection and information are followed. All relevant federal Ministry of Agriculture and provincial Ministry of Environment regulations are followed"[32].

IPM is an approach to pest control that focuses on minimizing pest problems by creating an environment that is unfavourable to pest habitation. A combination of available pest management strategies is used to prevent economically damaging pest outbreaks while reducing risks to human health and the environment. Activities can include simple monitoring, properly timed pesticide use, or organic IPM in which there is total elimination of synthetic pesticides. The appropriate IPM strategy depends on the objectives pursued by the decision-maker.

In 2000 and 2001, UBC applied eleven types of pesticides, including four herbicides: Trillion, Casoron, Killex®, and Roundup®. Killex® was applied to the grass areas in the highly manicured areas including the Rose Garden, Cecil Green House and MacKenzie House (President's residence). Roundup® was applied 1-4 times per year, as required, in the spring and summer for weed control in the plant beds and on hard surfaces where weeds grow within cracks. Pesticides are not routinely used on university lawns or playing fields or at Acadia, a family residence on campus. Quantities and application details for each type of pesticides is provided in Exhibit C.

[32] http://www.policy.ubc.ca/

Currently, two full-time Plant Operations' employees apply pesticides on campus. According to John Metras, "Safety is our number one priority" when handling pesticides. Plant Operations strictly follows the pesticide legislation in terms of personal safety, storage facilities requirements, mixing and loading, equipment maintenance, transportation, emergency procedures, monitoring, disposal, and record-keeping. Staff is provided with proper safety equipment and training before handling the pesticides and a protective suit must be worn. Roundup® is applied directly to the weeds and warning signs are posted on the treated area for three days. A Safety Committee comprised of both union members and Plant Operations management and staff exists to ensure that a safe environment is provided. To date, the union has never objected to their members' handling of pesticides on campus.

Opportunities for Further Reductions

Plant Operations has estimated that six additional full-time equivalent workers (three landscape technologists and three labourers) plus the two current employees are required to maintain the campus beds at their current level if Roundup® is eliminated. Adding six workers would result in annual increases of $285,971 in labour costs, $22,200 in equipment costs and $3,600 in training costs. A savings of $6,000 would be realized in reduced pesticide costs. (see Exhibit D.) Manual weeding will increase the risk of injuries such as Carpal Tunnel Syndrome and back and knee problems.

Some members of the Plant Operations staff have expressed concern that this estimate may be conservative and that 8–10 new staff members may be required. The grounds crew has expressed mixed opinions about using pesticides. While some crew members indicated they would be very pleased to discontinue the use of all pesticides on campus, others perceive Roundup® as a

valuable and efficient tool. Concern has been expressed that some areas on campus, like the cracks on sidewalks, could not be maintained without using a pesticide, as it would be impossible to extract the roots by pulling the exposed portion of the weed.

Horticultural practices, which suppress weed growth, can be adopted to reduce the need for pesticides. These include the use of bark mulch in planted beds, or planting shrubs that require less water and grow between 18' and 3' in height. The resulting arid and dark conditions limit weed growth. For example, perennials such as day lilies are now incorporated into some of the campus beds; these plants grow into a ground cover that restricts the growth of weeds. This technique is currently used on 5% of the planted areas on campus. Planting these types of shrubs does not immediately alleviate weeding concerns because two to four years is required before the covering plants have matured sufficiently to inhibit weed growth.

Recently, some new landscapes have been designed on campus that are not maintenance-friendly. For example, narrow plant beds with grass along both sides are difficult to maintain because weed-creating seeds can be easily blown into the bed. Low quality soil, which is prone to weeds, has been brought in for some new projects. Furthermore, horticultural decisions directly impact the amount of labour required for maintenance. Essentially, many weeding issues could be minimized by ensuring landscapes are properly designed. The labourers want to be proactive, rather than reactive in fighting weeds and indicate that they should be consulted directly by the Office of the University Architect during the design phase.

