

PREVENTING BREAST CANCER:

AN ANALYSIS OF CANADA'S REGULATORY REGIME FOR CHEMICALS

ELLEN C. SWEENEY

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by Ellen C. Sweeney

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Examination Committee members:

1. Dr. Dayna Scott
2. Dr. Miriam Smith
3. Dr. Aryn Martin
4. Dr. Barbara Rahder
5. Dr. Abby Lippman

Abstract

Breast cancer is the most commonly diagnosed cancer in women worldwide. The incidence rates are such that one in nine Canadian women will be diagnosed in her lifetime. While social science research has demonstrated the influence of social, political, economic, and environmental factors on health outcomes, many still emphasize the role of traditional risk factors for breast cancer, such as family history or diet. However, these factors are unable to account for the increased incidence of the disease in industrialized countries. This leads to a call for more attention to the environmental links to breast cancer, including the 'everyday exposures' to toxic substances that we experience in our daily lives, which often include mammary carcinogens and endocrine disrupting chemicals. The *Canadian Environmental Protection Act, 1999* and the federal government's *Chemicals Management Plan* are designed to protect the environment and the entire Canadian population from risks associated with exposure to toxic substances. This dissertation research examines the body of Canadian law, policy and practice which encompasses Canada's regulatory regime for toxic substances. The regime is evaluated from a population health and primary prevention perspective. I asked: are the laws, policies and practices governing the everyday exposures to toxic substances in Canada inherently precautionary? And do they enact a primary prevention approach to women's health?

The primary prevention of environmental health outcomes has not been a strong feature of public health policy and legislation in Canada, despite the efforts of environmental breast cancer activists who advocate for a precautionary approach. This research is steeped in politicized debates as it engages with issues central to women's health, risk and the environment. I examine how the issues are communicated and understood, who the policies are designed to protect, and where the burden of risk is presumed to lie. I consider whether the policies capture the need for prevention and action related to women's health. This research seeks to identify gaps in the law, policy and practice and in doing so, concludes that women's health is not adequately protected from detrimental health outcomes as a result of everyday exposures to toxic substances, including breast cancer.

Dedication

I would like to dedicate this dissertation to my father, Reg Sweeney (1949-2007). Our parents instilled us with a strong work ethic and only ever asked that we try our best. Dad, I know you would be proud and I miss you every day.

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The Faculty of Environmental Studies at York University is one of the only places where I could have conducted this research. This faculty encourages its students to conduct critical work drawing from and across multiple disciplines which was essential for a project linking women's health, toxic substances, risk, and regulation.

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List of Abbreviations

ACEWH - Atlantic Centre of Excellence for Women's Health
BBP – n-butyl benzyl phthalates
BCCEWH - British Columbia Centre for Excellence in Women's Health
BHA - butylated hydroxyanisole
BHT - butylated hydroxytoluene
BPA - bisphenol A
BFR - brominated flame retardants
CEPA - *Canadian Environmental Protection Act*, R.S.C. 1988
CEPA 1999 - *Canadian Environmental Protection Act*, R.S.C. 1999, c. 33
CESAF - Centre of Excellence for Women's Health - Consortium Université de Montréal
CFCs - chlorofluorocarbons
CMP - *Chemicals Management Plan*
CWHN - Canadian Women's Health Network
DBP - di-n-butyl phthalates
DDT - dichlorodiphenyltrichloroethane
DEA - diethylalumine
DEHP - di(2-ethylhexyl) phthalates
DES - diethylstilbestrol
DIBP - diisobutyl phthalates
DMF - N,N-dimethylformamide
EDC - endocrine disrupting chemical
GBA - gender based-analysis
HCBD - hexachlorobutadiene
IARC - International Agency for Research on Cancer
IICA - International Council of Chemicals Associations
LGBT – Lesbian, Gay, Bisexual, and Transgender
LOAEL - Lowest-Observed-Adverse-Effect-Level
NDMA - N-nitrosodimethylamine
NO(A)EL - No-Observed-(Adverse)-Effect-Level
NNEWH - National Network on Environments and Women's Health
NPE - nonylphenol and its ethoxylates
NTP - National Toxicology Program
OECD - Organisation for Economic Co-operation and Development
PAH - polycyclic aromatic hydrocarbons
PBDE - polybrominated diphenyl ether flame retardants
PCB - polychlorinated biphenyls
PCEWH - Prairie Women's Health Centre of Excellence
PEG - polyethylene glycol compounds
PFC - perfluorinated chemicals
PFOS - perfluorooctane sulfonate
PSL1 - first Priority Substances List

PSL2 - second Priority Substances List
REACH - Registration, Evaluation and Authorization of Chemicals
RoHS - Restriction of the use of certain Hazardous Substances in electrical and electric equipment
RQASF - Réseau Québécois d'Action pour la Santé des Femmes (Quebec Womens' Health Action Network)
Siloxane D4 - octamethylcyclotetrasiloxane
Siloxane D5 - cyclopentasiloxane, decamethyl-
SNAc - Significant New Activity
TSCA - *Toxic Substances Control Act (US)*
TSMP - *Toxic Substances Management Policy*
USEPA - United States Environmental Protection Agency
WHCR - Women and Health Care Reform
WHP - Women and Health Protection

Chapter 1

Introduction

Introduction

Advances in medical and environmental science have created an awareness of the relationship between toxic agents and human health (Somers, 2001). Kroll-Smith and Kelly (2008) utilize the term of “ecological impairment” in their examination of the evolution of the relationship between bodies and environments. They consider the historical progression of bodies in environments, including industrial environments and industrial elements in bodies. The authors focus their attention on the 19th century in order to consider how changing environments were believed to have the capacity to alter or change the body. During this time, environment and disease were linked to landscape, topography and changes in climate (Kroll-Smith and Kelly, 2008: 306-07). However, between 1900 and the early 1960s, there was a shift in ideas about the relationship between the body and environment. The field of medicine became professionalized and the germ theory of disease emerged to surpass the role of landscapes, topographies and climates as explanations for health and sickness. Environmental links to disease were dismissed in this phase in favour of germ theory and explanations focused on microbes entering the body. There was a definite shift away from any attention that might have been paid to the increasingly chemical-laden industrial environments with medical, political and public emphasis placed on personal hygiene and self-regulation (Kroll-Smith and Kelly, 2008).

The third period, beginning in the mid-1960s, marks a historically significant transformation around the causality of disease and health outcomes (Chernomas and Donner, 2004). During this period, environments are viewed as “encroaching upon, invading, and indeed poisoning bodies” through human-made, synthetic environments (Kroll-Smith and Kelly, 2008: 309-10). The increase in disease incidence in western society corresponds with the increased mechanization and industrialization beginning in the late 20th century (Brophy et al., forthcoming). The global production of chemicals increased 400-fold from 1930-2000, and the increase in the production and use of toxic substances occurred largely without assessing the potential risks to the environment and human health (Environment Canada and Health Canada, 2004: 27). There is no agreement regarding pathophysiology for most contemporary toxic exposures in western society, and one cannot simply claim to have a disease when there is not a clear etiological explanation of exposures and symptoms. Under this new paradigm, it is common to acknowledge both the complex changes in the relationship between bodies and environments and the implications these relationships have for clinical medicine (Kroll-Smith and Kelly, 2008: 316). Environments are viewed as possible sources of impairment and it is recognized that some bodies that are exposed may experience health problems as a result. Proponents of this view argue that environments, like bodies, can be injured. However, unlike an impaired body that is unlikely to pose a risk to other bodies, *an impaired environment places bodies in danger* (Kroll-Smith and Kelly, 2008: 316-17, emphasis added).

The period in which industrial elements have permeated bodies has generated new scholarship which posits that “the human is always intermeshed with the more-than-human world” and the “substance of the human is ultimately inseparable from ‘the environment’” (Alaimo, 2010: 2). The contemporary risks associated with exposure to toxic substances simultaneously embody Rob Nixon’s (2011) concept of “slow violence” and Rachel Carson’s (1962) “death-by-indirection.” In the risk society, risks are defined as the probability of physical harm occurring as a result of technological processes. The dangers associated with an increase in chemical contaminants include risks to bodies that are both pervasive and cumulative. These risks are unlimited across both space and time, as they cross all territorial borders and have the potential to affect future generations (Beck, 1992). These “landscapes of risk” embody the hazards which become inscribed on women’s bodies and may result in detrimental health outcomes (Alaimo, 2010). By viewing environments and bodies not as distinct entities, but rather as intricately linked, this discussion provides a place to situate critical research and analysis on environmental health.

“As the 21st century unfolds we are witnessing important changes in, and vigorous debates about, the ways in which people in the industrialized West understand and experience illness” (Moss and Teghtsoonian, 2008: 3). The fullest definition of environmental health problems includes all of the health hazards found in our living and working conditions, including bacteria and viruses in human waste; animal vectors for infectious diseases; surface-water and groundwater pollution; air pollution; chemical and petroleum product spills and explosions; and disasters such as floods, hurricanes,

landslides, and fires which may be natural or caused by humans (Brown, 2007). To narrow the definition to the understanding reflected in most research and policy on environmental health, environmental health problems may be defined as the “health effects caused by toxic substances in people’s immediate or proximate surroundings” (Brown, 2007: 1). Brown (2007: 2) prefers to use the term “environmentally induced diseases” as the causation is linked to environmental factors, but the environmental factors may also interact with genetic predispositions or with some personal behaviours. Concerns around environmentally induced diseases focus on acute and chronic exposures to toxic substances which may be linked to cancer, respiratory diseases, and problems associated with the immune and endocrine systems. These health conditions affect the lives of Canadian residents and have implications for the health care system, social services and the economy (Health Canada, 2010a: 32).

Recognizing the carcinogenic, bioaccumulative and persistent nature of environmental contaminants, there is a call for a shift away from the biomedical model of disease which focuses on the diagnosis and treatment of breast cancer and towards research which focuses on environmental causes and primary prevention. My research will contribute to these debates with an explicit focus on preventive health policy in order to augment disease prevention efforts. The Government of Canada has a “duty to protect the environment, including its biological diversity, and human health, from any of the adverse effects of the use and release of toxic substances, pollutants and wastes” under the Administrative Duties of the *Canadian Environmental Protection Act, 1999*. In this research, I conduct an interpretive policy analysis of Canadian environmental law, policy

and practice which encompasses the regulatory regime for toxic substances. I focus specifically on the *Canadian Environmental Protection Act* and the *Chemicals Management Plan*, and frame the research with a cancer prevention lens.

Situating Breast Cancer: Issues of Risk, Responsibility and Prevention

Toxic exposure has provoked a substantial amount of debate and conflict, policymaking, legislation, public awareness, media attention, and social movement activity. It has also prompted vigorous debate between laypeople and professionals, citizens and government and among professionals themselves (Brown, 2007). My research investigates whether the environmental legislation and policies which are designed to protect the environment and human health capture the need for prevention and action related to protecting women's health in Canada. Breast cancer has been a notable touchstone as the "rising incidence of breast cancer in the decades following World War II paralleled the proliferation of synthetic chemicals" (Gray et al., 2009: 45). Because known attributable risk factors cannot account for the increased incidence of breast cancer, particularly in industrialized countries, it has become necessary to consider environmental links to breast cancer including mammary carcinogens and endocrine disrupting chemicals¹ through everyday exposures to industrial chemicals and toxic substances in consumer products (Schwarzman and Janssen, 2010).

¹ Endocrine disrupting chemicals are natural and human-made substances that can mimic or interfere with the function of hormones in the body (NIEHS, 2013b). Endocrine disrupting chemicals can disrupt the endocrine system in three specific ways: i) by mimicking a natural hormone in the body which may result in a signal stronger than the natural hormone or a signal that occurs at the "wrong" time; ii) by binding to a receptor within a cell and preventing the correct hormone from binding and resulting in abnormal reactions within the body; and iii) by blocking cell receptors which interferes with how normal hormones and receptors function in the body (CCOHS, 2013; Labelle, 2000). Endocrine disrupting chemicals are found in a wide range of substances including polychlorinated biphenyls (PCBs), dioxins, pharmaceuticals including

Breast cancer is a public health issue of concern: it is the most commonly diagnosed cancer in women worldwide (WHO, 2013). Breast cancer rates in Canada are among the highest in the world with similar incidence rates as the United States, northern Europe and Australia. Breast cancer is the most common cancer in Canadian women under age 50, ages 50-69 and over age 70, as well as being the most common cancer-related cause of death for women under 50 (CCS and NCIC, 2007). One in nine women will develop breast cancer in her lifetime and approximately sixty-five Canadian women are diagnosed with breast cancer every day. An estimated 23,800 women in Canada will be diagnosed this year and 5,000 will die as a result (BCSC, 2013a).²

diethylstilbestrol (DES), dichlorodiphenyltrichloroethane (DDT) and other pesticides, and plasticizers including bisphenol A (BPA) (CCOHS, 2013; NIEHS, 2013b). These substances may interfere with the endocrine system in humans and wildlife resulting in adverse developmental, reproductive, neurological and immune effects (NIEHS, 2010, 2013b).

² It should be noted that breast cancer can occur in men. However, it is rare with men accounting for less than one percent of diagnosed cases (CCS and NCIC, 2007). An important example of environmental exposures and male cases of breast cancer involves Camp Lejeune which is a Marine Corps Base in North Carolina. Marines and Naval personnel, residents, family members and civilians who lived in military base housing at Camp Lejeune were exposed to contaminated water through the release of volatile organic compounds into the drinking water from 1957 to 1987 (TFTPTF, 2010). Camp Lejeune was officially listed as a Superfund site in 1989 under a federal program by the United States Environmental Protection Agency which addresses uncontrolled hazardous waste sites (USEPA, 2013a). Approximately 750,000 to 1,000,000 people were exposed to trichloroethylene, tetrachloroethylene, benzene, and vinyl chloride which are linked to miscarriage, birth defects, childhood leukemia, and other forms of cancer (Ordonez, 2012; Semper Fi: Always Faithful, 2013). Eighty-one cases of male breast cancer have been linked to exposures at Camp Lejeune as of November 2012 resulting in the single largest cluster of male breast cancer (Partain, 2012). A newly released study by the Agency for Toxic Substances and Disease Registry cites a report from 1985 where levels of trichloroethylene were 18,900 parts per billion in a drinking water well at Camp Lejeune, nearly 4,000 times today's maximum allowable limit of 5 parts per billion (Breed, Waggoner and Biesecker, 2013). Leaders of the House and Senate Veterans Affairs Committees stated that this is "possibly the worst example of water contamination" in the history of the United States (Ordonez, 2012). The House of Representatives approved the *Janey Ensminger Act* which provides health care to affected military personnel and their family members if they lived or worked at least thirty days at Camp Lejeune from 1957 to 1987 and their health condition is listed in the Bill as being associated with exposure to the chemical contaminants (Ordonez and Barrett, 2012). For additional information about this case, refer to the Agency for Toxic Substances Disease Registry (2013); *The Few, The Proud, The Forgotten* (2012); and Williams (2012).

Most illnesses in western society are viewed through a unique dominant epidemiological paradigm which involves a specific set of beliefs and practices about a disease, its causation and treatment that are embedded in science, government and public life (Brown, 2007: 18). The dominant epidemiological paradigm is directly influenced by the biomedical model of disease which focuses on anatomy and physiology, and causes of disease at the cellular, hormonal and genetic levels (Rosser, 2000). This paradigm is characterized by a “hegemonic outlook on disease that emphasizes individual behavioural factors rather than environmental and social factors as keys to disease prevention” (Brown, 2007: 21). The dominant epidemiological paradigm places the onus of responsibility strictly on the individual and does not acknowledge other determinants of health. The dominant epidemiological paradigm involved in studying breast cancer is

Another case of groundwater contaminated by trichloroethylene occurred in Shannon, Quebec which is located close to and shares an aquifer with a military base. CFB Valcartier used trichloroethylene as an industrial solvent prior to 1980. The trichloroethylene was then stored in human-made open lagoons to allow the substance to evaporate. However, the trichloroethylene leached through the lagoons and contaminated the aquifer and private wells in Shannon. Base officials became aware of the contamination in 1997, but residents of Shannon were not formally informed at this time by the Department of National Defense. Water samples from a private well in 2000 found that trichloroethylene levels were 200 times higher than acceptable levels. Emergency measures were ordered at this time by Quebec Public Health Officials including drinking only bottled water and showering with open windows (CBC Fifth Estate, 2007; Stephen, 2009). It is suggested that the contamination of the water resulted in an increased incidence of cancer in Shannon with as many as 500 cases (CBC, 2009). A class action lawsuit was filed in 2003 against the Government of Canada and the Department of National Defense representing 3,500 residents of Shannon. The lawsuit claims that the government knew about the exposure of residents to trichloroethylene and that they drank the contaminated water for 22 years (CBC, 2009, 2011a, 2011b). *Spieser v. Canada* began in 2011 and took place over 115 days with 74 witnesses including 23 experts in the fields of hydrogeology, toxicology, epidemiology, and oncology. The Honourable Justice Bernard Godbout found that the plaintiff did not meet the burden of proof regarding causation of health outcomes and did not order punitive damages (Gagné and Mosian, 2012). However, compensatory damages were awarded in the amount of \$12,000 per person for the “fears, worries, troubles and nuisances associated with the fact of having lost a source of drinking water in such circumstances” (Gagné and Mosian, 2012). The Quebec City Regional Public Health Agency has recently hired eight international experts to examine the 500 cases of cancer. “The expected rate for brain cancer is one in every 20,000. With a population of 5000[,] Shannon had 20 brain-cancer cases. That’s 80 times the normal expected rate” (Séguin, 2013). Residents hope to use the findings of this study when the case goes to the Quebec Court of Appeal in 2014 (CBC, 2013a, Séguin, 2013).

based on a biomedical model of disease and attributes causation to individual-level factors, including diet, exercise, age at first parity, and genetics (Brown, 2007; Nash, 2006). This approach places an emphasis on individual-level approaches to prevention, detection and treatment including changes in lifestyle such as diet, utilization of mammographic technology to detect tumours, and treatment options which include surgery, radiation and chemotherapy. The dominant epidemiological paradigm is utilized by the biomedical community and the mainstream breast cancer movement and it frames breast cancer as a preventable disease by placing the onus of responsibility on the individual in terms of managing personal risk factors and behaviours, and downplaying social, structural, political, economic, and environmental factors that influence the disease (Zavestoski et al., 2004; Orsini, 2007).

There are multiple symbolic meanings associated with women's breasts in Western society, including representations of sexual pleasure and desire, nurturing and motherhood. Women's breasts are also now associated with ideas about danger and risk: the "risk of disease, risk of defeminisation, risk of deformity, [and] risk of death" (Klawiter, 2008a: xx). A special issue of the *Canadian Cancer Statistics* report provides a discussion of the risk factors associated with the development of breast cancer which can be categorized as modifiable or non-modifiable. Non-modifiable characteristics include reproductive and hormonal factors, and heredity associated with a family history of the disease and genetic mutations (CCS and NCIC, 2007; PHAC, 2009, 2012). A woman's lifetime exposure to estrogen is tied to her risk of developing breast cancer. For instance, early menstruation beginning at age eleven or younger and late menopause increases the

number of years the breast tissue is exposed to estrogen. As estrogen levels are lowered during pregnancy and breast feeding, full-term pregnancies before the age of twenty are thought to lower a woman's risk of developing breast cancer, whereas pregnancies after the age of thirty-five or never becoming pregnant are linked to an increased risk (National Cancer Institute, 2011). An estimated five to ten percent of breast cancer diagnoses involve a specific genetic and hereditary component such as the "breast cancer genes," BRCA₁ and BRCA₂ which were discovered during the 1990s (CCS and NCIC, 2007). Other non-modifiable biological risk factors include high breast density which is associated with a higher risk of breast cancer, and previous breast conditions with biopsies showing abnormal cells (PHAC, 2009, 2012).

Modifiable risk factors associated with the development of breast cancer include lifestyle and behavioural risk factors. The predominant view of cancer prevention focuses "almost exclusively on individual lifestyle changes" (Chernomas and Donner, 2004: 4). This view is promoted by Health Canada, the Public Health Agency of Canada, and mainstream cancer and breast cancer organizations including the Canadian Cancer Society, the Canadian Breast Cancer Foundation, the Breast Cancer Society of Canada, and the Canadian Breast Cancer Network (BCSC, 2013b, 2013c; Canadian Cancer Society, 2008, 2013a; CBCF, 2012a, 2012b; CBCN, 2013a; Health Canada, 2012a, PHAC, 2009, 2012). The "risky behaviours" include using tobacco, consuming alcohol, not engaging in physical activity, exposure to the sun, and a diet high in fat, red meat, sugar, and processed foods. The Canadian Cancer Society and the National Cancer

Institute of Canada (2007: 74) conclude that the best opportunities for primary prevention and reducing the risk of developing breast cancer are

eating a healthy diet and being physically active throughout life (thereby maintaining a healthy body weight), minimizing alcohol consumption and avoiding nonessential hormones. Regular participation in high quality screening programs will further lower the breast cancer burden by reducing mortality and improving prognosis.

This official narrative rarely concedes that the modifiable “lifestyle” factors account for only a fraction of breast cancer incidence. Even the *Canadian Cancer Statistics* report, which acknowledges this, places the onus of responsibility solely on the individual with its emphasis on personal behaviours (CCS and NCIC, 2007).

There is a long history which focuses on the role of lifestyle and personal behaviours in health outcomes. The individualization of health and illness has resulted in a “responsibilization paradigm” (Orsini, 2007: 349). This ideology places the onus of responsibility on the individual and suggests that the risk factors for health are controllable if one makes the appropriate lifestyle choices. If one does not behave accordingly or if one does and still becomes ill, there are elements of blame placed on the individual. The responsibilization paradigm places the individual at the centre of disease prevention where “cancer prevention is depoliticised and reduced to behaviour modification” (Brophy, 2004: 60).

The mainstay of breast cancer prevention remains early detection and treatment (Shah, 2003: 221). However, measures of detection and prevention are often conflated in the discourse surrounding breast cancer. In the United Kingdom, United States and Canada, public health policy has a very clear policy promoting detection over primary

prevention (Potts, 2004a). McCormick et al. (2003: 550) note that the American Cancer Society and the National Cancer Institute have a long history arguing that “mammography is the best form of prevention.” The Canadian Task Force on Preventive Health Care³ provides recommendations around clinical breast exams and mammography for women aged forty to seventy-four who are at an average risk of developing breast cancer, but do not apply to women who are at an increased risk with a personal history of the disease, known BRCA₁ or BRCA₂ mutations, prior chest wall radiation, or a history of the disease in a first degree relative. Recommendations are not made for women over seventy-five due to a lack of data (Canadian Task Force on Preventive Health Care, 2013b). Prior to a 2011 update on screening guidelines, the Task Force recommended annual screening with a clinical breast exam and mammography for women aged fifty to sixty-nine. Women aged forty to forty-nine were encouraged to receive counselling in order to make their decision around the potential benefits and risks associated with mammographic screening and the age at which they wish to begin testing (Shah, 2003: 221).

Recent evidence has shown that there is sufficient evidence to exclude the routine teaching of breast self examination (BSE) for the periodic health examination of women aged 40 to 69, and there is insufficient evidence to evaluate its effectiveness in women younger than 40 and older than 70 (Shah, 2003: 222).

³ The Canadian Task Force on Preventive Health Care is an independent body which consists of fourteen primary care and prevention experts who promote the need for evidence-informed preventive activities in primary care in Canada. The Task Force develops and disseminates practice guidelines for primary and preventive care based on systematic analyses of scientific evidence (Canadian Task Force on Preventive Health Care, 2013a).

The most recent screening guidelines from 2011 recommend routine screening with mammography every two to three years for women aged fifty to sixty-nine and aged seventy to seventy-four. Women aged forty to forty-nine are no longer recommended to engage with routine mammographic screening (Canadian Task Force on Preventive Health Care, 2013b). This new recommendation⁴ is based on evidence of false positive test results being higher in this age group which may have “undesirable consequences” and “lead to further investigation, including other unnecessary procedures such as breast removal” (Canadian Task Force on Preventive Health Care, 2013a, 2013b). Breast cancer organizations promote mammography as part of “preventive health care” (CBCF, 2012c). The Breast Cancer Society of Canada (2013a) promotes early detection as a means of prevention, including breast self-exams, clinical breast exams and mammography. However, as advocates note, once a tumour has been detected, prevention has ultimately failed.

The established risk factors such as a family history account for less than half of diagnosed cases (Gray, 2010; Parkin et al., 2011). Breast cancer is a multifactorial disease caused by a combination of hormonal, genetic, lifestyle, and environmental factors (Gray, 2010). It is argued that a truly primary prevention focused approach would involve attempting to prevent the disease before it develops. Primary prevention may be broadly defined as “the protection of health by personal and community-wide efforts...[which] consist of measures aimed at preventing the inception of a pathological

⁴ The Canadian Task Force on Preventive Health Care will provide an updated report of recommendations around prevention and screening practices within five years of the 2011 guidelines (Canadian Task Force on Preventive Health Care, 2013b).

process or the occurrence of disease” (Tomatis and Huff, 2001: 458). A primary prevention approach to a multi-factorial disease such as breast cancer would “aim to reduce and eliminate as far as possible, human exposures to all substances or agents that are known to be, or suspected of being, implicated in the disease process” (UK Working Group on the Primary Prevention of Breast Cancer, 2005: 10). A primary prevention focus towards environmental health outcomes as a result of exposure to toxic substances has been historically underrepresented in public health policy and legislation.

A woman’s risk of developing breast cancer may be increased by exposure to mammary carcinogens and exogenous estrogenic compounds. Brophy et al. (2012: 2) describe the endocrine disruptor theory which contends that “the timing of exposure is important to varying susceptibility, particularly during critical periods of breast development when breast tissue is less differentiated, but also predicts that effects may occur at low doses.” Exogenous exposures may include use of hormone replacement therapy and oral contraceptives, but also includes exposure to environmental contaminants. Exposure to endocrine disrupting chemicals may play a particular role during key periods of development or “windows of susceptibility” including the prenatal period, childhood, puberty, menstruation, pregnancy, and menopause (Birnbaum, 2009; Brophy et al., 2012; Cooper et al., 2000; Diamanti et al., 2009; Gray, 2010; Schug et al., 2011; and Schwarzman and Janssen, 2010).⁵

⁵ It should also be noted that the endocrine disrupter discourse contains aspects of heteronormativity. “It seems that the horror associated with the theory of ‘feminisation’ as a manifestation of underlying endocrine disruption must be tied to its potential for completely disrupting the ‘heterosexual matrix’” (Scott, 2009a). Di Chiro (2010: 201) explores how heteronormativity is found within the anti-toxics discourse and rhetoric. Exposure to toxic substances results in undermining or distorting the “natural” including biologies, ecologies, bodies, and reproductive processes. She suggests that this has resulted in a

In the United States, the President’s Cancer Panel produced a report in 2009 that calls for reducing the risk of developing cancer associated with the widespread and ubiquitous exposure to toxic substances. The Panel was “particularly concerned to find that the true burden of environmentally induced cancer has been grossly underestimated” (Daghofer, 2010; Reuben, 2010: 5). Director of the Science and Environmental Health Network, Dr. Ted Schettler described the report as an “integrated and comprehensive critique” and suggested that the Panel “underscored that regulatory agencies should reduce exposures even when absolute proof of harm was unavailable,” drawing on the precautionary principle (Cone, 2010).

The Interagency Breast Cancer and Environmental Research Coordinating Committee⁶ published a report in 2013 that calls for making prevention the key to reducing the burden of breast cancer. This report recognizes environmental contaminants, as well traditional risk factors for breast cancer including lifestyle and behavioural factors and other social determinants of health (IBCERCC, 2013). Jeanne Rizzo, co-chair of the Committee and President and CEO of the Breast Cancer Fund, states that the report demonstrates that research and programs “focused on preventing breast cancer need as much attention as treatment and a cure” (Goldman, 2013). Rizzo notes that

[w]e’re extending life with breast cancer, making it a chronic disease, but we’re not preventing it. We have to take a look at early life exposures, in utero,

“sex panic” in which heterosexist and queerphobic arguments reinforce “what and who are constructed as normal and natural” (Di Chiro, 2010: 202). For an in-depth exploration of queer ecologies, refer to *Queer Ecologies: Sex, Nature, Politics, Desire*, edited by Mortimer-Sandilands and Erickson (2010).

⁶ The Interagency Breast Cancer and Environmental Research Coordinating Committee was established by the United States Secretary of Health and Human Services after Congress passed the *Breast Cancer and Environmental Research Act* in October 2008. The Committee consisted of federal and non-federal representatives (NIEHS, 2013a).

childhood, puberty, pregnancy and lactation. Those are the periods when you get set up for breast cancer. How does a pregnant woman protect her child? How do we create policy so that she doesn't have to be a toxicologist when she goes shopping? (Grady, 2013).

The Committee found that identifying and mitigating the environmental causes of breast cancer is the key to reducing the number of new cases and recommends a breast cancer prevention strategy to prioritize and increase government funding in breast cancer prevention (Forman, 2013; IBCERCC, 2013; Rizzo, 2013). "Prevention requires we close the knowledge-to-action gap and translate science into preventive public health actions that can impact breast cancer incidence in the future" (Rizzo, 2013).

Canadian Environmental Law, Policy and Practice

Health Canada and Environment Canada are jointly responsible for the risk assessment and management associated with toxic substances. The first *Canadian Environmental Protection Act* in 1988 included two broad categories of substances. The first was the 28,000 "existing substances" that were manufactured, imported or in commercial use in Canada between January 1, 1984 and December 31, 1986. The majority of these substances had not been evaluated for potential detrimental effects on human health and the environment and were placed on the so-called Domestic Substances List. The second category included substances which were new to Canadian society and commerce and were not part of the Domestic Substances List. It was required that an assessment be conducted on all new substances for their potential impact on human health and the environment before their introduction to the Canadian market. One of the guiding principles of the original *Canadian Environmental Protection Act, 1988* was the "management of pollution" (House of Commons Standing Committee on Environment

and Sustainable Development, 1995). However, there was a shift in focus in the *Canadian Environmental Protection Act, 1999* in which “pollution prevention” became the cornerstone in order to achieve the highest level of environmental quality for the health of Canadian citizens (Environment Canada, 2010a). Section 73 of the revised Act required that all existing substances on the Domestic Substances List be categorized according to which substances presented the greatest potential for exposure for individuals in Canada, and which were considered persistent, bioaccumulative and ‘inherently toxic’ to human beings or nonhuman organisms. The categorization of the Domestic Substances List was completed between 2000 and 2006 and the results determined that 4,300 of the 23,000 substances examined were classified as priorities for further action. The newly implemented *Chemicals Management Plan* identified five hundred chemicals classified as the highest priorities for immediate action (Health Canada, 2010a: 33). The *Chemicals Management Plan* is designed to assess and manage the risk of all chemical substances categorized as potentially harmful to human health or the environment under the *Canadian Environmental Protection Act* by 2020.

Analyzing the *Canadian Environmental Protection Act* and the *Chemicals Management Plan* from a primary prevention perspective has allowed me to tie together my interests in women’s health, risk and disease prevention. It is suggested that the traditional focus of Canadian health policy has been on health care policy with an emphasis on the treatment of diseases and injuries, rather than on disease prevention. As others have noted, “[t]here is clear recognition that we need to move from a system focused predominantly on health care to one more oriented to improved health status”

(Miller Chenier, 2002: 13). My research is aligned with the argument that comprehensive preventive health policy has the potential to contribute to efforts in disease control and population health outcomes.

Research Design and Methodology

This research utilizes a population health approach framing breast cancer with a primary prevention perspective and as a disease influenced by social conditions (Chernomas and Donner, 2004). The nature of critical analysis of social problems requires an interdisciplinary approach and I draw upon theory and methods utilized in sociology and social anthropology, health, gender studies, and environmental studies. Policy analysis may be considered to be an “applied social science discipline which uses multiple methods of inquiry and arguments to produce and transform policy-relevant information that may be utilized in political settings to resolve policy problems” (Dunn, 1981: 35; Fischer, 2003: 1).

The primary data sources for this research are documents related to Canada’s regulatory regime for toxic substances. I draw upon government publications, grey literature and media coverage in analyzing environmental law, policy and practice with a particular focus on the *Canadian Environmental Protection Act* and the *Chemicals Management Plan*. My goal in this research is to determine not only what policies exist, but also to examine how the issues are communicated and understood, who the policies are designed to protect, and where the burden for assuming risk is presumed to lie. I question whether the policies capture the need for prevention and action related to protecting women’s health, whether the precautionary principle is implemented, and if

they enact primary prevention in approaches to women's health. I explore whether issues of sex and gender are accounted for in the legislation and policies which is of particular relevance in issues related to women's health outcomes. I investigate issues which are contested in nature including environmental links to disease and the debate surrounding exposure-based approaches and hazard-based approaches to risk assessment. I also examine the shifting and contested concept of toxicity which I follow from its inception to its current form under the regulatory regime. During the research process, I seek to identify gaps in the law, policy and practice which do not adequately protect women's health.

The sources of qualitative data for this research include documents from the Canadian federal government; environmental, women's health, cancer, and breast cancer organizations including mainstream organizations and members of the environmental breast cancer social movement; and relevant media coverage. The data sources include:

Government Publications: Website searches include all documents related to breast cancer and all other relevant documents from Environment Canada, Health Canada, the Government of Canada and the *Canada Gazette* (1988-2012) related to the *Canadian Environmental Protection Act* and *Chemicals Management Plan*. Additional documents related to environmental health, cancer, breast cancer, human biomonitoring, public health policy, health impact assessments, environmental assessments and health, toxic substances, environmental contaminants, exposure and human health, as well as initiatives such as the Canadian Partnership for Tomorrow Project (a pan-Canadian project to learn more about causes of cancer and other chronic diseases) and Cancer 2020 (an action plan for cancer prevention and detection) are included. Any documents that could not be obtained directly from government websites, archives, university or public libraries were requested in electronic format or hard copy.

Grey Literature: Grey literature searches include websites of organizations including but not limited to the Atlantic Centre of Excellence for Women's Health, Breast Cancer Action, Breast Cancer Action Montreal, the Breast Cancer Society of Canada, the Breast Cancer Fund, the British Columbia Centre of Excellence for Women's Health, the Canadian Breast Cancer Foundation, the Canadian Breast Cancer Network, the Canadian

Cancer Society, the Canadian Environmental Network, the Canadian Environmental Law Association, the Canadian Network for Human Health and the Environment, the Canadian Women's Health Network, the Centre for Environmental Health Equity, the David Suzuki Foundation, Ecojustice, Environmental Defence, the Environmental Working Group, FemmeToxic, the National Network on Environments and Women's Health, the Prairie Women's Health Centre of Excellence, Prevent Cancer Now, the Quebec Women's Health Action Network, Women and Health Care Reform, Women and Health Protection, and the Women's Healthy Environments Network. Any documents that could not be obtained directly from websites of organizations were requested in electronic format or hard copy. Search terms included but were not limited to: [Canadian Environmental Protection Act], [CEPA], [Chemicals Management Plan], [CMP], [environment and health], [environment], [toxic], [toxic substances], [breast cancer], [breast cancer and environment], [disease prevention], and [prevention].

Media Coverage: Media coverage for this research includes coverage from 1988-2012 in Canadian national newspaper *The Globe and Mail* and the *CBC News Archives* using York University newspaper search engines (Canadian Newsstand and Factiva). Search terms included but were not limited to: [Canadian Environmental Protection Act], [CEPA], [Chemicals Management Plan], [CMP], [environment and health], [breast cancer], [environment and breast cancer], [toxic], and [toxic substances]. Other relevant news media coverage emerged from the *Toronto Star*, *CTV News*, the *Huffington Post*, the *New York Times*, as well as other news sources up to July 2013.

These policy documents were examined and analyzed through multiple readings of the texts and interpretive policy analysis. Interpretive approaches to policy analysis consider both *what* specific policies mean and *how* the policies work by exploring the processes through which meanings of policy are communicated and questioning who the intended audiences are. This process also questions what context-specific meanings are embedded in relevant policy documents which include symbolic language, objects and actions (Salter, forthcoming; Yanow, 1996, 2000: 8).

In conducting interpretive policy analysis, it is necessary to identify groups of policy documents and stakeholders in order to determine how a policy and policy process are understood. A question of central importance and consideration is how the policy issue is being framed by the various parties to the debate. Policy frames may be

expressed through language in order to shape perceptions and understandings. In this case, frames are used to create a framework in which to interpret policy-related documents. Frames may be used to direct attention towards some elements while also specifically diverting attention from other elements (Yanow, 2000: 11-12). It is necessary to “map the ‘architecture’ of debate relative to the policy issue under investigation, by identifying the language and its entailments (understandings, actions, meanings) used by different communities in their framing of the issue” (Yanow, 2000: 12-13). This process is of particular relevance in order to understand the varying perspectives involved in this research. Different groups of policy actors frame the issues in distinct ways related to issues of risk, exposure to toxic substances, and health outcomes including breast cancer.

My method involves four specific steps in conducting interpretive policy analysis. The first step involves identifying the policy documents that hold significant meaning for policy-relevant actors, stakeholders and interpretive communities for a given policy issue. These documents include but were not limited to the *Environmental Contaminants Act*, the Lalonde Report, the *Canadian Environmental Protection Act, 1988 and 1999* and its review processes, the *Chemicals Management Plan* and other documents related to public health, breast cancer, risk, and toxic substances. The second step involves identifying the communities relevant to the policy issue that create or interpret the policy documents and meanings. The relevant communities in this research include but are not limited to the Government of Canada, Environment Canada, Health Canada, stakeholders in the review process of the *Canadian Environmental Protection Act*, and women’s health, cancer and breast cancer organizations. It is possible to have multiple interpretive communities and

multiple interpretations of policy documents and the first two steps may be conducted concurrently as the policy documents and interpretive communities are intricately linked and each step leads back to each other (Yanow, 2000: 20). The third step in this process in continuing to analyze the policy documents involves the identification of the discourses utilized by the various interpretive communities in order to determine the meanings that are considered to be important. Finally, the fourth step involves identifying the meanings that are in conflict between or among interpretive communities and their conceptual sources. This process has the potential to demonstrate the implications of different meanings and interpretations for policy formulation and outcomes (Fischer, 2003; Yanow, 2000: 20). Building on these steps, additional questions that I asked throughout the interpretive analysis process include:

- Who are the subjects and what are the objects? What are the relationships between them?
- What information is present in the documents? What information is absent in the documents?
- Who made the decisions about what information is included or excluded in the documents?
- Who produced the documents? What is the nature of their role and relationship in the context of the document and the broader policy context?
- How was the document produced? What are the processes and who are the people involved?
- How is the information related to the broader policy context? (Ginger, 2006: 346-47).