In the United States, organic pesticides such as clove oil, vinegar or garlic are available for purchase. Unfortunately, the PMRA has yet to approve any organic pesticides for use in Canada and so switching to a non-synthetic pesticide is currently not an option.

While many universities in Canada have adopted IPM policies to establish a green campus, to date only York (Toronto, ON) and Dalhousie (Halifax, NS) have banned the use of pesticides on campus. In the early 1990s, York decided to minimize the use of pesticides on campus and every year it undertakes initiatives to further reduce the amount used. In particular, hot water systems are used to kill the top of weeds in cracks and near curbs. In plant beds, York's grounds crew applies a heavy 2-3 inch layer of mulch to suppress the growth of weeds. Since this method is fairly time-consuming, York is still in the process of optimizing the mulch supply chain and its implementation on campus. However, York has yet to officially announce that it will entirely ban pesticide application. Pesticide use is still regarded as an efficient tool that is indispensable (e.g. for the control of cockroaches in food areas, in the case of a breakout of beetles, etc.).

Similarly, Mount Allison (Sackville, NB) developed an environmental audit to set an example of environmental responsibility in 1998. Based on this audit, the University developed environmental guidelines which included the recommendation to "use pesticides only when required."[33] Unfortunately, no further information was available on the actual implementation of this recommendation.

On-Campus Perceptions

UBC's Public Relations Office reports that it rarely, if ever, receives calls inquiring about the use of pesticides on campus, but John Metras reports that his office receives between 20 and 30 letters a year. In an informal survey of 43 students and faculty staff, 93% agreed that the campus should be pesticide free and the median of their willingness to pay is $10. In a second informal

[33] http://www.mta.ca/environment/mtapolicy.htm

survey of 65 students, 77% agreed or strongly agreed that it is important to have an attractive campus; 69% agreed or strongly agreed that it is important to consider the economic costs; and 72% agreed or strongly agreed that it is important that UBC has a green image.[34]

Professors within the school's Faculty of Agriculture who are knowledgeable about pesticide use have indicated that the risk associated with the use of Roundup® on campus is minimal because Roundup® is applied specifically to the weeds rather than liberally sprayed. They regard the total volume of Roundup® used as minimal. However, these professors agree that the public perception on this issue is an important factor which must be taken into consideration.

Conclusion

As he finished the student's report, John gave a sigh. Though the students had provided him with some helpful insights, he recognized that convincing the Board of Governors to ban pesticides on campus would be a daunting task. In particular, he knew he would have to emphasize the advantages attained by achieving a green campus. Furthermore, he would have to be explicit that the figures described in his presentation pertained only to the reduction of Roundup® on campus. Alternatives still need to be developed for the other pesticides used on campus before UBC could benefit from stating that it is truly a pesticide-free campus.

[34] Survey conducted by Team RBC, Oct. 2002

Appendix A: Roundup® at UBC Case Study

Exhibit A – UBC Revenue and Expenses for 2000-2001

Revenues		
	$ (000s)	%
Government grants	$427,967	49.0%
Sales, service and other	$191,099	21.9
Student fees	$109,586	12.5
Non-government grants, contracts and donations	$85,905	9.8
Investment income	$59,380	6.8
Total Revenues	**$873,937**	**100%**
Expenses		
Salaries	$544,668	62.3%
Supplies and general expenses	$153,168	17.5
Depreciation	$60,306	6.9
Cost of goods sold	$34,990	4.0
Scholarships, fellowships and bursaries	$27,090	3.1
Other transfers	$22,017	2.5
Transfer to Endowment Principal	$21,061	2.4
Grants to other agencies	$10,520	1.2
Total Expenses	**$873,820**	**100%**
Surplus (Loss)	**-$(117)**	