The process and questions involved in conducting interpretive policy analysis allows for engaging with the policy documents in order to determine whether Canadian law, policy

and practice is inherently precautionary and enacts a primary prevention approach to women's health.

Overview of the Dissertation

This research will provide important policy lessons in its examination of Canadian law, policy and practice, with an explicit focus on primary prevention which is supported by current research linking breast cancer and toxic substances. The research results will be of interest to those studying environmental health, as well as to the policy sector and non-governmental organizations. It contributes to the larger body of breast cancer research with analysis and discussion around the issues of gender, risk and precaution by examining the impact of policy on disease prevention and its implication for the health of women across Canada.

This chapter provided an introduction to the overall context within which the research is situated including issues of risk, responsibility and precaution related to breast cancer. Chapter two provides a literature review which draws upon concepts, methods and theories which are situated in interdisciplinary but related fields including environmental studies, sociology, medical anthropology, health, and gender studies. It provides the theoretical underpinning and framework for this dissertation research in three substantive areas including i) sex- and gender-based analysis, ii) social movement theory and health social movements, and iii) risk and the risk society. Sex- and gender-based analysis has emerged as an important methodology in conducting health research. This chapter provides an overview of sex- and gender-based analysis and this lens is applied throughout the dissertation research. The chapter then introduces traditional

social movement theory in order to position more recent health social movement theory and its relationship to the multi-faceted and diverse breast cancer social movement. The history of breast cancer includes two specific disease regimes -- the regime of medicalization which began in the 1900s and the regime of biomedicalization which emerged in the 1970s and 1980s -- in which the disease is medically managed in individual bodies and publicly administered across populations. The role of biosociality played a significant role in the formation of shared experiences among patients and the creation of a breast cancer social movement through engagement with the practices of science, public health and medicine which enabled the formation of shared experiences among patients and the creation of a breast cancer social movement (Klawiter, 2008).⁷ The nature of breast cancer calls for examining questions and constructions of risk related to the development of the disease and everyday exposures to toxic substances. These questions of risk are engaged with by exploring Beck's (1992) theory of the risk society which views contemporary risks as unique hazards which are created and managed through social, cultural and political factors. The risk society perspective is augmented with considerations from environmental justice literature in order to provide the overarching framework for the dissertation as it connects issues of risk, toxic substances and environmental health.

Chapter three offers an overview of the evolution of legislation and public health policy which were designed to protect Canadian citizens from exposure to toxic

⁷ While it would have been interesting to explore the way that the regulatory regime, perhaps even its failures, have enabled the formation of the breast social movement and the environmental breast cancer movement specifically, it is beyond the scope of this dissertation.

substances. It draws upon legislation, government publications and grey literature in order to provide a descriptive history of Canadian policy from the 1970s when environmental issues were emerging as widespread concerns to the present. The chapter begins with the influential Lalonde Report, *A New Perspective on the Health of Canadians* which provided a new approach for addressing health outcomes. It then presents the first environmental legislation, the *Environmental Contaminants Act* and the introduction of the *Canadian Environmental Protection Act, 1988*. The revised *Canadian Environmental Protection Act* was implemented in 1999. The Act was promoted as reflecting a shift in the regulatory approach from pollution management to pollution prevention and it is still the primary piece of legislation which governs environmental protection in Canada. Finally, the chapter presents the *Chemicals Management Plan* which was introduced in 2006 and is the most recent tool for the assessment and management of risks associated with toxic substances. The review of environmental health policy presented in this chapter is necessary in order for the more in-depth and critical analysis which follows in chapters four and five.

Chapters four and five examine the relationship between theory and practice in Canadian law, policy and practice and the potential for protecting women's health. Chapter four examines the history of the concept of "toxicity" in Canadian legislation, how it has evolved and its contested nature. The assessment of toxicity is grounded in the current risk assessment processes which are based in toxicology, and rely on exposure estimates and an inherent assumption of threshold effects. The chapter provides a brief overview of the siloxane D5 case which raises important questions about the regulation

of toxic substances, the contested nature of risk and toxicity, and the influence of socioeconomic interests. It then introduces the concept of the precautionary principle, along with a growing concern about the effects of endocrine disrupting chemicals, and questions whether the precautionary principle is implemented in risk management processes. The chapter concludes by examining the debate between exposure-based and hazard-based risk assessments which is central to the evaluation of whether Canadian law, policy and practice is enacting a primary prevention approach related to women's health.

Chapter five draws upon government publications, grey literature and media coverage in order to explore questions and tensions around risk, precaution and prevention. It begins with a discussion of the role and implementation of sex- and gender-based analysis in Canadian health policy. The chapter then poses a series of questions in order to explore issues of risk and responsibility. Where is the burden of risk in preventing health outcomes presumed to lie? The responsabilization trend and the practices of precautionary consumption both fit comfortably into the dominant epidemiological paradigm of breast cancer. Both place the onus of responsibility for risk and disease prevention on the individual. These dynamics are explored in-depth. Who is at risk and who are the policies designed to protect? The *Canadian Environmental Protection Act, 1999* does not specifically address any populations of concern. While children are identified as a population of concern by Health Canada, women are not viewed as an at-risk or susceptible population of concern under the legislation and policy. While bisphenol A (BPA) has been regulated in baby bottles in Canada, this regulation is

explored and critiqued. Occupational exposures to toxic substances including BPA are considered, as well as the challenges related to issues of accountability and compensation. It examines the messaging and campaigns around breast cancer by women's health and cancer organizations including the mainstream Canadian organizations and members of the environmental breast cancer movement. It concludes by discussing the impact of broad federal funding cuts on citizen participation in legislation and policy, and organizations which conducted critical, feminist research, policy and advocacy work.

Finally, chapter six calls for a paradigm shift from a reactionary to a preventative approach to health policy. It concludes that the Canadian regulatory regime is not truly precautionary and does not enact a primary prevention approach. The chapter addresses the specific gaps in the law, policy and practice that would need to be addressed in order to truly protect women's health from detrimental health outcomes such as breast cancer.

Chapter 2

Literature Review: Situating Interdisciplinary Research

Introduction⁸

The nature of environmental health research is necessarily interdisciplinary. As Moss and Teghtsoonian (2008: 3) suggest, “we are witnessing important changes in, and vigorous debates about, the ways in which people in the industrialized West understand and experience illness” in the twenty-first century. In order to understand the complex issues involved in this field, it is necessary to draw upon concepts, methods and theories situated in related literatures including environmental studies, sociology, medical anthropology, health, and gender studies. This chapter will provide the theoretical underpinning and framework for the research. The chapter begins with an introduction to sex- and gender-based analysis and the importance of applying this lens in health research and policy analysis which is reflected throughout the dissertation. The chapter then introduces traditional social movement theory in order to situate the emergence of contemporary health social movements with a specific focus on breast cancer. It investigates the history of breast cancer as a disease and the emergence of the distinct factions of the breast cancer social movement which have different understandings and engagements with issues related to gender, race, class, and sexuality, and varying relationships to science, biomedicine and cause-related marketing. Finally, the chapter

⁸ Please note that sections of this chapter were previously published and are reproduced here in revised form with slight modifications. See Sweeney, E. (2012a). “Tracing the Role of Gender in the History of Breast Cancer Social Movements.” *Women’s Health and Urban Life*, 11(1); and Killoran-McKibbin, S. and E. Sweeney. “Selling Pink: Feminizing the Non-Profit Industrial Complex Through Ribbons and LemonAid” which is under review in a *Women’s Studies* journal.

explores Beck's (1992) theory of the risk society which provides an overarching framework for the dissertation by engaging with issues of risk, exposure to toxic substances, environmental health, and the risk a woman has of developing breast cancer. In this chapter, there is a call for a paradigm shift from the dominant epidemiological paradigm of breast cancer to the promotion of primary prevention within public health, regulation and policy which is grounded in the environmental breast cancer movement.

Sex- and Gender-Based Analysis

Greaves (2009) notes that gender was first introduced into health research by social philosophers and social scientists. Since then it has become an important consideration in health research, policy, programming, and service development, particularly as the health determinants model gains more widespread acceptance and support, and gender has been identified as a key determinant.⁹ The analysis of sex and gender in health research has emerged as an increasingly important methodology which

⁹ The history of health determinants in Canada influenced both the direction of research about population health and the development of government policies designed to improve health. The Lalonde Report which is discussed in detail in Chapter 3 is cited as the first stage of health promotion in Canada and was founded upon the health field concept (Glouberman and Millar, 2003; Lalonde, 1974). Different health organizations and researchers identify various determinants which have a direct impact on the health status of a given population (Benoit and Shumka, 2009). Health Canada first identified nine determinants of health in 1994 as part of a focus on population health and in response to the critique of health promotion strategies. The original nine determinants included income and social status; social support networks; education; employment and working conditions; physical environments; biology and genetic endowment; personal health practices and coping skills; healthy child development; and health services (Health Canada, 2002). The Public Health Agency of Canada (2011) utilizes twelve determinants of health including income and social status; social support networks; education and literacy; employment/working conditions; social environments; physical environments; personal health practices and coping skills; healthy child development; biological and genetic endowment; health services; gender; and culture. The World Health Organization (2011) promotes ten health determinants including income and social status; social support networks; education; economic environment; social environment; physical environment; personal individual characteristics and behaviour; genetics; health services; and gender. In Dennis Raphael's most recent work, he offers fourteen determinants including income and income distribution; education; unemployment and job security; employment and working conditions; early childhood development; food insecurity; social exclusion; social safety networks; health services; Aboriginal status; gender; race; and disability (Raphael and Mikkohen, 2010).

necessitates the consideration of impacts on both men and women, as well as identifying the shortcomings which emerge as a result. The “integration of a sex- and gender-based analysis makes for better science and more inclusive policies” (Lewis, 2011: 5).

The foundation of sex- and gender-based analysis is the understanding that both biology *and* social experiences, and thus sex *and* gender, impact the health status of Canadian citizens. In order to conduct thoughtful and effective health research, it is necessary to clarify the concepts behind sex and gender. Sex typically refers to biological and genetic characteristics which are manifested in one’s anatomy, physiology and hormones. Sex includes the “specific capacities of our bodies, and affects the propensity and trajectory of diseases and health conditions” (Greaves, 2009: 3). While sex plays an important role in reproductive health, there are also important considerations in terms of male and female bodies differing in their susceptibility to disease and differing in reactions to substances including alcohol, tobacco, over-the-counter, prescription or illegal drugs because of differences in metabolism, blood chemistry and body fat composition (Batt, 2007; Clow et al., 2009). For example, women may be at higher risk for health issues related to exposure to environmental contaminants which tend to concentrate in body fat and are often related to estrogen receptors, and women tend to have a higher ratio of body fat and estrogen levels than men (Assembly of First Nations Environmental Stewardship Unit, 2009; Clow et al., 2009; Nickerson, 2006; Women’s College Hospital, 2013). It is important to ask questions about levels of susceptibility, body size or sex-linked differences which raises additional issues related to sex-specific variations in disease, health and illness (Clow et al., 2009: 11).

Gender should not be confused or conflated with sex as it is a social construct that “extends beyond the boundaries of biologically defined categories of sex” (Benoit and Shumka, 2009: 7). Gender includes the social, cultural and economic factors that influence the socially constructed roles and relationships, personality traits, attitudes, behaviours, values, and influence that a particular society assigns to women, men and other gender groups such as transgendered and two spirited persons (Clow et al., 2009: 11; Greaves, 2009: 3). The consideration of gender in health research is especially critical as it can “determine different exposures to certain risks, different treatment-seeking patterns, or differential impacts of social and economic determinants of health” (Hankivsky, 2007a: 155). Matters related to gender are relevant in every society and affect every population and individual. As sex has been treated as having two distinct categories of male or female, traditionally gender has also been treated in this manner in categories of masculinity or femininity. However, this binary is inadequate and does not account for a continuum of characteristics and behaviours. There are also people who do not identify as male or female or reject those categories entirely (Clow et al., 2009: 12).

Clow et al. (2009: 12-14) and Johnson et al. (2009) offer four specific dimensions of gender including gender identity, gender roles, gender relations, and institutionalized gender which may have an impact on the health outcomes of a given population.

- *Gender identity* involves one’s sense of being a “woman” or a “man” and is developed within the prescriptions related to the “appropriate expression” of gender for the biological sex (Clow et al., 2009; Johnson et al., 2009). It should be noted that in some instances or in some cultures, gender identity does not fall into dichotomous categories (Benoit and Shumka, 2009);
- *Gender roles* include the ways in which gender identities are expressed and the behavioural norms within societies which influence individuals’ actions,

expectations and experiences in their daily lives (Clow et al., 2009: 12; Johnson et al., 2009). Gender norms may shape the illness experience, as well as what health care issues are researched, what health care services are available, and the quality of patient care (Benoit and Shumka, 2009: 7);

- *Gender relations* involve interactions and how people are treated based on their ascribed gender. For instance, there is a stereotype that women need to be “protected” and this may affect the ways in which women experience illness and approaches to treatment¹⁰ (Clow et al., 2009: 13; Johnson et al., 2009); and
- *Institutionalized gender* involves the experiences, roles and relationships which are framed by social institutions such as the media, education, legal, and health care systems, and religious and political establishments. These institutions influence the social norms that “define, reproduce and often justify different expectations and opportunities” for women, men, girls, and boys, such as “social and family roles, job segregation, job limitations, dress codes, health practices, and differential access to resources such as money, food or political power” (Clow et al., 2009: 13; Johnson et al., 2009).

Clow et al. (2009) add the concepts of equity and diversity to sex and gender as key considerations in sex- and gender-based analysis. Equity refers to the inequalities and gender oppression that may result in detrimental health outcomes. Diversity concerns recognize that experiences with gender identity, gender roles, gender relations, and institutionalized gender are specific,

particular to a certain time and place, and social, cultural, economic and political situation...and because gender differences and inequalities in a particular place combine with the effects of other forms of social division such as class and ethnicity, not all women or all men experience gender-related health problems or issues in the same way (Clow et al., 2009: 14).

The four core concepts of sex, gender, equity, and diversity create a framework for exploring and understanding experiences of health and illness, and evaluating the extent

¹⁰ For an example of gender relations and health care, refer to the section on *The History of Breast Cancer and Disease Regimes* in this chapter for a discussion linking breast cancer and hysteria, as well as issues of informed consent with male physicians and husbands making treatment decisions on behalf of breast cancer patients.

to which a society's responses are "equal, fair, effective and efficient" (Clow et al., 2009: 16; Greaves, 2009).

Sex- and gender-based analysis involves more than understanding the differences or similarities *between* women and men, but also examines the differences *among* groups of women and men (Greaves 2009). A sex- and gender-based analysis also considers other determinants of health and explores how diversity within and between subgroups of women and men may affect health outcomes. Thus, the intersection of sex and gender are considered alongside issues of age, race, ethnicity, culture, geographic location, sexual orientation, and socioeconomic status (Tudiver, 2009).¹¹

A health determinants framework may be used from an empirical, theoretical or policy perspective and attempts to understand the myriad of "interrelated social, cultural, environmental and biological factors that affect the health of individuals and communities" (Benoit and Shumka, 2009: 1). A health determinants framework acknowledges the interaction between predisposing genetic and biological factors, and social and cultural influences that impact individual attitudes and behaviours to positively or negatively affect health. The purpose of this framework is not merely to understand how various factors individually affect the health of a population, but to also understand

¹¹ Importantly, sex- and gender-based analysis can allow for further analyses engaging questions of sexuality and sexual orientation. Sex, gender and sexuality intersect in numerous ways, impacting various populations differently. Research indicates higher incidence rates of breast cancer among certain groups who are differentially affected by the intersection of sex, gender and sexuality. For instance, research suggests that lesbian women have increased rates of breast cancer, possibly as a result of reproductive factors such as being less likely to have given birth, or more likely to have done so later in life; or other factors such as body mass index and alcohol consumption; and barriers to screening and poor patient-provider communication within the healthcare system. For additional information, refer to Boehmer (2002), Brandenburg et al. (2007), Brown and Tracy (2008), Dribble et al. (2004), Kavanaugh-Lynch et al. (2002), and O'Hanlan et al. (2002).

why there are differences in health status and health outcomes and the influence of an unequal distribution of resources (Benoit and Shumka, 2009: 2).

The health determinants literature often fails to include sex and gender as determinants of health or includes one but not the other, though it should be noted that sex may also be viewed as a biological determinant which may be why some lists of social determinants of health do not include it. Sex and gender have often been conflated, used interchangeably and applied as one variable in health research rather than as constructs which cross-cut other variables in influencing health status (Benoit and Shumka, 2009; Tudiver, 2009). In their discussion about gender and determinants of health, Benoit and Shumka (2009: 5-6) note a systemic bias as a result of the historical health research that was based solely on the experiences of men and an inability to disentangle biological and social conditions which influence health outcomes. Thus, gender is now acknowledged as an important variable in policy analysis. Gender-based analysis requires “a solid knowledge of gender trends in society and the collection of information that furthers the understanding of the ways that gender interacts with policy, how policy may reinforce existing power structures based on gender, or how policy may reproduce gender inequalities (Hankivsky, 2007b: 114-15). Benoit and Shumka (2009: 11) offer a gender-inspired health determinants model which assigns equal importance of sex and gender to other fundamental health determinants. This model demonstrates causal connections between *fundamental macro-level determinants* including sex, gender,

socioeconomic status,¹² race, ethnicity, immigrant status, age, and geographic location; *access to key meso-level resources* such as employment status, education, childcare, safe neighbourhoods, and health services; *proximal micro-level determinants* such as smoking, diet and exercise; and *morbidity and mortality* as health outcomes. It is argued that sex- and gender-based analysis is essential for improving the health of Canadians in conducting health research and in the development and implementation of health programs and policies. Applying this lens is particularly relevant in research on women's health and is utilized throughout the dissertation.

Social Movement Theory

The history of breast cancer as a disease and the associated social movements must be examined in order to understand the influence of sociocultural, political, economic, and environmental factors. Women are often key actors in the mobilization around public health issues, including breast cancer (Williams et al., 1995). The tradition of hiddenness and invisibility with breast cancer led women to seek support from each other and to “form associations that could serve as the basis for organizing and taking action to improve treatment and to increase public awareness” (Schulzke, 2011: 43). The

¹² In addition to including sex and gender as fundamental determinants of health, this model recognizes how inequalities in health are associated with social class or socioeconomic status as measured by education, occupation and income which is consistent with discussions of the importance of socioeconomic status in Health Canada's *Health Policy Research Bulletins* (Health Canada, 2004a; 2005a; 2005b; 2007a; 2009a). This perspective considers a community's physical, social and public policy environments in relation to health status. Research demonstrates that health risks are not evenly distributed across the population but rather are disproportionately affecting those living with low socioeconomic status. Place can be thought of as a “geographic area where men, women, boys and girls all live in their diversity” (Health Canada, 2007a: 7). However, in order to properly analyze the complexities involved in the relationships between people, place and health, place ought to be viewed as more than simply geographical locations. Place may be conceptualized as “environments consisting of physical, cultural, political, economic and social components, with each component contributing in complex ways to the differential health risks experienced by a population” (Health Canada, 2007a: 8).

public awareness related to breast cancer as a disease along with a perception of susceptibility and risk act to mobilize support for collective action (Brown et al., 2002). Despite being organized around one specific disease, breast cancer is also one of the broadest of health social movements drawing from multiple influences and crossing institutional domains, disease regimes, fields of contention, and cultures of action (Klawiter, 2008a: 248).