Exhibit B - Organization Chart for UBC's Plant Operations

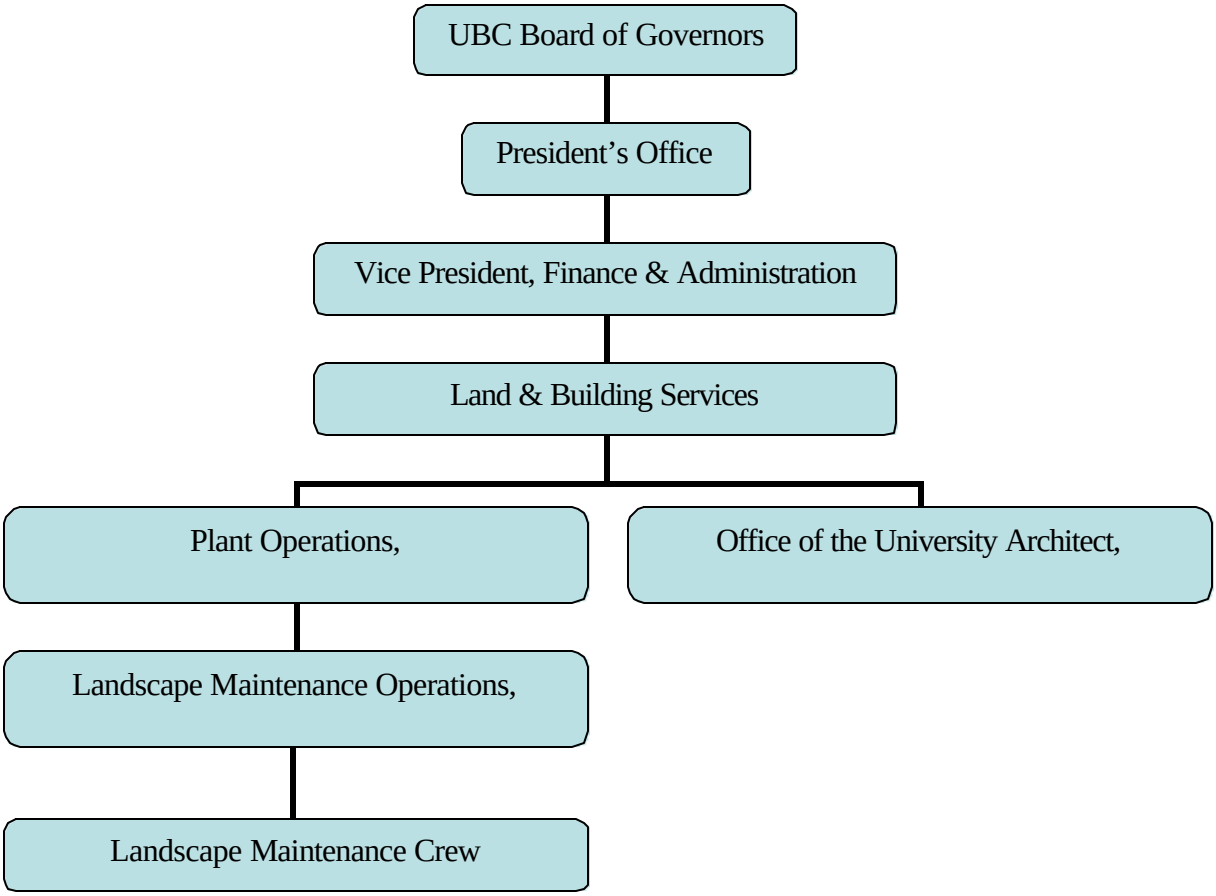


Exhibit C – Annual Pesticide Use at UBC (1998 - 2001)

Product	Type	Application	Quantity Used			
			2001	2000	1999	1998
Roundup®	Herbicide	Weed control in planted beds	99.9 L	191.6 L	98.9 L	105.1 L
Killex®	Herbicide	Weed control in grass at Rose Garden	0.1 L	0.12 L	0.155 L	
Dormant Oil	Fungicide	Mildew/black spot control at Rose Garden	7.5 L			
Superior 70 Oil	Fungicide	Mildew/black spot control at Rose Garden	15 L			
Fixed Copper	Insecticide	Insect control at Museum of Anthropology	0.285 L			
Casoron	Herbicide	Weed control in planted beds	30.0 kg	337.75 kg	225.5 kg	661.5 kg
Easout	Fungicide	Mildew/black spot control at Rose Garden		0.343 kg	0.079 kg	0.061 kg
Lime Sulphur	Fungicide	Mildew/black spot control at Rose Garden		3.0 L		0.25 L
Trillion	Herbicide	Weed control in grass at Rose Garden		0.09 L		0.7 L
Dimethoate	Insecticide	Aphid control in Main Mall oaks		21.0 L		8.0 L
Daconil	Fungicide	Anthracnose control in Main Mall oaks		3.108 L		
Basudin	Insecticide	Aphid control in Main Mall oaks	no longer used		0.08L	
Benlate	Fungicide	Mildew/black spot control at Rose Garden	no longer used		0.025 kg	0.867 kg
Hyvar XL	Herbicide	Weed control in gravel substation lots	no longer used			6.0 L
Ureabor	Herbicide	Weed control in gravel lots & along curves	no longer used			112.5 kg
Diazinon	Insecticide	Aphid control in Main Mall oaks	no longer used			2.71 L

Exhibit D – Costs Required to Eliminate The Use of RoundupÒ on Campus

Additional Staff Required for Manual Weeding

Job Class	*New Full-time Employees Required*	*Annual Wages*	*Employee Benefits (21%)*	*Labor Costs*
Landscape Technologist	3	$130,338	$27,371	$157,709
Laborer	3	$106,002	$22,260	$128,262

Additional Equipment/Vehicle Requirements

Type of Equipment	*Quantity*	*Depreciation Costs*	*Operations & Maintenance Costs*	*Equipment Costs*
1/2 ton Pick-up Trucks	2	$12,000	$7,200	$19,200
Personal Protective Equipment	6	$3,000		$3,000

Additional Training

Type	*Number of Trainees*	*Training Costs*
Basic Safety	6	$1,800
Equipment Operation	6	$1,800

Reduction in Pesticide Use

Type of Pesticide	*Quantity*	*Cost/Litre*	*Cost Savings*
Roundup®	100L	$60	($6,000)

Exhibit E - UBC Plant Operations Operating Budget

Revenues	2001/2002	2002/2003
University General Purpose Operating Fund	$ 20,175	$ 24,790
Fees for Service	$ 19,081	$ 21,067
Student Fees (Aquatic Center)	$ 896	$ 896
Total Revenues	$ 40,152	$ 46,753
Expenses		
Cost of Goods Sold	$ 3,373	$ 4,641
Salaries	$ 26,657	$ 30,199
Benefits	$ 4,994	$ 5,667
Travel	$ 64	$ 79
Staff Development		
Operational Supplies	$ 3,476	$ 4,194
Repairs & Maintenance	$ 215	$ 215
Furnishings & Equipment	$ 1,450	$ 603
Utilities	$ 854	$ 742
Professional Fees	$ 354	$ 297
Admin Service Fees	$ 372	$ 404
Physical Infrastructure Charge	$ 16	$ 34
Total Expenses	$ 41,825	$ 47,075
Net Income (Loss)	$ (1,673)	$ (322)
Retained Earnings Beginning of Year	$ (1,022)	$ (2,695)
Net Income (Loss)	$ (1,673)	$ (322)
End of Year	$ (2,695)	$ (3,017)

Exhibit F - Summary of "Willingness-to-Pay" Survey

	Yes	No
Do you agree UBC should become a pesticide-free campus?	40	3
Do you think UBC will increase its reputation if it becomes a pesticide-free campus?	39	4

How much are you willing to pay to support a pesticide-free campus?	$0	2
	$10	29
	$20	6
	$30	2
	$40	0
	$50	1

Note: Informal survey conducted by Team RBC among 45 students on campus.