Social movement theory provides a useful lens for examining breast cancer as a health social movement. Social movements have the potential to increase public awareness, provide political challenges towards government, issue scientific challenges to medicine and science and for changes in organizations such as health-related charities, and influence the distribution of power and authority among organizations within a movement (McCormick et al., 2003: 573). The success of a social movement hinges on the ability to strike a balance between the need to have the platform and priorities institutionalized so that broad and enduring changes can be made, and the need to remain flexible so as to generate the pressures necessary for adaptation. The movement's goals must be embraced by the prevailing power structure, but the movement must also maintain its ability to pressure and successfully influence governing institutions when new actions are required or more ambitious policies need to be pursued (Bryner, 2001).

This section will first provide a brief overview of traditional social movement theory before focusing on health social movement theory more specifically. I will examine the history of breast cancer as a disease which will be discussed in terms of disease regimes related to medicalization and biomedicalization (Klawiter, 2008a). The

groundwork for the breast cancer social movement began in the 1970s with public education work and the women's health movement, followed by HIV/AIDS activism in the 1980s which provided a new model for public impact on health policy, and the formation of national coalitions and significant lobbying efforts for increased research in the 1990s (Finley, 1995). Feminist, postcolonial and queer theories have pushed the boundaries of concepts such as woman, sex, and gender and highlight the importance of analyses in health that "contextualize women in their diverse social and economic circumstances and understand gender as inseparable from other forms of social difference such as race, ethnicity, culture, class, sexual orientation, gender identity and ability" (Morrow et al., 2007: 9). The three distinct cultures of action in the breast cancer social movement which emerged in the 1990s in the Bay Area of San Francisco are examined in depth (Klawiter, 2008a). The cultures of action and specifically the environmental breast cancer movement remain influential and provide important context for a primary prevention approach to the disease.

Traditional Social Movement Theory

Staggenborg (2007: 2) offers key questions to be considered in the study of social movements including why movements originate when they do, how they attract and maintain support, how they present issues and formulate strategies and tactics, how they structure organizations, how they change cultures, why they generate opposition and sometimes decline, and how and why they succeed or fail in achieving their objectives. Social movements are key agents for change in society. The development of the modern social movement was made possible by the development of the nation-state which is

noted as the most important and often only actor with the capacity to act on claims (Meyer, 2000: 39). Instances of change at the level of legislation and policy as a result of social movements may be rare, but changes more commonly occur that are local and cultural in nature. Social movements problematize the way in which we live our lives and call for changes in thought and action. Social movements are natural experiments in power, legitimation and democracy and the dynamics of social movements allow for the examination of the broader political structures of society (Crossley, 2002).

Tarrow (1994: 3-4) defines social movements as “collective challenges by people with common purposes and solidarity in sustained interaction with elites, opponents and authorities.” Social movement theorists make the distinction between social movement groups and other organized groups such as political parties and interest groups by regarding social movements as challengers that are outside of the established power structure, whereas political parties and interest groups may have some degree of access as insiders. A social movement community consists of networks of individuals, cultural groups, alternative institutions, institutional supporters, and political movement organizations. The interactions of social movements involve social movement participants, the target of the social movement, the public, and other actors relevant to a specific movement. Social movements are sustained through multiple campaigns or multiple episodes of collective action within a single campaign (Staggenborg, 2007: 5-6). While the most common denominator of social movements is interest, it is the participants’ recognition of their common interests that provides the potential for mobilization and collective action. It is by sustaining the collective action against

opponents that a contentious episode can become a social movement and it is the common purpose, collective identities, and an identifiable challenge that allows this process to occur (Tarrow, 1994).

Issues of collective identity play a key role in the development of social movements and in the experiences of participants. Collective identity involves an “individual’s cognitive, moral, and emotional connection with a broader community. It is a perception of a shared status or relation, which may be imagined rather than experienced directly, and it is distinct from personal identities, although it may form part of a personal identity” (Brown et al., 2004: 60). The collective identity may be embedded within a specific social movement organization, within the social movement itself, and within the solidarity group involved. It is expressed through styles of dress, language, demeanour, and discourse and is not static but rather the result of fluid processes (Boehmer, 2000). Social movements can demonstrate how experiential knowledge and expertise are integral to collective identities which are involved in social, legal and political claims made by a social movement (Orsini and Smith, 2010).

Meyer (2000: 39-41) notes four elements which distinguish social movements from other social and political phenomena. The first element involves social movements making claims on the state or another authority which is viewed as having the capacity to address the grievances of participants. The second element is the challenging of cultural codes and the transformation of the lives of participants which allows for the acknowledgement and utilization of experiential knowledge. Social movements use tactics including demonstrations, boycotts, pickets, civil disobedience, and political

violence, in addition to those offered and accepted by mainstream politics, such as public education campaigns. Finally, social movements involve a diverse range of organizations and individuals working towards the same general goals, though it is noted that the boundaries of a movement are fluid.

Traditional social movement scholars in Europe and North America have utilized a number of theoretical approaches which were developed independently of one another, with *collective behaviour*, *resource mobilization* and *political process theory* emerging in the United States and *new social movement theory* originating in Europe (Staggenborg, 2007). The social movement theory emerging from the United States was founded upon the idea that instances of collective behaviour were influenced by particular psychological and societal factors, and that rational actors were able to propel social movements by strategically mobilizing resources or political forms. In comparison, the traditional European social movement theory has more focus on the impact of socioeconomic structures, as well as with ideology and identity in terms of collective action (Dobrowolsky, 2008: 164). It has been noted that the efficacy of social movements only becomes apparent over time, through the challenging of cultural codes and conventions. Social movements suggest to the broader society that “alternative frameworks of meaning are possible and that the operational logic of power apparatuses is not the only possible ‘rationality’” (Epstein, 1998: 346).

Collective Behaviour Theory

Collective behaviour theory emerged in the United States and theorists claim that collective behaviour occurs during a period of social disruption as opposed to being part

of a standard political process (Crossley, 2002). While there are different approaches to collective behaviour theory, Staggenborg (2007) notes several commonalities. It is believed that instances of collective behaviour occur as a result of cultural or structural breakdown or strain, such as instances of rapid social change or a dramatic event. Instances of collective behaviour exist outside of institutionalized structures and there is an emphasis placed on the role of social psychology and shared beliefs and among participants (Staggenborg, 2007: 12).

The theory of mass society is based on Durkheimian theory and proposes that collective behaviour emerges as an extreme response to social isolation. The mass society exists within conditions in which there are few groups which link individuals to mainstream society such as religious or community organizations. It is suggested that individuals experience feelings of alienation and anxiety as a result of isolation from social and political institutions creating susceptibility for recruitment by social movements, such as the German Nazis. However, it has since been proven that it is not isolated individuals who are most likely to participate in social movements, but rather those who are already involved in social networks and organizations (Staggenborg, 2007: 14).

The Chicago School approach to collective behaviour was developed in the 1920s by American sociologists who studied symbolic interactionism which focused on how actors create meanings through social interaction. Proponents of the Chicago School approach contend that collective behaviour emerges when established systems of meaning and sources of information have broken down creating situations in which

participants create new meanings to guide behaviours. There is an emphasis on how participants act collectively and create new goals, culture and organizational structures in the form of social change (Staggenborg, 2007: 12-13). Another approach to collective behaviour includes Smelser's theory from 1962 which offers a model with six interrelated determinants, including conditions of structural conduciveness to encourage specific types of behaviour; structural strain which creates a sense of deprivation; the growth and spread of generalized belief which creates meaning for participants; precipitating factors related to the generalized belief which create a specific target for action; mobilization for action; and finally, acts of social control which may attempt to prevent the collective behaviour. Both the Chicago School approach and Smelser's theory have been critiqued for placing too much emphasis on structural strains on society, when "strains may be a fairly constant feature of societies and the rise of movements may be better explained by factors such as political opportunities, resources and organization" (Staggenborg, 2007: 13-14; Klawiter, 2008a).

Resource Mobilization and Political Process Theories

North American social movement theory began to move away from concerns of collective behaviour theory in the 1970s. The resource mobilization and political process theories found that the collective behaviour theories did not adequately account for the new wave of protests that emerged in the 1960s (Klawiter, 2008a). Whereas the collective behaviour theory focused on the motivations of individuals as a psychological phenomenon, the newer perspectives framed social movements as political phenomena where individual participants are viewed as rational actors with clearly defined goals and

motivation. According to this perspective, social movements “arise out of pre-existing organization, engaging in both institutionalized and non-institutionalized forms of action” (Staggenborg, 2007: 16). In addition to political movement organizations, it is argued that other types of mobilizing institutions are involved in the recruitment of participants, including formal and informal networks, groups and organizations (Staggenborg, 2007).

Resource mobilization theory emphasizes the importance of resources, organization and opportunities for collective action in the mobilization of social movements. The availability of resources is believed to be of great importance to the success of social movements in this approach. Resources include both tangible assets such as funding, as well as intangible resources such as the availability and level of commitment among participants. Resources used and created by social movements may include moral resources such as legitimacy; cultural resources including strategic knowledge; social-organizational resources including infrastructures, networks and organizational structures; human resources which includes both the labour and experience of activists; and material resources such as capital and office space (Staggenborg, 2007: 16). It is noted that these resources may not necessarily come from aggrieved groups who benefit from the social movement, but rather from conscience constituents who contribute to movements but do not personally benefit from the results of the movement (McCarthy and Zald, 1987). However, Melucci (1985: 197-98) suggests that the resource mobilization approach avoids a macro-level analysis and does not allow for the consideration of the “cultural orientation of the emerging social conflicts.”

The political process approach to social movement theory was advanced by Tilly, Zald, McAdam, McCarthy, and Tarrow. It was developed from resource mobilization theory and also influenced by new social movement theory from Europe (McCarthy and Zald, 1987; Smith, 2008; Tarrow, 1994). Political process theory identifies both opportunities and constraints related to the mobilization of social movements and the potential influence on the emergence and activities of social movements (Brown et al., 2004). This approach emphasizes the interactions of participants with the state and the role of political opportunities as occasions for collective action; social movements are most likely to occur when activists feel that conditions are favourable (Klawiter, 2008a; Smith, 2008; Staggenborg, 2007).

In political process theory, the nation-state is framed as the “primary enabler, suppressor, and target of social movements” (Klawiter, 2008a: 11). Social movements are not only influenced by political processes but can create opportunities for the movement itself and for other social movements (Staggenborg, 2007). The strong program of political process theory posited that political opportunities did not directly cause social movements, but that social movements develop as a result of and would not succeed without political opportunities (Klawiter, 2008a). The weak program utilizes Snow’s (2007) concept of “framing processes” which frames and assigns meaning in the process of interpreting relevant events in the mobilization of participants. It is described as a conscious and strategic effort of participants to develop a shared understanding in the legitimation and mobilization of collective action (Klawiter, 2008a: 12; Snow, 2007:

384).¹³ The use of frames was to respond to critics who note that resource mobilization theory and weak political process theory did not account for the importance of cultural factors in the development of social movements, including ideas and perceptions.

Political process theory has been critiqued for overestimating the role of the nation-state as a primary target for social movements and contentious politics (Klawiter, 2008a).

New Social Movement Theory

New social movement theory was developed from a history of European tradition, Marxist analysis and critical theory. Key theorists involved in new social movement theory include Melucci, Habermas and Touraine and it emphasizes social movements in a post-industrial, advanced capitalist society including the environmental, gay and lesbian, student, and women's social movements which emerged in the 1960s and 1970s (Brown et al., 2004; Klawiter, 2008a; Staggenborg, 2007). As post-industrial societies produce an integration of economic, political, and cultural structures (Melucci, 1985), it is argued that new social movements differ from movements in the industrial society, such as the labour movement in terms of structure, types of constituents and overall ideology. New social movement theorists emphasize collective identity, and the shared experiences and values which lend themselves to collective agency (Staggenborg, 2007: 20-21).

Whereas previous social movement research in Europe reflected Marxist theory, an important factor in new social movement theory is the intentional dismissal of class as a central concern (Orsini, 2008). Unlike political process theory which focused its

¹³ Snow's (2007) "framing processes" should be distinguished from the policy frames in chapter one's discussion of interpretive policy analysis. While framing processes assign meaning and shared understanding in mobilization processes, policy frames create a framework in which to interpret policy-related documents and the meanings used by different policy actors and communities (Yanow, 2000).

attention on formal politics and the nation-state, new social movement theory proposed a need for a more thorough understanding of the large-scale transformations that occurred in advanced, post-industrial capitalist societies and argued that the expansion of the state into the private sphere produced new kinds of social movements (Klawiter, 2008a: 16-17). New social movement theory is “postmodern, postmaterial, or uninterested in the economy of the state,” drawing on framing processes to understand the conflict which reflects participants’ engagement with issues of collective identity rather than specific economic interests (Orsini, 2008: 342).

Key outcomes of new social movement theory include new types of values, identities and organizations (Staggenborg, 2007: 23). Williams et al. (1995: 115) note that many new social movements include issues related to inequality that were not considered in earlier class-related movements, including gender, sexuality, ethnicity, age, and disability. However, the authors note that class is still an important factor when studying social movements, such as the environmental movement. For instance, the environmental movement has largely consisted of a white, middle-class membership, whereas often those most at risk for related health problems are “working class” (Williams et al., 1995).

Critiques of Traditional Social Movement Theory

Dobrowolsky (2008) suggests that while each of the traditional approaches to social movement theory has strengths and weaknesses, these approaches do not consider that social movements negotiate both issues of strategy and identity. It is argued that politics must be discussed as both a way in which traditional political theory is

understood and also as a location for larger political discourse; while social movements are affected by politics, they may also affect politics (Dobrowolsky, 2008: 164). It is suggested that social movements can be understood in terms of macro- and micro-processes (Orsini, 2008; Staggenborg, 2007). Macro-processes may involve three related concerns including systematic explanations of the rise of social actors and participants, the clarification of the relationship between the state and civil society, and the processes related to the formation of collective identities. Micro-processes include the dynamics involved in the mobilization processes, the organization of the social movement, and the role of individual participants (Orsini, 2008: 342). While new social movement theory may address the macro-level processes, resource mobilization theory may be more able to address the micro-level processes. Civil society should be viewed as both the target and terrain of collective action (Orsini, 2008).

Melucci (1985: 795) contends that the field of social movement theory must transition from empirical generalizations towards analytical definitions and defines a social movement as a “form of collective action (a) based on solidarity, (b) carrying on a conflict, [and] (c) breaking the limits of the system in which the action occurs.” He argues that analysis of social movements should focus on the systemic relationships more so than the logic of participants, but also recognizing the structural conditions and the importance of organization as a critical site of observation as social movements operate within systems of opportunities and constraints (Melucci, 1985). To address the question of why movements originate when they do and how they attract and maintain support, Staggenborg (2007) contends that social movements do not develop quickly and are often

linked in some way to earlier movements. The development of a social movement is directly influenced by processes of mobilization in which a “group that shares grievances or interests gain collective control over resources” and recruitment of individuals which is “part of a broader process of mobilization involving the commitment of individual resources, such as time, money, and skills, to a cause” (Staggenborg, 2007: 26). It is important to note that mobilization and recruitment are not static, but ongoing processes that are influenced by large-scale socioeconomic and political changes, opportunities and threats, critical events, pre-existing or emergent organizations, leadership, resources, and frames (Staggenborg, 2007: 28).

In the 1990s, many theorists drew from studies of the sociology of culture, gender, emotions, and identity as they placed a greater emphasis on the importance of agency in social movement theory. The social constructionist approach allows for a greater understanding of the “the expressive, emotive, discursive, interpretive, identity- and solidarity-building activities in which social movement actors engage” (Klawiter, 2008a: 10). However, continuing the recognition of the importance of structural factors on participants themselves and social movements more broadly, it is noted that structural factors shape both the external world and the internal world, including us as participants and subjects, as “selves” (Klawiter, 2008a: 11).

Health Social Movements

Narrowing the focus from social movement research more broadly to health research specifically, health social movements offer an important opportunity to challenge political power, professional authority and develop personal collective identity

(Brown and Zavestoski, 2005). Health social movements may be defined as “collective challenges to medical policy, public health policy, belief systems, research[,] and practice which include an array of formal and informal organizations, supporters, networks of cooperation and media” (Brown and Zavestoski, 2005: 1). While not considered by most political process theorists, health social movements have become central to research conducted by medical sociologists and anthropologists in order to understand the ongoing transformation of bodies, biomedicine and health care, and subsequently our experiences of health, risk, disability, illness, and disease (Klawiter, 2008a: 289). Health social movements have very different goals than those found in traditional social movement theory. While the focus of traditional social movements has been at the level of state policy, health social movements often focus on targets at other levels, such as the health care system, biomedicine and traditional approaches to health, public health policy, and the recognition of experiential knowledge and the illness experience. Health social movements challenge power and authority, as well as our understanding about individual and collective identities (Orsini and Smith, 2010: 40).

Brown and Zavestoski (2005: 9) note three ways in particular in which health social movements are able to affect contemporary society. First, health social movements have the potential to produce changes in the public health care system in terms of health care delivery, social policy and regulation. Secondly, health social movements can affect contemporary society through changes produced in the field of medical science, including promoting new and innovative hypotheses and methodological approaches to research, as well as advocating for changes in funding priorities. Finally, health social movements can

influence society by calling for processes of democracy within institutions that influence medical research and policy-making. Health social movements act as a “critical counter-authority aimed at democratizing and reshaping social policy and regulation in a way that transforms the socioeconomic and political conditions that underlie distributions of health and disease among populations” (Brown and Zavestoski, 2005: 14).

Concepts from resource mobilization, political process and framing theories are utilized in the conception of health social movements. The resource mobilization theory acknowledges knowledge, experience and networks as important resources to be utilized by health social movements; the political process theory may explain the processes utilized in health movements related to political opportunities; and framing processes include the importance of the use of emotions, grievance and experiential knowledge (Brown et al., 2004). However, the traditional approaches to social movement theory do not account for the role of class which is an important consideration in terms of access to health care, as well as health outcomes (Brown et al., 2004).

Health social movements most often address i) access to, or provision of, health-care services; ii) health inequality and inequity based on race, ethnicity, gender, class and/or sexuality; and iii) disease, illness experience, disability and contested illness (Brown, 2007: 26). The purpose of health access social movements is to seek equitable access to healthcare, as well as improved delivery of services. Examples of health access social movements include the US mobilizations for national healthcare reform and extension of health insurance to the uninsured (Brown, 2007). Groups associated with constituency-based health social movements address disproportionate outcomes and

oversight by the scientific community while addressing health inequality and inequity related to issues of race, ethnicity, gender, class, and/or sexuality differences.

Constituency-based movements include the women's health movement, the gay and lesbian movement, and the environmental justice movement (Brown, 2007).

Until recently, the majority of health social movements focused more on expanding access to and improving the quality of health care which is reflected in the health access and constituency-based movements. The third category, embodied health movements, does address some issues of health care access but focuses more on the personal understanding and experience of illness (Brown and Zavestoski, 2005: 3). Embodied health movements include the tobacco control, HIV/AIDS and breast cancer movements (Brown, 2007). Embodied health movements address the experience of disease, disability or illness by challenging science on etiology, diagnosis, treatment, and prevention. These movements also focus on contested illness that may be unexplained by current medical knowledge or illnesses that have environmental explanations which are often disputed. Contested illness is defined as that which is "dismissed as illegitimate, - framed as 'difficult,' psychosomatic, or even non-existent - by researchers, health practitioners, and policy-makers operating within conventional paradigms of knowledge" (Moss and Teghtsoonian, 2008: 7). Research on contestation addresses illness not only through diagnosis and treatment, but also examines the mechanisms through which social practices, discourses and institutional processes shape conventional understandings of illness (Moss and Teghtsoonian, 2008). It is argued that virtually all diseases that can be attributed to environmental causes are highly contested because of the scientific

limitations related to the burden of proof and potential liability issues (Brown, Kroll-Smith and Gunter, 2000; Shriver and Kennedy, 2005). The status of illnesses as contested since the Second World War has arisen from several sources including i) the illnesses themselves stemming from the production use and disposal practices of the past half century; ii) a reflection of the growing uncertainty over the specific causes and expression symptoms; and iii) the popular participation in science and politics making the identification of illness and its causes much more public (Brown, 2007: 230).