Exhibit G – Financial Analysis of a Roundup® Free Campus

	2003 ($ thousands)
Benefits	
Operating, Training, & Labour Savings	$128
Roundup® Savings	$6
Equipment/Vehicle Savings	$10
Total Benefits	$144
Costs	
Labour Costs	$414
Equipment/Vehicle Increase	$22
Training Costs	$4
Total Costs	$440
Net Benefit	($296)

Exhibit H – Net Present Value Analysis of the Project

($ thousands)

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Project Benefits	$145	$150	$156	$163	$169	$176	$183	$190	$198	$206
Project Costs	$440	$462	$485	$509	$535	$562	$590	$619	$650	$683
Net Benefit (NB)	($296)	($312)	($329)	($347)	($366)	($386)	($407)	($429)	($452)	($477)
Net Present Value of NB	$275	($289)	($282)	($275)	($269)	($263)	($256)	($250)	($244)	($238)
Total	**($2,092)**									

Assumption: The average social discount rate is 8%.

Exhibit I - Cost-Benefit Analysis

	($ thousands)
Project Benefits	
Operating Cost Savings	$128.30
Roundup Savings	$6.00
Equipment/Vehicle Savings	$10.20
Potential Environment/Health Benefits	$470.00
Administration Benefits	$20.00
Total Benefits	$634.50
Project Costs	
Labour Costs	$414.20
Equipment/Vehicle Increase	$22.20
Training Costs	$3.60
Total Costs	$440.00
Net Benefit	**$194.50**

Assumptions:
In 2003, the estimated UBC student population will be 38,000 and the faculty and staff population will be 9,000 for a total of 47,000. Administration and community benefits are estimated.

Exhibit J – Net Present Value (NPV) of Cost Benefit Analysis

($ thousands)	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Benefits	$634.50	$647.19	$660.13	$673.33	$686.80	$700.53	$714.55	728.84	743.41	758.28
Costs	$440.00	$462.00	$485.10	$509.35	$534.82	$561.56	$589.64	619.12	650.08	682.58
Net Benefit (NB)	$194.50	$185.19	$175.03	$163.98	$151.98	$138.97	$124.95	109.72	93.33	75.7
NPV of NB	$194.50	$171.47	$150.06	$130.17	$111.70	$94.58	$78.71	64.021	50.42	37.86
Total	**$1,413.32**									

Assumption: The average social discount rate is 8%

Exhibit K – Sensitivity Analysis of the Cost Benefit Analysis

(2003, $ thousands, except for willingness-to-pay)

Willingness-to-Pay	**$ 5**	**$ 6**	**$ 7**	**$ 8**	**$ 9**	**$ 10**
Projects Benefits						
Operating Cost Savings	$128.00	$128.00	$128.00	$128.00	$128.00	$128.00
Roundup® Savings	$6.00	$6.00	$6.00	$6.00	$6.00	$6.00
Equipment/Vehicle Savings	$10.20	$10.20	$10.20	$10.20	$10.20	$10.20
Environment/Health Benefits	$235.00	$282.00	$329.00	$376.00	$423.00	$470.00
Administration Benefits	$20.00	$20.00	$20.00	$20.00	$20.00	$20.00
Total Benefits	$399.20	$446.20	$493.20	$540.20	$587.20	$634.20
Projects Costs						
Labour Costs	$414.00	$414.00	$414.00	$414.00	$414.00	$414.00
Equipment/Vehicle Increase	$22.20	$22.20	$22.20	$22.20	$22.20	$22.20
Training Costs	$3.60	$3.60	$3.60	$3.60	$3.60	$3.60
Total Costs		$440.00	$440.00	$440.00	$440.00	$440.00
Net Benefit	**-$40.80**	**$6.20**	**$53.20**	**$100.20**	**$147.20**	**$194.20**

Exhibit L – UBC Pesticide Supply Chain

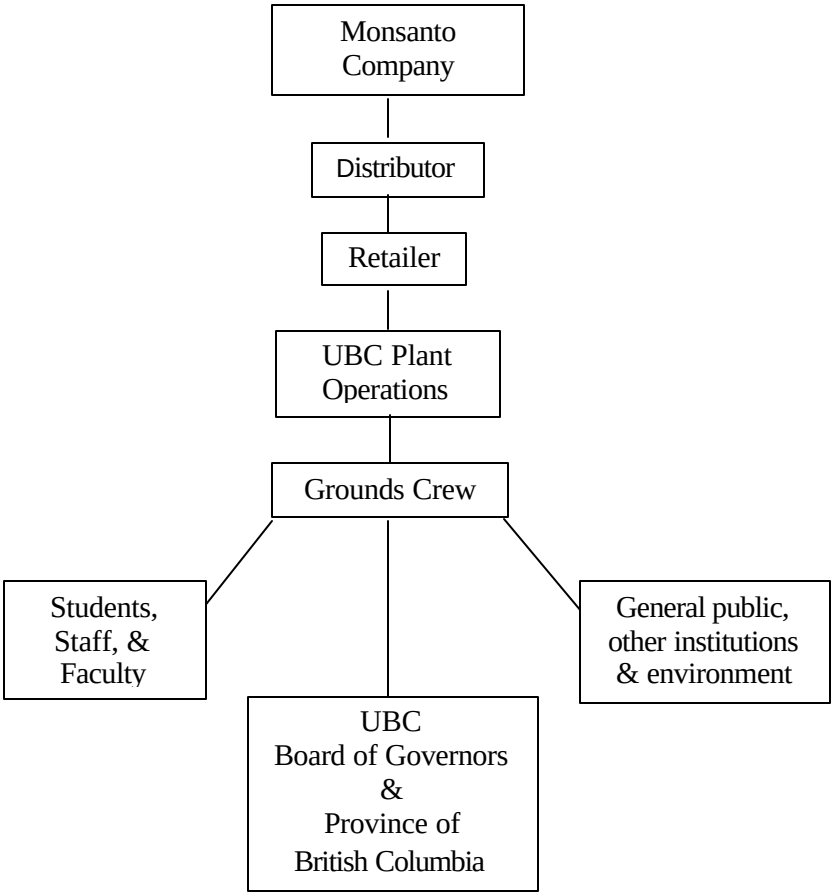
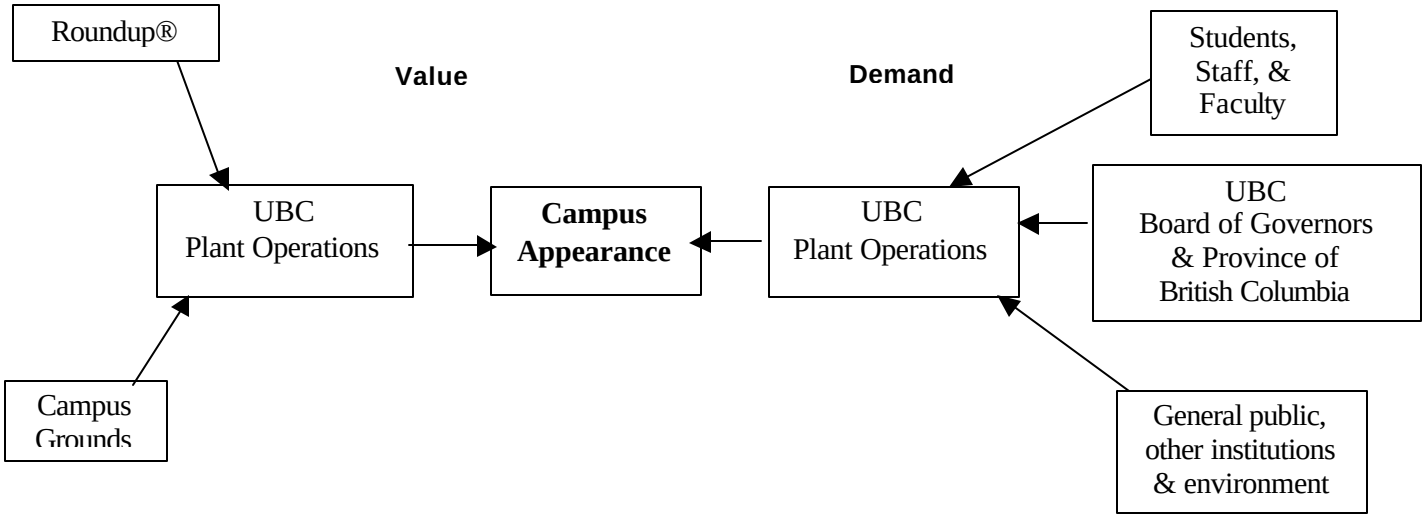