Participants in embodied health movements organize to achieve medical recognition of contested illnesses, research and treatment.¹⁴ Interestingly, members of these groups may also include people who are not ill themselves but see themselves at risk for the disease, as well as those who experience the disease through family connections. Brown et al. (2004: 54-55, 2012a: 18-21) provide an overview of the ideal characteristics and tactics that embodied health movements are unique in possessing. They include: i) introducing the biological body to social movements; ii) challenging existing medical and/or scientific knowledge and practice; and iii) activists' involvement

¹⁴ While breast cancer and other environment-related illnesses such as multiple chemical sensitivity are contested illnesses, there are important differences surrounding the concepts of visibility and acceptability. When considering multiple chemical sensitivity, the contested nature lies not only with environmental links to disease but in the challenges of acceptance and in fact, to the very existence of the disease itself. Sufferers with multiple chemical sensitivity experience struggles with legitimacy and lack an accepted sick role due to insufficient scientific credibility. This is not the case when considering the diagnosis and treatment of breast cancer which is well established within biomedicine and the dominant epidemiological paradigm. The current treatment options for breast cancer, including surgery, radiation and chemotherapy are the same regardless of the etiology of disease; no one is disputing its existence or challenging its associated illness experience. There are clear parallels of invisibility between multiple chemical sensitivity and breast cancer in the invisibility of the environmental risks themselves which are often impossible to detect through human senses (Shriver and Kennedy, 2005), and subsequently impossible to avoid. For further discussion of contested illness and multiple chemical sensitivity, refer to Alaimo (2010), Ashford and Miller (1998), Dumit (2006), Kroll-Smith and Floyd (1997), Lipson (2004), Moss and Teghtsoonian (2008), Nash (2006), Shriver and Kennedy (2005), and Shriver, White and Kebede (1998).

and collaboration with scientists and health professionals in pursuing treatment, prevention, research, and expanded funding.

The first characteristic involves the experience of the disease within the body producing a particular “disease identity” which may or may not be stigmatized. The disease identity represents the intersection of the social construction of illness with the lived personal experience of a biological disease process. It is important to note that those with the disease experience are in a unique position of living with the disease process, the personal experiences, interpersonal effects, and the social ramifications of the illness (Brown et al., 2004: 55-56). Brown et al. (2004: 56) argue that the significance of the experience in the embodiment of a disease is reflected in the options available to an embodied health social movement when it is mobilized. Those who experience the disease identity can either work within or against the system which produces the scientific and medical knowledge (Brown et al., 2004, 2012a). That system plays a direct role in determining whether an illness is contested or not. The ability to work within or against this system may be impacted by a number of factors including whether or not the disease is contested. The personal experiences possessed by those with a disease identity within an embodied health movement prove valuable in terms of a lived experience and perspective that is not available to others, as well as instilling a moral credibility to the social movement within both the public and scientific realms (Brown et al., 2004: 56). A collective illness identity emerges when individuals develop a “cognitive, moral, and emotional connection” with other illness sufferers (Brown et al., 2004: 60).

The second tactic used by embodied health movements involves challenging the existing medical and/or scientific knowledge and practice. Embodied health movements are ultimately tied to the production of scientific knowledge and to changes in practice as social movement participants seek support for their illness claims from these institutions. What differentiates embodied health movements from other social movements in the challenge to medical and scientific knowledge is the involvement and utilization of experiential knowledge related to environments, bodies and illnesses (Brown et al., 2004: 56). The third tactic specific to embodied health movements involves the collaboration of activists with scientists and health professionals. Participants in this social movement must simultaneously challenge and collaborate with the fields of science, medicine and public health (Brown et al., 2012a: 19). This collaboration occurs as activists attempt to pursue treatment, prevention, research, and expanded funding for their illness (Brown et al., 2004: 54-55).

While embodied health movements may be unique in possessing each of the three traits, they are also similar to other social movements as mobilization is dependent on the emergence of a collective identity. In the case of illnesses, the initial approach involves working within established social institutions. However, if science and biomedicine fail to recognize the illness experience and offer accounts of the disease that activists do not accept, they may adopt an identity of an aggrieved illness sufferer and proceed with collective action (Brown, 2007: 27-28). The concepts of collective identity and disease identity are combined to provide a discussion about the politicized collective illness identity in which the collective identity is “linked to a broader social critique that views

structural inequalities and the uneven distribution of social power as responsible for the causes and/or triggers of the disease” (Brown et al., 2004: 60, 2012a: 22). One of the factors involved in the development of a politicized collective illness identity is a common experience with government, medical and scientific institutions which create the dominant epidemiological paradigm. The critique situated within the politicized collective illness identity removes the onus of responsibility for both the treatment and prevention of disease from the individual and places it on social institutions. Activists criticize the biomedical model which they argue treats disease as a discrete entity occupying the body and in turn, the body as a discrete entity which is separate from the person occupying it (Brown et al., 2004: 61, 67, 2012a). The characteristics of embodied health movements are reflected in breast cancer social movements which will be examined in depth in the following section after addressing the historical context.

The History of Breast Cancer and Disease Regimes

It is necessary to consider the history of breast cancer and its disease regimes in order to fully understand the contemporary context of the disease. Historically, ideas about women’s risk for developing cancer were entangled with ideas about women’s “essential nature” (Jasen, 2002: 20). During the Enlightenment period (1750s-early 1800s), the association between menopause and cancer was supported by humoral theory which promoted the idea that the breasts become engorged and developed tumours after menstruation ceased and the body became “uncleansed.” Disease theory during this time observed that health status was negotiated by the body and mind, with a level of responsibility placed on the individual themselves (Jasen, 2002). The belief in

psychosomatic causes of disease was especially strong at this time, as “[w]omen, made of frail fibers, were seen to have easily impressionable souls and unquiet hearts readily carried away by lively imagination” (Bronfen, 1998: 114).

During the Victorian era (mid 1800s-1900), there was a shift towards research at the cellular level, although the association between breast cancer and hysteria was still common in medical literature in the late 19th century. Interestingly, it was during this era that public silence surrounding breast cancer became deeply entrenched. This silence was perpetuated by the notion that deaths caused by cancer were a social taboo in middle- and upper-class society, as well as being compounded by the breast’s association with sexuality and as a violation of the mother’s nourishing breast (Jasen, 2002: 28-29; Ehrenreich and English, 2011).

Klawiter (2008a) provides an important contribution to the literature surrounding breast cancer social movements with an alternative approach which focuses on the disease regimes in which breast cancer was medically managed in individuals and publicly administered in populations. Disease regimes are defined as consisting of the “institutionalized practices, authoritative discourses, emotional vocabularies, visual images, and social scripts through which diseases are socially constructed, medically managed, publicly administered, and subjectively experienced” (Klawiter, 2008a: 33). A disease regime includes interlinked practices through which a disease is medically managed in individual bodies and publicly administered across populations.

When the concept is applied to examine the regimes of medicalization and biomedicalization related to breast cancer (Klawiter, 2008a, 2008b), disease regimes of

breast cancer are mapped along the two axes of biopower. The first axis, the biopolitics of populations involves the public administration of disease and includes the discourses and practices of public health such as health promotion, education, population surveillance, epidemiology, and environmental health sciences. The second axis of biopower, the anatomo-politics of individual bodies involves the medical management of disease through the discourses and practices of clinical medicine including screening, diagnosis, treatment, and clinical research (Klawiter, 2008a: 33). Rather than the voluntary subjects of disease regimes such as scientists, physicians, healthcare professionals, Klawiter (2008a) focuses on the involuntary subjects who are recruited and incorporated into the regime through its discourses and practices. It is important to note that involuntary does not mean unwilling, rather disease regimes are most effective when the subjects are willing and able to participate in the processes.

The first regime of breast cancer, the regime of medicalization, occurred during the early 1900s after a shift in impressions of the human body. Humoral medicine was gradually replaced by scientific medicine which was founded upon new “technologies of seeing” including the microscope and medical dissection (Klawiter, 2008a). The research on breast cancer during the first half of the 20th century placed a significant emphasis on the natural pathology of the breast and away from causal factors outside the body, including dangers of “civilization” or trauma to the breast (Jasen, 2002). Though this process was initially resisted by both women and their physicians, it was during this time period that breast cancer became distinguished from other cancers, with its own origins

which could be treated through surgery. By framing breast cancer as a curable disease, this regime re-framed breast cancer patients as potentially curable (Klawiter, 2008a: 75).

As scientific medicine was institutionalized, it became an elite profession with largely white, upper-class, Christian men acting as its practitioners. The regime of medicalization transformed the power dynamic between physicians and patients in the clinical relationship, creating a new social script of the “sick role” which located the power and authority with male physicians and placed female patients in a position of compliance. The patient’s narrative about her illness experience no longer held significant value, but rather the diagnosis came from the physician who now focused on the body’s interior while subsequently creating new meanings of illness and reinforcing and reproducing the dominant gender order (Klawiter, 2008a: 62-63).

It was during the interwar period that a war on cancer was declared by government and the medical profession in which “only neglected cancer is incurable” (Jasen, 2002: 36; King, 2008). Breast cancer patients who were subjects of the medicalization regime were shaped and influenced in particular ways including i) experiences within their diagnoses and treatments; ii) the norms of non-disclosure rooted within interactions between physicians, surgeons and patients; and iii) the normalization processes which encouraged “cured” women to return to their daily activities and pass as “normal” women (Klawiter, 2008a: 75). The regime of medicalization was deeply entrenched in the gender roles and norms of this time period. Women were blamed for failing to be vigilant in detecting breast lumps with surgeons and pathologists promoting the “notion that women’s greatest risk lay in the failure to be vigilant in detecting and

reporting suspicious lumps” (Jasen, 2002: 36). Male surgeons and occasionally the patient’s husbands made the decisions regarding treatments, often without consulting the patient and, at the same time, requiring her compliance and obedience (Jasen, 2002; King, 2008; Klawiter, 2008a).

Breast cancer was diagnosed through surgical biopsy during the regime of medicalization, and because breast cancer was viewed as a localized disease, the Halsted radical mastectomy became the dominant treatment among North American surgeons. Until the early 1970s, rather than performing two separate procedures, a radical mastectomy was performed if the biopsy results were malignant, while the patient remained unconscious (Klawiter, 2008a: 76). The radical mastectomy involved removing the entire breast in addition to the chest wall muscles, lymph glands and fat located under the skin (Ley, 2009). When the breast cancer patient awoke from the biopsy and radical mastectomy, she awoke “not as a cancer patient but as a mastectomee who had been successfully treated for a condition that was not called by name, at least not in front of the patient” (Klawiter, 2008a: 77). The sick role which emerged in this regime segregated and isolated those who were ill from those who were not and did not allow for the forming of a collectivity. The sick role “channels deviance so that the two most dangerous potentialities [to the medical establishment], namely, group formation and successful establishment of the claim to legitimacy, are avoided” (Parsons, 1951: 477; Klawiter, 2008b). For instance, in the case of new mastectomees, patients were required to leave the temporary sick role and return to their regular lives and responsibilities immediately. The “formation of disease-related identities, solidarities, social networks,

and other forms of biosociality¹⁵ was thus heavily constrained by and within the regime of medicalization” (Klawiter, 2008a: 37).

A second regime of breast cancer, the regime of biomedicalization emerged during the 1970s and 1980s with new developments in biomedical research and cancer epidemiology. This regime moved discourses and practices of risk to the forefront and included changes in the practices of education, and measures and promotion of early detection, diagnosis, disclosure, treatment, and rehabilitation. In considering the public administration of disease, this included the development of new screening practices and the construction of all women, regardless of whether they are symptomatic or not, into risky subjects who are responsible for the status of their own health and must participate in the screening practices (Klawiter, 2008a: 86).

During the late 1970s, feminist health activists began to agitate against the one-step biopsy and Halsted radical mastectomy, calling it paternalistic and patriarchal. They argued that the procedures denied women the right to be informed of their diagnoses and to participate in the decision making process (Boehmer, 2000; Ley, 2009). The processes involved in the medical management of disease in the regime of biomedicalization include the emergence of informed consent, the refinement of surgical procedures, increased use of adjuvant therapies, redefining the roles and responsibilities of patients and physicians, and the development of rehabilitation programs which addressed the experiences of isolation among breast cancer patients (Klawiter, 2008a).

¹⁵ Biosociality signifies the ways in which the practices of science, public health and medicine enable the formation of new subjects and social groups (Klawiter, 2008a: 27).

Historically breast cancer was a private, even secretive disease associated with feelings of shame. Breast cancer emerged into the public domain in the 1970s through the influence of feminism and the women's movement,¹⁶ as well as the role of the media and the public breast cancer cases of prominent women such as Shirley Temple Black, Betty Ford and Happy Rockefeller who encouraged early detection and intervention (King, 2008; Ley, 2009; Sherwin, 2006). While these prominent women were willing to speak publicly about their experiences with breast cancer, it is important to note that their positions of privilege and status influenced their ability to do so.

Breast cancer was now framed as a disease for which every woman is at risk and required continual vigilance by individual women. Measures of surveillance and detection were heavily promoted as the "moral duty" of women, including engaging in breast self-exams, clinical examinations and mammographic screening. The temporary sick role for symptomatic women from the regime of medicalization was replaced by a permanent risk role for all women (Klawiter, 2008a: 38). While the processes involved in the regime of biomedicalization did not improve breast cancer incidence or mortality rates during the 1970s or 1980s, the subjects and social relations of the disease regime were transformed. This created the conditions for biosociality and collective action among the "risky subjects" within this regime, including asymptomatic women, women

¹⁶ In addition to the women's health movement and feminism, the breast cancer social movement has been significantly influenced by the HIV/AIDS movement. Despite differences in the history, biological and social epidemiology of breast cancer and HIV/AIDS, it was the politicization of HIV/AIDS that paved the way for the politicization of breast cancer and the participation of women who had not previously been active in social movements (Boehmer, 2000; Epstein, 1998). For a complete discussion of the relationship of activism between breast cancer and HIV/AIDS, refer to Ulrike Boehmer's (2000) book *The Personal and the Political: Women's Activism in Response to the Breast Cancer and AIDS Epidemics*.

in treatment for breast cancer, women at risk of recurrence, and women in remission (Klawiter, 2008a: 39-40).

The women's health movement was grounded during the third wave of the feminist movement.¹⁷ Specifically, the cancer movement in Canada and the United States became organized around a feminist analysis, taking the position that cancer is a political issue. Boehmer (2000: 99) points to a collective feminist identity which is negotiated between politically experienced feminists and women with no prior political engagement. Since the early 1990s there has been an ongoing cultural transformation in which understandings of breast cancer have shifted from that of a historically stigmatizing disease of individuals suffering in isolation, to that of a neglected epidemic at the center of public debate and political organizing. It has become common for many women with breast cancer to dismiss the label of "patient" and embrace an identity associated with being a "survivor" (King, 2008: x). This cultural transformation led to the development of three distinct cultures of action in the San Francisco Bay Area (Klawiter, 2008a).

Breast Cancer and Cultures of Action

Klawiter (2008a: 44) uses cultures of action as a "heuristic device for conceptualizing and mapping patterns of similarity and difference within social movements." Cultures of action are produced by individuals, groups, agencies, organizations, councils, corporations, and coalitions and involve shared goals, assumptions and discourses among interactions involving allies and opponents. They

¹⁷ During the third wave of feminism, the women's health movement focused specifically on the politics of reproduction, including issues surrounding sexuality, birth control, pregnancy, childbirth, breast-feeding, forced sterilizations, unnecessary hysterectomies, and the safety of pharmaceutical technologies including the birth control pill, hormone therapy and the DES (diethylstilbestrol) controversy (Klawiter, 2008a: 167).

change over time as a result of influence from the actions of members and relationships with other cultures of action, as well as the shifting dynamics in the discourses and practices the culture of action is attempting to influence (Klawiter, 2008a; Zavestoski et al., 2004). Cultures of action “are not simple constellations of ideas, frames, cognitions, or identities. Rather, they enact, embody, and articulate (visually and verbally) particular visions of what is and what ought to be” (Klawiter, 2008a: 44).

During the same time period in the 1990s, three different cultures of action emerged within the Bay Area of San Francisco. Moffett (2003: 290) contends that breast cancer advocacy groups have three goals in particular, including: i) raising awareness about breast cancer and promoting the use of biomedical processes, such as mammographic technologies; ii) providing emotional support for women in varying stages of the disease and their treatment; and iii) raising funds or promoting that funds be allocated towards scientific research for breast cancer. These goals are reflected in Klawiter’s (2008a) first culture of action; however it is not the case in the second or third. Each specific culture of action employs different discourses related to breast cancer, promotes different identities and body politics, and supports different agendas and priorities. Each culture of action also draws upon distinct understandings of gender, race, class, and sexuality, and has diverse perceptions of and relationships to science and biomedicine, capitalism, corporate philanthropy and cause-related marketing, and the pharmaceutical industry (Klawiter, 2008a: 45).

1) Culture of Early Detection and Screening Activism

The discourse surrounding breast health began to emerge in the early 1990s; these discussions were linked exclusively to breast cancer screening as part of awareness and early detection campaigns. This is evidenced by the focus of the *culture of early detection and screening activism* which emerged in the San Francisco Bay Area and drew upon the strong evidence and science related to the detection and treatment of breast cancer (Brown et al., 2002; Klawiter, 2008a). Similar to the breast cancer awareness campaigns of the 1970s and 1980s, this culture of action involves the promotion of breast self-examination, clinical breast exams and mammographic screening as life-saving technologies while simultaneously placing the onus of responsibility to comply with screening for early detection on individual women. The unique aspects which emerged during the 1990s and distinguished this culture of action from previous campaigns include three developments in particular: i) the interpenetration of the state, private industry and breast cancer screening advocacy; ii) the rise of mass-participation fundraising events; and iii) growing pressure to expand mammographic screening to medically marginalized communities (Klawiter, 2008a: 131-32).

The early detection and screening activism culture of action challenged the assumption in social movement theory that social movements have clear boundaries which can be distinguished from the state, private industry and philanthropic organizations, and those social movements must engage in contentious forms of protest (Tarrow, 1994). In addition to individuals, this particular culture of action involved public agencies, professional organizations, health care organizations, and private

industry. Rather than engaging in the contentious forms of protest embraced by the other cultures of action in this area, a culture of consensus emerged which “privileged the identity of ‘breast cancer survivor’ and tied this identity to the physical display of heteronormative femininity” (Klawiter, 2008a: 134).

The discourse utilized in this culture of action focused exclusively on a lack of awareness about breast cancer and the financial, cultural and physical barriers to screening. Concerns about access to mammographic screening for medically marginalized women, particularly low-income, uninsured women of colour became a priority at this time (Klawiter, 2008a). It is important to note that this was not unique to the San Francisco Bay Area, but was also occurring nationally and internationally. Parallels can be drawn between these issues in the United States and similar concerns about access to mammographic screening in rural and geographically isolated areas of Canada.

The promotion of mammography within this culture of action increased women’s concern about their individual risk of developing breast cancer. The discovery of the “breast cancer genes,” BRCA₁ and BRCA₂ during the 1990s altered the discussion surrounding women’s risk of breast cancer and the options available in determining this risk. An estimated 5-10 percent of breast cancer diagnoses involve hereditary forms of cancer and women may seek to engage with the health care system to obtain this information through genetic testing regardless of their risk profile (Bottorff et al., 2002; Bouchard et al., 2004; Rees et al., 2001). It is suggested that testing for BRCA₁ and BRCA₂ genetic mutations may be the first widespread utilization of pre-symptomatic

genetic testing transforming general medicine into predictive medicine (Bouchard et al., 2004). Although the majority of breast cancer diagnoses do not involve genetic mutation, its presence does increase the risk of an invasive breast cancer diagnosis¹⁸ (Klawiter, 2008a). Women with BRCA₁ and BRCA₂ genetic mutations are faced with uncertainty about if and when they will develop breast cancer and how to manage this risk (Lippman, 1998; Rees et al., 2001). The preventive measures offered by geneticists and physicians to patients with BRCA₁ and BRCA₂ genes include increased surveillance, breast self-examination, mammography screening, chemoprevention, and prophylactic surgery in the form of a preventive mastectomy (Bouchard et al., 2004).

Genetic screening contributes to the biomedicalization regime of breast cancer and the framing of all women as “risky subjects” (Klawiter, 2008a: 262). Due to the widespread prevalence of cancer in western society, Jain (2007a) contends that everyone lives with some degree of prognosis. The effects of genetic screening for breast cancer are not limited to the individual being tested, but also have an impact on close relatives who are living and those who have not yet been conceived. The knowledge of genetic mutations linked to breast cancer increases the experience of risk and anxiety among both the carrier and his or her extended family (Klawiter, 2008a: 262).

While prophylactic surgery has a strong history in the regime of medicalization, the option of chemoprevention emerged in the late 1990s. The Breast Cancer Prevention Trial included 13,338 Canadian and American women, and tested the breast cancer treatment drug tamoxifen against a placebo in “high risk” women who had a 1.7 percent

¹⁸ The increase in risk of developing invasive breast cancer with the presence of BRCA₁ and BRCA₂ genes is between 36-85 percent depending to which study one refers (Klawiter, 2008a: 262).

or higher risk of being diagnosed with breast cancer in the next five years. This percentage was the average risk a 60-year old woman had of developing breast cancer in the United States. The results of this clinical trial indicated that the group of women receiving tamoxifen were approximately half as likely to develop invasive breast cancer as the control group (Batt, 2002; Klawiter, 2008a). There was extensive media coverage around this issue at the time suggesting that “[w]e know for the first time in history that we can prevent cancer through pharmaceuticals” (Batt, 2001). The subsequent decision by the United States Food and Drug Administration to approve tamoxifen for supplemental and preventive use in healthy women considered to be at “high risk” was considered controversial by women’s health organizations. The decision was critiqued in terms of the promotion of the drug by pharmaceutical company, Astra Zeneca, to physicians and direct-to-consumer advertisements targeting women. By focusing on medication for the “prevention” of breast cancer, the advertisements removed focus from the causes of the disease. The decision was also critiqued as data indicated that women taking tamoxifen were twice as likely to develop endometrial cancer, three times more likely to develop pulmonary embolisms, and fifty percent more likely to suffer a stroke (Batt and Lippman, 2010; Klawiter, 2008a: 263-66). In fact, the use of tamoxifen on healthy women was described as “disease substitution” due to the number of other life-threatening illnesses associated with taking the drug (Batt and Lippman, 2010: 49; Fosket, 2004: 293). These policies assume that risks associated with health should be “managed rather than reduced or eliminated” (CWHN, 2003).

The representative symbol associated with the culture of early detection and screening activism is the now well-known pink ribbon -- the gold-standard in cause-related marketing. Cause-related marketing emerged in the mid-1980s as a strategic marketing tool which allowed companies to simultaneously associate themselves with a particular cause while concurrently increasing profits and developing reputations as good corporate citizens (King, 2008: 9). During this time, cause-related marketing transformed from short-term promotions of one to two months with charitable organizations towards long-term commitments which directly link the company to a particular “cause” in the minds of consumers. Marketing professionals are clear that while the long-term strategy may be viewed by the public as less opportunistic than short-term campaigns, cause-related marketing campaigns themselves are and should be seen as “first and foremost a strategy for selling products, rather than an altruistic or philanthropic activity” (King, 2008: 10).

The now widely recognizable and corporate-influenced pink ribbon has its origins within a grassroots movement. Inspired by the red ribbon associated with the HIV/AIDS movement, Charlotte Haley began distributing peach ribbons to raise awareness about breast cancer and funds for the prevention of the disease (Harvey and Strahilevitz, 2009; Moffett, 2003). She distributed postcards with the peach ribbons that stated: “The National Cancer Institute’s annual budget is \$1.8 billion, only 5 percent goes for cancer prevention. Help us wake up our legislators and America by wearing this ribbon” (BCA, 2011a). However, Haley was not interested in commercializing her efforts and refused to partner with cosmetics company, Estée Lauder. Based on focus group research, Estée

Lauder created, produced and marketed the *pink* ribbon, with the colour choice representing heterosexual femininity and hope (Estée Lauder, 2010; Jain, 2007b).

Demonstrating the principles of cause-related marketing, breast cancer awareness became linked to corporations during the 1990s. Industries such as fitness, fashion and cosmetics used breast cancer as a way to differentiate their products from others, while increasing their visibility in relation to female consumers, elevating their corporate image, and increasing profit-margins (Harvey and Strahilevitz, 2009; King, 2008, 2010). The combination of cause-related marketing and breast cancer has resulted in a clear case of cause-related consumption with the successful pink ribbon and National Breast Cancer Awareness Month campaigns that encourage the public to make purchases in order to “support breast cancer.” Fundraising events such as Run/Race for the Cure involve hundreds of thousands of participants across Canada and the United States each year. These events exclusively promote positive messages combining images of feminine triumph, strength, positivity, hope, and beauty (Batt, 1994; Klawiter, 2008a).

There was an interesting dynamic during this time in which women had developed a personal relationship to breast cancer, either as a patient themselves or knowing someone else with breast cancer. The pervasiveness of awareness campaigns resulted in the commercialization of breast cancer presenting the disease through a very specific and narrow lens. The decades of early detection promotion had created a category of white, middle-class women as both “risky subjects” and consumers (Klawiter, 2008a: 132). This culture of action benefits from the cause-related marketing, pink ribbon and philanthropic activities related to breast cancer while blurring the

boundaries between social movements, the state and private industry. The tangible successes of this movement lie in addressing the unequal access to mammographic screening in medically marginalized communities. This culture of action operates on a discourse of hope which advertises a sense of control for women through participation in early detection and screening activism, despite being risky subjects (Klawiter, 2008a).

2) *Culture of Patient Empowerment and Feminist Treatment Activism*

The second culture of action that emerged in the Bay Area, *patient empowerment and feminist treatment activism*, occurred during a time when cancer was viewed as an “acceptable epidemic” and was in conflict with the culture of early detection and screening activism (Klawiter, 2008a: 164). Participants in this movement were influenced by the women’s health movement and the lesbian community and worked towards creating a discourse that was feminist, anti-racist, not exclusively heterosexual, accommodating towards people with (dis)abilities, and recognized non-Western alternative therapies (Klawiter, 2008a: 170). By addressing and combining concerns of racism, classism and sexism, participants in this culture of action believe that breast cancer is influenced as much by factors of economic, social and cultural factors as genetics. Thus, for them, addressing issues of breast health requires engaging with these plural environments (Davis and Webster, 2002; Eisenstein, 2001; Potts, 2004a).

This culture of action constructed a feminist discourse to emphasize the importance of empowerment for breast cancer patients. The feminist cancer organizations in the Bay Area, such as Breast Cancer Action and the Breast Cancer Fund, promoted the empowerment of women with breast cancer, and challenged the positive discourse of

‘survival.’ They scorned the unscarred feminine bodies that were utilized and promoted in the mainstream media and within the culture of screening and activism underlying a heteronormative framework (Klawiter, 2008a). Feminist activists challenge the “cheery deary” positive discourse promoted by pink ribbon activists with

narratives that drew attention to the false promises and misrepresentation of the cancer establishment, to the ineffectiveness of mammographic screening, the unreliability and toxicity of treatments, the chronic nature of the disease for many women, the inadequacy of research, the lack of scientific understanding and medical progress on the disease, the emphasis on individual risk factors, and the low priority given to cancer prevention (Klawiter, 2008a: 175).

They created social spaces which promoted alternative images, discourses and ways of embodying breast cancer (Ehrenreich, 2001; King, 2010; Klawiter, 2008a).

The culture of patient empowerment and feminist breast cancer activism was founded upon a culture of caring and compassion for women diagnosed with breast cancer, and thus involved advocating for direct services and support. While the feminist cancer activists supported the promotion of universal access to mammographic screening for all women, this culture of action also challenged the idea that unpleasant emotions such as sorrow, grief and aggression should be suppressed. Rather than buying into the symbolic pink ribbon, feminist cancer activists wore “Cancer Sucks” buttons. They showed photographs of bald, one-breasted women while arguing that the survival discourse and “pretty pink ribbons distorted the ugly realities of the disease” (Klawiter, 2008a: 169; Matuschka, 2012; Sulik, 2011).

3) Culture of Cancer Prevention and Environmental Risk

The third culture of action that emerged in the Bay Area in the 1990s, the *culture of cancer prevention and environmental risk*, frames breast cancer as a 21st century

phenomenon by engaging with issues of environmental health (Klawiter, 2008a). Breast cancer is framed as representing the hazards associated with industrialization emblazoned onto women's bodies (Sherwin, 2006: 18). Historically, social movements have relied not on science but on ethical and moral appeals to promote change. Couch and Kroll-Smith (2000: 384) find that contemporary environmental social movements are organized around more than a populist appeal to ethical or moral rights. Rather, activists believe we are endangered by the production, use and disposal of environmental contaminants and utilize scientific, technical and medical expert knowledge with moral and ethical arguments about the right to a safe environment. These movements combine resources from civic rights and environmental justice movements with toxicology, risk assessment and biomedicine in order to frame claims which aim to change the actions or policies of institutions.

The culture of cancer prevention and environmental risk utilized the appeal of the discourse of early detection to challenge the personal lifestyle and responsibility surrounding the dominant epidemiological paradigm of breast cancer in order to promote a message of cancer prevention (Klawiter, 2008a). This culture of action recognizes that the lifestyle choices and behaviours women are encouraged to engage with in order to prevent breast cancer, such as diet, exercise and age at which she has her first child, are significantly influenced by her socioeconomic status and her cultural environment, and do not account for factors that are beyond her personal control (Leopold, 1999). King (2010: 107) argues that this discourse which locates risk factors in individual behaviours "operates more to detract attention away from external variables that might be implicated

in high incidence rates (industrial pollution, for instance), rather than to demonize women with breast cancer.” The idea of bodies existing separately from their environments distorts the complexity involved and there is a call for a recognition of “the interpenetration of bodies and their overlapping environments” (Eisenstein, 2001: 84). The environmental breast cancer movement has worked towards four goals in particular: i) to broaden public awareness of potential environmental causes of breast cancer; ii) to increase research into environmental causes of breast cancer; iii) to create policy which could prevent environmental causes of breast cancer; and iv) to increase activist participation in research (Brown, 2007: 44; Brown et al., 2004: 66-67; McCormick et al., 2003: 546).

In this perspective, “the gendered experience of breast cancer leads...[activists] to experience their disease not as a personal trouble to be dealt with through lifestyle changes, but as a condition caused by social and environmental factors that are shaped by powerful social institutions” (Zavestoski et al., 2004: 569). As Sulik (2011: 372) argues, “[t]he cultural equation of breasts, and having breasts, with women’s heterosexual identity enables pink ribbon products to trivialize and ignore the realities of breast cancer while simultaneously degrading women and putting them in their place.” Similar to the feminist breast cancer activists, the environmental breast cancer movement problematizes the heterosexual norms of femininity that are utilized in the media’s portrayal of breast cancer. This portrayal is furthered by the involvement of the beauty and fashion industries in the events and campaigns associated with National Breast Cancer

Awareness Month, and the mainstream breast cancer movement's promotion of heteronormative femininities (Brown, 2007; Jain, 2007b).

Zavestoski et al. (2004: 565) note three specific considerations related to gender which create difficulties in the attempts by activists' to transform popular and medical notions of breast cancer and situate them into a broader social and environmental context. The constraints include depictions of activists as "hysterical women" which has its roots in the 19th century medical literature linking breast cancer and hysteria (Jasen, 2002). The second element includes a marginalized illness experience of breast cancer where women are socialized and encouraged to present themselves as having "normal" bodies. The "struggle for normalcy often begins as soon as the disease is detected, intensifies as treatment becomes more aggressive, and continues long after the disease is cured" (Schulzke, 2011: 37). Finally, the third element involves the sexualization of breast cancer through the media. There are varying degrees of sexualization used in breast cancer cause-related marketing campaigns, including those that are overtly sexualized with images objectifying women's breasts and slogans that include "great breasts are worth fighting for," "save the ta-tas," and "don't let cancer steal second base" (Sulik, 2011; Save the Ta-Tas, 2012; Total Pro Sports, 2010; Zazzle, 2009). While this sexualization results in greater media coverage, it also parallels the experience of breast cancer with the loss of one's sexual identity which shifts attention away from important structural critiques (Zavestoski et al., 2004: 576). In this case, important questions which should be asked include "what is being bought and sold in advertisements, and in the name of 'the cause'?"

Couch and Kroll-Smith (2000: 388) find that in this movement, there are “people who find the authoritative voices of science and medicine unable to make sense of their bodies and environments. Importantly, they are doing more than questioning the use of expert knowledge. Indeed, they often become experts themselves.” It is in this respect that, despite constraints, there are also a number of ways that gender can enable the efforts of activists including: i) a unique perspective on health and illness as a result of women’s marginalization; ii) a holistic view of social change involving knowledge, personal experience and action; and iii) solidarity and social networks which result from a shared sense of subordination (Zavestoski et al., 2004: 564). Perhaps most importantly, activists utilize their embodied knowledge and lay expertise which creates a unique perspective while they work to “transform personal experience into scientific knowledge and then into political action” (Zavestoski et al., 2004: 572).

It is argued that scientific challenges and policy implications are far more complex with contemporary contested illnesses. Past examples of contested illnesses include black lung disease attributed to coal mining and asbestosis or mesothelioma attributed to asbestos exposure. These diseases became established through lay discovery and unions, occupational health and safety organizations and sympathetic scientists who challenged the dominant epidemiological paradigm to demonstrate a path of causation (Brown, 2007; Markowitz and Rosner, 2002). For instance, an active trade union health and safety movement worked towards exposing workplace hazards in Ontario (Brophy et al., 2007: 238). This movement resulted in the provincial government establishing a Royal Commission in the early 1980s in order to examine the health and safety issues

arising from the use of asbestos in Ontario (Brophy et al., 2007; Dupré et al., 1984). Between 1980-2002, approximately 1,487 cases of mesothelioma were diagnosed among men in Ontario (Brophy et al., 2007). However, it is Sarnia, Ontario that is the “epicentre of asbestos disease” (Wordsworth, 2012: 32). Hospital data for Sarnia from the 1990s demonstrates that the overall cancer rate was approximately thirty-four percent higher than the provincial average, the lung cancer rate was fifty percent higher, the mesothelioma rate was five times higher, and the asbestosis rate was nine times higher (Mittelstaedt, 2004). It is suggested that the statistics around asbestos-related disease incidence are likely to be underestimated based on an under-diagnosis and poor record keeping related to occupational health issues (Brophy et al., 2007; Mittelstaedt, 2004).¹⁹ While the economic cost of protecting coal miners and people working with asbestos fell primarily on industry, members of the culture of cancer prevention and environmental risk suggest that the environmental causes implicated in breast cancer are linked to “the heart of the entire economic system and require massive policy shifts” (Brown 2007: 229).

Activists utilized confrontational politics and public protests in their attempts to challenge private industry, local and state government, the other cultures of action, and public attitudes and perceptions. While the culture of early detection and screening activism uses the pink ribbon as its representative symbol, the culture of cancer prevention and environmental risk utilizes a poison skull to demonstrate the health

¹⁹ For additional discussion of asbestos exposure in Ontario, refer to Brophy et al. (2007), Dupré et al. (1984), Landsberg (2012), Mittelstaedt (2004), and Wordsworth (2012).

hazards associated with environmental contaminants. They posit that the economic interest in maximizing profits often conflict with efforts of disease prevention (Leopold, 1999; Potts, 2004b). Wilkinson (2007: 424) speaks to the explicit links with the commercialization of breast cancer. She specifically addresses the breast cancer “industry,” and the profits associated with mammographic screening services, radiotherapy and chemotherapy, and drug treatments.

The National Breast Cancer Awareness Month and the pink ribbon campaign is a clear example of successful cause-related marketing and associated corporations such as Avon, Revlon, General Motors, and Nike maintain a safe distance from feminist and environmental breast cancer activism (Moffett, 2003). The primary sponsor of this campaign, AstraZeneca, is critiqued by environmental breast cancer movement activists because in addition to manufacturing tamoxifen, it also produces pesticides, including the carcinogen acetochlor and one of its manufacturing plants is reportedly the third largest source of airborne carcinogenic pollution in the United States (Sulik, 2011; Wilkinson, 2007: 424). AstraZeneca also has the authority to approve or disapprove all printed materials used in campaigns during Breast Cancer Awareness Month and, not surprisingly, this literature does not include mention of the potential role of environmental contaminants in causing breast cancer (Sherwin, 2006; Wilkinson, 2007).

There is very little transparency when examining the percentage of revenues corporations donate from purchases of pink ribbon products during Breast Cancer Awareness Month to breast cancer research, treatment, screening, prevention, or education (Harvey and Strahilevitz, 2009; Moffett, 2003). Questions that may be asked

when purchasing pink ribbon products include: is there a cap on the amount of money the company will donate and has the maximum amount already been met; is the company contributing to the increasing incidence rates of breast cancer through everyday exposures to their products; and what organization will receive the funds and how will they be used (BCA, 2011a). Indeed, King (2010: 108) argues that there is “nothing inherently uncontroversial about breast cancer. . . . [T]he disease has been manufactured as such over two decades of organizing that has gradually been incorporated into conservative political agendas, the programs of large nonprofits in partnerships with the cancer industries, and corporate marketing strategies.” Activists in the culture of cancer prevention and environmental risk problematize, critique and question three aspects of the National Breast Cancer Awareness Month in particular. The first is that it legitimizes and promotes early detection programs as the only public health approach to breast cancer and does not recognize a causal link between environmental contaminants and breast cancer. The second is that the very multinational corporations that participate are also contributing to the development of cancer through the production of toxic products including pesticides, plastics and their industrial by-products, such as dioxin. The third is that certain corporations, such as pharmaceutical companies, profit from both the diagnosis *and* the treatment of breast cancer, and this information is concealed from the public (Klawiter, 2008a: 201).