Exhibit M – UBC Pesticide Value and Demand Chains



CURRENT UBC PRACTICES

? 402 hectares of land at UBC

? 152 hectare are soft landscape (includes planted lawn, forests, playing fields and plant beds)

? areas sprayed = plant beds, sidewalk cracks

? not sprayed in Acadia or on grass

? spot spraying takes place 2-3 times per week in spring /summer months therefore specific areas sprayed approximately once per year

? 2 full time workers spray

? 90 litres Roundup® purchased in 2001

? nonyl phenol ethoxylates surfactant used

Macmillan Pilot Project is addressing issues re: Alternative Pest Management at UBC via SEEDS project

For more information see:

www.monsanto.com

www.sustain.ubc.ca

www.pesticide.org

www.beyondpesticides.org

ace.orst.edu/info/extoxnet

THE UNIVERSITY OF BRITISH COLUMBIA
SEEDS
SOCIAL ECOLOGICAL ECONOMIC DEVELOPMENT STUDIES

If you have any concerns, contact:
David Smith
(Landscape and Grounds Supervisor) at
E-mail: **david.smith@ubc.ca**

ROUNDUP® AT UBC

THE RELATIONSHIP UNCOVERED

ELIMINATING THE USE OF ROUNDUP at UBC

THE FACTS

- herbicide produced by Monsanto Co.

- commonly used in agriculture with genetically modified resistant crop seeds

- affects all plants (non-selective)

- acts on plant after sprouting (post-emergent)

- takes 2-4 days after application for plant to die (slow acting)

- mode of action = inhibits synthesis of amino acids necessary for plant growth

- active ingredient = glyphosate

- altered form of amino acid glycine

- mixed with *inert* substance (surfactant) to penetrate waxy cell wall

- low toxicity (especially when sprayed directly on plants)

ALTERNATIVES & BARRIERS

CHEMICAL

? natural organic pesticide alternatives (i.e. clove oil and vinegar)	? not registered under the national Pest Management Regulatory Act

HORTICULTURAL PRACTICES

? ground cover (i.e. low growing shrubs, perennial day lilies to cover plant beds and discourage weed growth)	? expensive; need to control weeds until shrubs establish themselves; can incorporate into new landscape designs
? mulching year round (with bark mulch)	? time consuming; would need to continually re-mulch with 2-3" layer
? hand weeding	? need 6 additional employees = expensive; can not use volunteers because Plant Operations workers are unionized

OTHER

? accepting weeds	? UBC mandate to keep "extraordinarily beautiful campus" and weeds ? beauty

HEALTH EFFECTS

There is much debate & speculation re: the potential deleterious health effects associated with Roundup®. To date there is no unequivocal data for or against these allegations. More often than not, the potential health effects have been associated with chemicals that have been added