Jain (2007b: 519) contends that the use of cause-related marketing in pink ribbon campaigns to increase profits and build name recognition among consumers, while “cover[ing] up their production of carcinogens bears the name ‘pinkwashing’ . . . which

obscures the links among the production, suffering and obfuscation of disease.” The term “pinkwashing” is used to describe a company or organization that claims to care about breast cancer by promoting a pink ribbon product, but at the same time produces, manufactures and/or sells products that are linked to disease (BCA, 2011a).²⁰ Pink ribbon culture has become more than a successful cause-related marketing campaign:

[I]t has become a distinct cultural system that is integrated into the fabric of [North] American life. Grounded in advocacy, deeply held beliefs about gender and femininity, mass-mediated consumption, and the cancer industry, pink ribbon culture has transformed breast cancer from an important social problem that requires complicated social and medical solutions to a popular item for public consumption (Sulik, 2011: 9).

Each of the three cultures of action, the culture of early detection and screening activism, the culture of patient empowerment and feminist treatment activism, and the culture of cancer prevention and environmental risk provided important contributions to the breast cancer social movement which can be seen throughout the United States and Canada. The breast cancer movement provides a unique example of activists’ efforts that utilize ideologies from health, environment and women’s movements (McCormick et al., 2003). The cultures of action which emerged in the 1990s helped to shape the breast cancer social movement into one of the most popular and influential movements of the last twenty-five years (Klawiter, 2008a). As the breast cancer social movement is

²⁰ It should be noted that the concept of “pinkwashing” is also being used to describe the practice of a state, corporation or organization using “gay rights rhetoric” in order to present a particular image and to detract from other practices (Dhoot, 2012). Sarah Schulman published a widely cited op-ed in the *New York Times* grounding this global practice in Israel with a deliberate juxtaposition of Israeli LGBT citizens and Palestinian citizens (Schulman, 2011). In this context, pinkwashing can draw upon the “emotional legacy of homophobia” in its framing of LGBT citizens in order to distract from other, more controversial aspects of state behaviour (Schulman, 2011). For additional information on pinkwashing and the LGBT community, refer to Dhoot (2012), Fung (2013), Ng (2013), and Schulman (2011).

ongoing and diverse, it is important to consider the varying constructions of risk in relation to the development of the disease, everyday exposures to toxic substances and outcomes for women's health.

Risk and the Risk Society

Risk is a pervasive concept related to human existence in contemporary western societies (Lupton, 1999). Sociocultural perspectives on risk emphasize the social and cultural contexts in which risk is understood, factors that approaches rooted in the natural sciences and biomedicine are criticized for neglecting. In an interdisciplinary perspective, risk is viewed as a cultural and political concept associated with ideas about choice, responsibility and blame. Lupton (1999) points to categories of risk²¹ which concern individuals and institutions in contemporary western societies that are indicative of the broader sociocultural, political and economic context in which they exist including environmental risks such as pollution, radiation and chemical contaminants. This specific category of risk should be considered along with its relationship to health outcomes.

When considering the ontology of risk, Rigakos and Law (2009) contend that risk by its own definition does not exist, rather it is an unrealized potentiality which is fulfilled when it is measured by researchers or observed by lay populations. Risk embodies the “potentiality for a negative occurrence which must be understood for the

²¹ The six categories of risk include environmental risks such as pollution, radiation and chemical contaminants; lifestyle risks such as those linked to the consumption of food and drugs; medical risks related to medical care and treatment; interpersonal risks related to personal relationships, sexuality and gender roles; economic risks including under- and unemployment; and criminal risks as a result of being a participant in or potential victim of illegal activities (Lupton, 1999: 13-4). For the purposes of this research, I am primarily concerned with the category of environmental risks and their relationship with health outcomes.

purposes of avoidance or control” (Rigakos and Law, 2009: 80). While realists tend to agree about the epistemology of risk as rooted in science and real in existence, there is discord when considering the specific nature of this reality, the ontology of risk and potential involvement of social and cultural dynamics (Rigakos and Law, 2009). Lupton (1999) offers a continuum which demonstrates the epistemology of approaches to risk. The perspectives based in the natural sciences and biomedicine have a realist epistemology in which risk is an objective hazard that can be measured independently of social and cultural processes. In contrast, sociocultural perspectives often frame the discussions of risk “by identifying underlying cultural structures, hierarchies and categories that serve to define risk knowledges and practices” (Lupton, 1999: 25-26). Thus, in several of these perspectives, risk is considered to be more of a subjective phenomenon than an objectively measurable one. Finally, the risk society perspective views risk as an objective and real hazard that is mediated, perceived and responded to through social, cultural and political processes (Lupton, 1999: 35).

Beck (1992) combines objectivism and cultural relativism in his approach to risk. He views risks as real in existence but points to the weakness of an objectivist, realist approach founded in the natural sciences because in a quest for objectivity, it fails to recognize the ways in which ‘scientific facts,’ like other perspectives on risk, are “situated and interpreted in cultural and political contexts” (Lupton, 1999: 60). A cultural relativist approach emphasizes the contextual aspects of risk responses and recognizes that what concerns a particular social group in a specific historical context may not concern another. However, Beck (1992) argues that such an approach fails to recognize

the unique nature of contemporary environmental risks in western society. Thus he seeks to integrate both perspectives into a sociological approach to risk which incorporates a scientific objectivist perspective recognizing that risks do exist, and a cultural relativist perspective which recognizes that nature and causes of risk are conceptualized differently in contemporary western societies than in previous eras (Lupton, 1999: 61).

According to the risk society perspective as theorized by Beck, risk is viewed as the probability of physical harm due to technological processes and as a systematic way of dealing with hazards and insecurities induced and introduced by modernization itself (Beck, 1992: 4, 21). The risk society perspective describes a phase of development in society in which the social, political, ecological, and individual risk created by the momentum of innovation increasingly elude the control and protective institutions of industrial society (Beck, 1992, 1995). Unlike the risks of early industrialism, contemporary nuclear, chemical, ecological, and biological threats are unlimited across both space and time, as they cross international borders and have the potential to affect future generations (Beck, 1992). Therefore, risks are more difficult to calculate, manage and avoid than in past eras (Lupton, 1999).

Beck (1992) and Giddens (1990) argue that contemporary society is characterized by a critique of the processes of modernity, and thus industrial society itself. This society is no longer unproblematically viewed as producing “goods,” such as wealth and employment, but is now seen to produce many of the dangers from which we feel threatened, including environmental pollution and contaminants. The production and management of risk is framed as a human responsibility and the central institutions of

contemporary society, including government, industry and science, are singled out as the main producers of risk (Beck, 1992, 1995, 1996; Giddens, 1990). Beck (1995) reserves the term “risk society” for the contemporary era and notes distinct features of risk in late industrialism compared with pre- and early industrialism. One significant difference is that the type of risk, including environmental contamination and radiation, differs in contemporary societies than in previous eras. Since the Second World War contemporary western societies have been confronted with threats to human life on an unprecedented and previously unknown scale. Beck (1995) contrasts the calculability of risk with those from pre-industrial eras which included plague and famine, but also magic, gods and demons which were incalculable as they were believed to be caused by external and supernatural causes. During early industrialism, risks became calculable through the instatement of insurance and compensation schemes (Beck, 1995). However, the modernist rules of causation and the processes of risk calculation fail in the risk society as contemporary risks may be minimized through technology but it is not possible to eliminate the risk entirely (Beck, 1995: 76-77; Lupton, 1999).

The transition into a period of threats to social, economic and political order is presented as a challenge to the present and future, and as a justification of the risk society itself. The entry into the risk society occurs at the moment when hazards which are now decided and produced by society undermine the established safety systems of the state’s existing risk calculations (Beck, 1996). In the past risks were traced to a lack of hygienic technology, such as in the case of noxious fumes in 19th century London sewers. Interestingly, today many hazards are both imperceptible to the senses and are a result of

industrial overproduction. There are risks associated with modernization itself and because of the continually evolving forms of technology, the calculability of the consequences of risk becomes impossible (Beck, 1992). Unlike the risks of early industrialism, contemporary nuclear, chemical, ecological, and biological threats found in the risk society are i) not limitable, either spatially or temporally; ii) not accountable according to the prevailing rules of causality, guilt and liability; and iii) neither compensable nor insurable (Beck, 1995: 2; 1996: 31). The known and unintended consequences in the risk society have emerged as previously unknown entities in history and western society (Beck, 1992).

The risk society describes a period of time in which the hazards produced in the growth of industrial society become predominant (Beck, 1996: 28-29). The risk society constitutes “the end of the antithesis between nature and society” so that nature can no longer be understood separately from society and contemporary cultural activity or society from nature (Beck, 1992: 80; Adam, 1996). These risks include radioactivity, which completely evades human perceptive abilities, as well as toxic substances and pollutants in the air, water and food sources, and their short-and long-term effects on plants, animals and people. The risks produce

systematic and often irreversible harm, generally remain invisible, are based on causal interpretations, and thus initially only exist in terms of the (scientific or anti-scientific) knowledge about them. They can thus be changed, magnified, dramatized or minimized within knowledge, and to that extent they are particularly open to social definition and construction. Hence the mass media and the scientific and legal professions in charge of defining risk become key social and political positions (Beck, 1992: 23).

Beck (1996) identifies two phases when considering industrial society and the risk society. The first phase involves the systematic production of self-endangerment and its consequences but which are not a topic of public debate or political conflict. This scenario is altered when the hazards of industrial society dominate public, political and private debates. At this time, the institutions of industrial society, including government, science and industry, produce and legitimize hazards which they cannot control. Industrial society sees and criticizes itself as a risk society. Society still makes decisions and acts on the pattern of the old industrial society; however, at this time debates and conflicts which originate in the dynamic of the risk society are now being applied to interest organizations, the legal system and politics (Beck, 1996: 27-28). It is important to note that the risk society is still at the same time an industrial society because it is mainly industry, in conjunction with science, that is involved in the creation of the risks involved in the risk society (Beck, 1992: 3).

Three observations have been made about the risk society in particular. The physical risks are always created within social systems, such as organizations and institutions which are supposed to manage and control the risky activity. Therefore, the magnitude of the physical risks is a direct function of the quality of social relations and processes. The primary risk is social dependency upon institutions; these institutional actors may be inaccessible to the people affected by the risks in question (Beck, 1992: 4). Giddens (1990) also sees modern institutions as playing a key role in the risk and uncertainty associated with contemporary western societies. He points to both the pace and scope of change as unique to this time period. The rapidity of change in conditions is

extreme and demonstrated in the case of technology which is pervasive and reflected in the global nature of risks (Giddens, 1990: 6). These risks negate the standard separation between past, present and future and create an uncertainty of the implications for future generations (Adam, 1996).

The aspects of risk related to value-laden social constructs create an appropriate venue for reflexive inquiry (Rigakos and Law, 2009). The concept of reflexive modernization may be introduced when considering the stages of industrial society, the risk society and their consequences. The concept of risk is “directly bound to the concept of reflexive modernization” (Beck, 1992: 21). The shift towards reflexivity is an unintended side effect of the contemporary industrialized society and the risks produced. It is the “process of modernity coming to examine and critique itself” (Lupton, 1999: 66). Reflexive modernization does not signify reflection, but rather self-confrontation with the consequences of the risk society that cannot adequately be addressed and overcome in the system of industrial society. The risks cannot be measured by industrial society’s own institutionalized standards (Beck, 1996: 28). The concept of risk is linked to reflexivity because “anxieties about contemporary risks pose questions about current practices” (Lupton, 1999: 66). The risk society becomes reflexive through processes including the awareness of the global nature of risk triggering new impulses towards the development of co-operative international institutions and the boundaries of the political being removed, leading to worldwide alliances (Lupton, 1999: 66).

Through these processes, the risk society becomes a “world risk society” where the public sphere of debate and action is globalized (Lupton, 1999). Processes of

globalization, including the pervasiveness of technology are unique to the late 20th and early 21st centuries and connect diverse populations creating a world risk society. The historical dualistic discussions of nature and culture and people's relation to environments indicate that nature is separate from cultural activity. Traditional social science understandings of nature and culture are impacted by the dissolution of the boundaries between people and their physical environments, as well as geographical boundaries in the risk society (Adam, 1996: 89-90). The risks produced through industrial processes are not just environmental problems but represent an institutional crisis as the institutions in which the public places its trust, including government, industry and science, fail to protect our health (Beck, 1995). Beck (1995: 2) argues that "[t]hreats are produced industrially, externalized economically, individualized juridically, legitimized scientifically, and minimized politically." In this view of the world risk society, there is a global citizenship in which traditional means of defining identity linked to locality are exchanged for a focus on the world-wide perspective, as environmental risks are an invisible reality and create a global future and common experience regardless of geographical location (Adam, 1996; Lupton, 1999).

The globalization of risk creates far-reaching consequences. Both Beck (1992) and Giddens (1990) contend that the nature of globalized risks does not respect the class divide or geographical boundaries of the world. In an elimination of the "other," the nature of globalized risk transcends social and economic considerations. It is possible to frame risks such as radioactivity, nuclear technology and toxic substances as not respecting geographical boundaries and affecting the global population regardless of

location or socioeconomic status. The pervasiveness of environmental risks and the geographical span demonstrates that locally-produced risks can result in globally-produced consequences (Mythen, 2004: 32). Unlike Beck, Giddens (1990: 125-26) does acknowledge that risks are “differentially distributed between the privileged and the underprivileged,” but neither proponent of the risk society provides an in-depth analysis of how issues of class may still be prevalent in the risk society.

The increased social awareness of the detrimental impact of human practices on the environment leads to the social cognition and environmental impact of risk becoming a global issue. This leads to Beck’s claim that risks within the risk society dissolve hierarchies of class and geography (Mythen, 2004: 32). However, this does not allow for the recognition that these global risks often affect already marginalized or historically-oppressed populations disproportionately and the risks are experienced in profoundly different ways. Marshall (1999: 269) observes that historically, corporations have located hazardous industries in communities of low socioeconomic status, choosing “the path of least resistance.” In fact, the environmental justice and environmental racism literature situated in the social sciences demonstrates that communities of low socioeconomic status are systematically and disproportionately affected by technological hazards such as toxic contamination, oil spills and radioactive waste storage (Marshall, 1999; Scholsberg, 2007). The unequal distribution of environmental risks cannot be adequately understood through a framework which emphasizes one factor to the exclusion of other relevant factors (Brulle and Pellow, 2006). Environmental justice is the first framework to explicitly link environment, race, class, gender, and social justice concerns and the

disproportionate burden faced by at-risk populations²² (Taylor, 2000: 42). A critique grounded in environmental justice is able to consider the lived experience and experiential knowledge of those most affected by the risks which is clearly missing from the risk society. Proponents of environmental justice in social movements call for i) equity in the distribution of environmental risk; ii) acknowledgement of the diversity of participants and experiences of affected communities; and iii) participation in the political processes which create and manage environmental policy and thus, assess and manage the associated risks (Scholsberg, 2007: 517). Environmental breast cancer activists' efforts to

integrate the needs of socially and economically marginalized women into the environmental breast cancer movement have not only broadened the movement's demographic base, however, but also highlight the ways in which gender, race, and class shape understandings of the environmental breast cancer problem, the strategies for addressing it, and disease prevention efforts more generally (Ley, 2009: 138).

The intersection of sex and gender with other determinants of women's health is of particular relevance when considering potential outcomes related to environmental health, contaminants and breast cancer (Hankivsky et al., 2010).

The risk society perspective offers an overarching theoretical framework for this research that acknowledges risks and a causal relationship with environmental health. However, there are important gaps in this perspective and the framework is augmented with environmental justice literature which allows for a broader consideration of the

²² For additional discussion of environmental justice and health concerns, refer to Brown et al. (2012), Buzzelli (2008), Dhillon and Young (2010), Fletcher (2003), Hoover et al. (2012), MacDonald and Rang (2007), and Scott (2009a).

globalization of risks, the politics of risks and hazards, and the pitfalls associated with the individualization of risk and illness (Hess, 2004).

Beck (1995) distinguishes two stages in the ecological conflict in the risk society. The first stage is a struggle to uncover the risks and their environment and health implications which must be exposed despite industrial expansion and progress. The second stage occurs when knowledge about the risk is accepted in principle, but there is no remediation and thus a conflict surrounding issues of accountability arises. Beck (1995: 8) contends that

the ecological issue, considered politically and sociologically, focuses at heart on a *systematic, legalized violation of fundamental civil rights*—the citizen's right to life and freedom from bodily harm. This violation is not going on incidentally, accidentally, or individually, but in broad daylight, as part of the development of industry, prosperity, and technical rationality in the glare of the mass media and in an alert democracy of citizen's groups (emphasis in original text).

Beck (1992: 71) suggests that if risks are not recognized scientifically then they do not exist legally, medically, technologically, or socially and subsequently are not prevented, treated or compensated for.

Conclusions

The theoretical framework for this research draws from seemingly disparate bodies of literature and concepts including sex- and gender-based analysis, social movement theory, and the risk society perspective. In my view, each is necessary for conducting an effective analysis of Canada's body of law, policy and practice related to toxic substances, and for prioritizing a primary prevention approach to breast cancer. First, breast cancer is a disease that primarily affects women, and there is a growing body of evidence that suggests at least some of its incidence is related to endocrine disrupting

chemicals understood to affect bodies in ways profoundly influenced by sex and gender considerations. The fact that sex- and gender-based analysis has not been a central feature of the law, policy or practice governing the regulation of toxics justifies its inclusion into the analytical approach taken here. Second, the culture of cancer prevention and environmental risk which emerged in San Francisco and the related and widespread environmental breast cancer movement has shaped the way that the law, policy and practices related to toxic substances have been understood. By acknowledging the risks associated with everyday exposures to toxic substances and the associated detrimental health outcomes, including the development of breast cancer, and by making these political issues, those social movements have generated a widespread call for a shift away from the dominant epidemiological paradigm of breast cancer. And third, the influence of the biomedicalization regime has resulted in all women being framed as permanently at risk for developing the disease and as responsible for their own health outcomes. This “risk role” can be understood through the risk society perspective which acknowledges the unique nature of contemporary risks which are produced and managed through social, cultural and political factors.

There are three axes along which struggles for a paradigm shift against the dominant epidemiological paradigm occur and which reflect the varying levels of prevention, risk factors and public participation in research.²³ The first axis is concerned

²³ Brown et al. (2006) argue that challenges to the breast cancer dominant epidemiological paradigm are located primarily within the United States as a result of the strength of the breast cancer movement and particularly the environmental breast cancer movement. However, I would suggest that the challenges to the dominant epidemiological paradigm are also occurring in other western countries, including Canada.

with the level of prevention and whether the focus of research involves treatment, intervention or prevention (Brown et al., 2006). Degrees of prevention include primary, secondary and tertiary prevention and are well-utilized in the field of health promotion. Primary prevention promotes the prevention of disease among specific populations and is most relevant for this research in its potential to truly prevent disease from a public health context. In an environmental health framework, these strategies would include the objective of reducing human exposure to environmental contaminants and are consistent with the efforts of the culture of action of cancer prevention and environmental risk (Brown et al., 2006: 511-12; Klawiter, 2008a). Secondary prevention efforts promote access to screening measures, early detection of disease and timely intervention. For breast cancer, measures of secondary prevention include breast self-examination, biopsy and mammography (Brown et al., 2006: 512). Aspects of secondary prevention efforts reflect the efforts of both the culture of early detection and screening activism and the culture of patient empowerment and feminist treatment activism (Klawiter, 2008a). Finally, tertiary prevention efforts attempt to minimize the health effects of disease. Efforts of tertiary prevention in breast cancer involve the traditional interventions including surgery, radiation, chemotherapy, and medication (Brown et al., 2006: 512).

While the first axis focuses on health interventions and levels of prevention, the second axis focuses on research itself, both at the level of the individual and the community. The traditional biomedical approach to disease focuses on individual risk factors, including biological, genetic and lifestyle factors. In contrast to an approach which focuses on individual characteristics, models from health promotion, political

economy of health, and social production of disease question how economic, political and environmental factors may influence health outcomes. In this framework, disease prevention occurs through changes in industrial production practices rather than individual behaviour or forms of medical treatment. A more broadly-based population approach focuses on the relationship between bodies and macro-level structures and asks why some groups of women have higher incidence rates of breast cancer than other groups. These considerations are not accounted for in an individual approach to breast cancer (Brown et al., 2006: 517-18). Brown et al. (2006: 518) contend that “[i]n terms of intervention, the population based approach is more radical because it implies the need for mass environmental control measures or the alteration of socioeconomic norms that give rise to widespread hazardous exposures and collective behaviors that enhance the vulnerability of certain communities to disease.”

The third axis within the struggle for a paradigm shift in the breast cancer dominant epidemiological paradigm pertains to the involvement of lay activists in the research process. Brown et al. (2006) use a continuum to illustrate this process. On one end of the continuum, research is conducted independently, and laypersons may participate as subjects in a study but without the possibility of contributing to the research questions, methodology, data analysis, or the dissemination process. On the opposite end of this continuum, laypersons are actively involved and collaborate in the research process by providing important and substantive contributions. The “magnitude of lay involvement in breast cancer research signifies the broad societal importance of the

disease itself and is representative of campaigns for public representation in other illnesses as well” (Brown et al., 2006: 525).

Breast cancer is an important area of research for developing critical theory, policy and practice (Wilkinson, 2007). Breast cancer in contemporary society has distinct similarities to the disease a hundred years ago. In both time periods, the medically accepted forms of treatment carry significant risks, and cannot offer a guaranteed cure for the disease. Similarly, in both time periods, there are concerns surrounding the effectiveness of disease prevention (Leopold, 1999). Considering the history of breast cancer clearly demonstrates how something that appears to be an objective concept is influenced by cultural factors, and the influence of contemporary beliefs about gender, the mind, bodies, and personal responsibility has implications for discussions of illness (Jasen, 2002: 42).

It has become clear from sociocultural perspectives on risk that understandings of disease and health cannot be separated from the social and political contexts in which they arise (Nash, 2006). Risk is a pervasive concept related to human existence in contemporary western societies and is associated with notions of choice, responsibility and blame (Lupton, 1999). In the risk society,

[r]isks lie across the distinction between theory and practice, across the borders of specialities and disciplines, across specialized competences and institutional responsibilities, across the distinction between value and fact (and thus between ethics and science), and across the realms of politics, the public sphere, science and the economy, which are seemingly undivided institutions (Beck, 1992: 70).

The incidence of harm related to toxic substances in the risk society is “not only significant, intentional, and expected, but [is] also...inherent to our practices of

production and consumption” (Scott, 2008: 296). Therefore, environmental health issues are so strongly contested because they are so intricately linked to the production and consumption processes in contemporary western society (Beck, 1992; Brown, 2007).

Definitions of illness are continually shifting and evolving with social forces playing an integral role in the social construction of illness (Shriver, White and Kebede, 1998). The acceptance of environmental causation of disease is further complicated by issues of uncertainty and the problems of knowing which are consistent themes in discussions of contested illnesses, including breast cancer. Ley (2009: 36-37) contends that the issue of uncertainty creates difficulty in calling for more protective environmental policies within a regulatory system that “demands proof of harm before taking action.” Contemporary environments are filled with manufactured risks created by corporations and government which are difficult to measure, predict and control (Brown, Kroll-Smith and Gunter, 2000; Giddens, 1990). The inherent uncertainty associated with these risks is grounded in the interests of those responsible for their production. As Adam (1996: 97) argues, “insistence on certainty and ‘proof’ for situations characterized by indeterminacy, unpredictability and multiple time-lags is central to much of the political complacency about environmental problems.” There are problems associated with the i) rapid changes occurring in the contemporary environment, and ii) the limited capacity of experts and their systems for fully assessing and evaluating these changes (Brown, Kroll-Smith and Gunter, 2000). The latency period between exposure and identifiable symptoms could be months, years or even decades which complicates the question of proof with respect to the causal connection between toxic substances and illnesses such

as breast cancer. This temporal gap, combined with the mobility of individuals in contemporary society, makes it difficult to connect symptoms with particular locations and exposures and further complicates attempts to challenge contemporary assumptions about the separation of bodies and contaminated environments (Nash, 2006: 181).

Brown, Kroll-Smith and Gunter (2000) provide some important considerations surrounding the uncertainty related to environmental health controversies and contested illnesses. There is uncertainty surrounding the body's past exposures to potentially hazardous environments, the potentially synergistic effects, and the lack of a history of exposure during interactions with the medical profession. There has traditionally been a great deal of uncertainty around the low-dose response relationship in toxicology and the difficulty producing data about the effects of chronic, low-level toxic exposures on human health (Brown, Kroll-Smith and Gunter, 2000). However, a number of recent publications focus on the health effects of low-dose exposures to toxic substances, and endocrine disrupting chemicals in particular. When the original *State of the Science of Endocrine Disrupting Chemicals* report was published in 2002 (WHO, ILO and UNEP, 2002), the evidence linking endocrine disrupting chemicals to human health outcomes was described as "weak" (Bienkowski, 2013a). The state of the science has evolved considerably in the past ten years and the newly published report concludes that endocrine disrupting chemicals "have the capacity to interfere with tissue and organ development and function, and therefore may alter susceptibility to different types of diseases throughout life. This is a global threat that needs to be resolved" (UNEP and WHO, 2012: xv).

Similarly, the European Environment Agency has developed a working definition of the precautionary principle since the publication of the first *Late Lessons from Early Warnings* report in 2001 (EEA, 2001) to reflect advances in science and research over the past decade and recognizing the implications of toxic substances for the environment and human health.

The precautionary principle provides justification for public policy and other actions in situations of scientific complexity, uncertainty and ignorance, where there may be a need to act in order to avoid, or reduce, potentially serious or irreversible threats to health and/or the environment, using an appropriate strength of scientific evidence, and taking into account the pros and cons of action and inaction and their distribution (EEA, 2013: 681).

Finally, regarding the toxicology concept that “the dose makes the poison” in the traditional dose-response relationship, recent research has demonstrated that low-dose exposures of endocrine disrupting chemicals can have effects that are not predicted at higher doses (Vandenberg et al., 2012).

The final uncertainty described by Brown, Kroll-Smith and Gunter (2000: 11) involves problems associated with diagnosis as the authors suggest that physicians often do not possess the technology or knowledge to determine a causal link between exposure to environmental contaminants and a specific disease. While this uncertainty still exists and environmental links to health remain contested, there is a clear need for precaution and prevention of disease, especially in the context of women’s health. The increasing number of chronic diseases in contemporary society, including breast cancer, cannot be adequately addressed within the individualist paradigm for the management of infectious diseases (Davis and Webster, 2002). Breast cancer is clearly influenced by sociocultural, political, economic, and environmental factors and advocating for increased research

without changing the environmental regulatory system is not enough to protect women's health (Ley, 2009: 82).

Chapter 3

The History of Environmental Health Policy in Canada

Introduction

This chapter will provide a descriptive history of Canadian policy related to environmental health drawing from federal legislation including the *Environmental Contaminants Act* and the *Canadian Environmental Protection Act*; government publications from the 1970s to the present, including Environment Canada and Health Canada; and grey literature from environmental and health organizations. This chapter considers the evolution of legislation and public health policy designed to protect Canadian citizens from exposure to toxic substances and the associated adverse health outcomes.

The chapter begins its overview of the history of health policy in Canada with the influential Lalonde Report written in 1974, one of the first policy documents to recognize the interacting influences on health outcomes, including the environment. It then moves to the *Environmental Contaminants Act*, which was the first piece of federal environmental legislation, followed by the the *Canadian Environmental Protection Act*, 1988. Here, an extensive review of the Act was paralleled by the implementation of the *Toxic Substances Management Policy*. This is followed by a discussion of the revised *Canadian Environmental Protection Act* which received Royal Assent in 1999, its review process, and the 2006 *Chemicals Management Plan*. The *Chemicals Management Plan* is the most recent tool for the assessment and management of toxic substances and the risks to the environment and human health. The detailed policy history that follows provides

the foundation necessary for the more in-depth and critical analysis in chapters four and five which examines the relationship between theory and practice in Canada's regulatory regime for toxics and the potential for protecting Canadian women's health, their risk for developing breast cancer and the potential for preventing the disease.

An Overview of the History of Health Policy in Canada

As discussed in chapter two, issues of health, especially those related to breast cancer and disease regimes, have historically been viewed as private matters rather than of public concern. Health issues were regarded primarily as the responsibility of the family and possibly charitable or religious institutions, whereas government intervention was limited. From 1867 to 1919, the Department of Agriculture was responsible for any health-related concerns in Canada (Ham, 2001). The first federal health department was established in 1919 and reconstituted in 1993 during which time its responsibilities included conducting public health studies, the regulation of food and drugs, the inspection of medical devices, the administration of health care insurance, and the dissemination of general information services related to health conditions and practices (Maioni, 2004; Miller Chenier, 2002).

A working document was published in 1974 which is frequently cited as revolutionizing understandings about health, identifying the need for intersectoral collaboration, and acknowledging the importance of multiple interventions in order to properly address the determinants of health (Canadian Population Health Initiative, 2002; Glouberman and Millar, 2003). Marc Lalonde, Minister of National Health and Welfare under the Liberal government, wrote *A New Perspective on the Health of Canadians*

which focused on the state of Canadians' health and proposed a new approach for addressing health outcomes (Lalonde, 1974). The health status of the Canadian population was framed as one of the significant problem areas with health outcomes including life expectancy, rates of mortality and morbidity, and causes of death (Lalonde, 1974: 19). Due to the lack of consensus regarding an established conceptual framework in the analysis of health, Lalonde (1974: 31) proposed the utilization of a "health field" concept that was developed by considering the underlying factors associated with the health status of Canadian citizens. The health field includes four broad elements and is proposed as a tool for the analysis of health problems, as well as determining the health needs of Canadians and how those needs might be properly addressed.

The first element proposed by Lalonde (1974: 31) is *human biology*, "all those aspects of health, both physical and mental, which are developed within the human body as a consequence of the basic biology of man and the organic make-up of the individual" (Lalonde, 1974: 31). Human biology is linked to a variety of health issues including genetic disorders and chronic diseases such as diabetes, arthritis and cancer. The second element utilized in the health field concept is the *environment* which involves "matters related to health which are external to the human body and over which the individual has little or no control" (Lalonde, 1974: 32). It was recognized at this time that health status can be impacted by both social and physical environments and that individuals cannot prevent health hazards associated with the pollution and contamination of air, water and food supplies (Lalonde, 1974).

The third category of the health field involves the *lifestyle* of individuals and the decisions and behaviours which impact their health status. The language used in the discussion of lifestyle factors is contradictory: placing blame on the individual for creating self-imposed risks which may contribute to illness or death such as smoking cigarettes and consuming alcohol, while simultaneously labelling the individual as a “victim” (Lalonde, 1974: 32). The final category within the health field involves the *health care organization* which consists of the “quantity, quality, arrangement, nature and relationships of people and resources in the provision of health care” (Lalonde, 1974: 32). The health care organization is more commonly referred to as the health care system and includes related institutions, professionals, practices, and treatments (Lalonde, 1974).

Prior to the 1970s most efforts to improve health status in Canadian society and the majority of direct health expenditures focused on the health care organization. However, as Lalonde (1974: 32) notes, the main causes of sickness and death in Canada are rooted in human biology, environment and lifestyle. A significant challenge encountered when attempting to improve the health status of the Canadian population is that the power to do so is dispersed among individual citizens, governments, health professions, and institutions. The Lalonde Report suggests that this creates fragmented responsibility and imbalanced approaches. The comprehensive nature of the health field concept allows for health problems to be traced to one or a combination of the four elements and to examine their significance and interaction (Lalonde, 1974).²⁴

²⁴ The influential Lalonde Report and the emphasis on interacting influences on health outcomes was a precursor to the rise of research focused on the social determinants of health that emerged in the 1980s and continues to evolve in 2013 (O’Neill et al, 2007; Mikkonen and Raphael, 2010; Raphael, 2003).

At the time of the Lalonde Report, the Government of Canada was committed to pursuing two broad objectives related to health outcomes: reducing mental and physical health hazards for citizens considered to be at increased risk, and improving accessibility of good mental and physical health care for individuals that encounter barriers to accessing such care (Lalonde, 1974). In order to achieve these objectives, five specific strategies were proposed:

- 1) a *health promotion strategy* to inform, influence and assist individuals and organizations to accept additional responsibility and become active participants in matters related to mental and physical health;
- 2) a *regulatory strategy* to use federal regulatory powers to reduce hazards related to mental and physical health, as well as promoting similar practices at the provincial level;
- 3) a *research strategy* to discover and apply information related to mental and physical health problems;
- 4) a *health care efficiency strategy* to assist the provinces in reorganizing the delivery of mental and physical health care to address issues of cost and accessibility; and
- 5) a *goal-setting strategy* designed to develop goals for improving the mental and physical health status of Canadians and the efficiency of the health care system overall (Lalonde, 1974: 66).

Health promotion in Canada is rooted in the Lalonde Report's proposal that human biology, lifestyle, environment, and the health care organization have a direct influence on the health status of Canadian citizens (Health Canada, 2002a; Lalonde, 1974). The five objectives were designed to create a participatory framework where health promotion is distinguished from both health protection and disease prevention. While *health protection* efforts are concerned with maintaining health status by addressing

intermediate health threats, and *disease prevention* attempts to anticipate and avoid imminent health threats, *health promotion* moves beyond maintaining health to improving health status and focuses on long-term health gains (Health Canada, 2002a). There was a rapid growth of interventions including health education in public schools, and social marketing public awareness campaigns focused on tobacco use, exercise and healthy diets in an attempt to influence individual knowledge, attitudes and behaviours (Health Canada, 2002a; PHAC, 1997). These early health promotion initiatives focused directly on the lifestyle component and the related links between health status and personal risk behaviours (Boyce, 2002) creating a precedent for individual responsibility for health outcomes.

However, by the early 1980s there was increasing concern about the limitations of health promotion campaigns that focused solely on lifestyle, individual choices and personal behaviours. In *Achieving Health for All*, Jake Epp, Minister of National Health and Welfare under the Progressive Conservative government, utilized a population-based approach to health as a complement to the healthcare system, and to identify aspects in health policy and practice that resulted in disparities and negative health outcomes among Canadian citizens (Epp, 1986; Parliament of Canada, 2008a). Epp (1986) called for an integration of concepts from public health, health education and public policy towards health promotion in order to reduce inequities, increase prevention efforts and enhance Canadian's capacity to cope. It was argued that framing the causal relationship between lifestyle and behaviour with health outcomes does not adequately account for interacting factors that also play a significant role (Epp, 1986: 5). Instead, Epp (1986: 7)

recommended three mechanisms for effective health promotion: i) *self-care*, the decisions and actions individuals can take in the interest of their own health and well-being; ii) *mutual aid*, the actions one can take to assist others; and iii) *healthy environments*, the creation of conditions and surroundings that are conducive to good health (Epp, 1986: 7; Health Canada, 2004b). Environmental change is framed as the most complex and difficult of the three mechanisms necessary for effective health promotion. Epp (1986: 9) concluded that it is “time to clearly articulate a direction which is designed expressly to promote the health of Canadians.”

The first international conference on health promotion was held in Ottawa in November 1986 and was co-sponsored by the World Health Organization, the Canadian Public Health Association, and Health and Welfare Canada. The five key strategies involved in the framework of health promotion included building healthy public policy, creating supportive environments, strengthening community action, developing personal skills, and reorienting health services (World Health Organization, 1986). A significant outcome of the conference was the publication of the *Ottawa Charter for Health Promotion* which has since become influential in the practice of health promotion both across Canada and internationally (PHAC, 1997; WHO, 1986). A perspective grounded in population health research emerged which recognized the impact of structural conditions such as poverty and discrimination on health status. Structural factors were now being considered along with environmental factors including the physical, social, cultural, and economic environments that impact the health of the Canadian population (Health Canada, 2002a). While Canada emerged as a public leader in health promotion at

this time, there was a disconnect between public health policy and emerging environmental legislation.

Environmental Contaminants Act

Unlike health protection statutes such as the *Food and Drugs Act*²⁵ which dates back to 1920, legislation designed to protect the Canadian environment has been developed more recently. The Department of the Environment was established in 1972 and the first piece of legislation that focused on environmental protection, the *Environmental Contaminants Act*, was promulgated in 1975 under the Liberal government.²⁶ The *Environmental Contaminants Act* was administered to address the environmental and health risks posed by toxic chemicals, under the rubric of “toxic substances management.” It also developed a domestic response to international initiatives at the level of the Organisation for Economic Co-operation and Development (OECD) to manage the risks associated with polychlorinated biphenyls (PCBs) (Leiss, 2001; Meek and Armstrong, 2007: 592).

There was an increase in concern about the causal relationship between the environment and human health at this time. Public awareness surrounding this relationship was influenced by widespread media coverage of events such as the industrial dumpsite at Love Canal, New York in 1978; a nuclear power plant accident at

²⁵ The *Food and Drugs Act* was established in 1920 and focused on preventing adulteration, unsanitary production, fraudulent labelling, and subsequently licensing requirements for drugs. By 1951, pharmaceutical manufacturers were legally required to obtain regulatory approval before marketing their drugs. However, the thalidomide tragedy of the early 1960s resulted in a strengthening of Health Canada’s regulatory abilities (Health Canada, 2010: 17).

²⁶ Environmental Contaminants Act, R.S.C. 1975.

Three Mile Island, Pennsylvania in 1979; a gas leak in Bhopal, India in 1984; and the world's worst nuclear power accident at Chernobyl, in the former USSR in 1986. A discussion of new "environmental risks," featuring aspects of collective risk, long latency periods, and irreversible impacts was distinguished from traditional environmental problems such as floods, earthquakes and tornadoes. The new risks included suspected carcinogens, mutagens and heavy metals which pose "long-term, serious threats of uncertain likelihood to health and life" (Page, 1978: 218). Researchers at the time emphasized that research findings demonstrated "that the release of certain chemicals into [hu]man's environment...[could] lead to the production of cancer, birth defects, genetic damage and a range of acute and chronic diseases" (Nemetz et al., 1981: 3).

Concern surrounding the visibility of environmental risks is consistent with Beck's (1992) later work on the risk society. It may be argued that the nature of environmental risks are visible because of the potential negative outcomes associated with a particular risk. However, Page (1978) proposes that the visibility of environmental risk is also impacted by a number of different factors and in particular ways. An important consideration is that environmental risks lack visibility when considering the potential for lengthy latency periods between exposure and health outcomes. It is suggested that the low dose concentrations of environmental pollutants result in a lack of visibility. The acknowledgement of the risk associated with the environment may also be affected by one risk receiving more attention than another, such as a recognized carcinogen over a suspected carcinogen or a contested contaminant (Page, 1978: 222-23). The identification of new environmental problems include the production of synthetic

chemicals which may be toxic, carcinogenic, mutagenic, or teratogenic. These new risks are described as being “less susceptible to management through existing regulatory, legal and economic institutions” (Page, 1978: 207-8).

The *Environmental Contaminants Act* did not require either assessment or testing of environmental contaminants for potential impact on human health or the environment prior to their release into the Canadian environment. Under the Act, if the Minister of the Environment and the Minister of National Health and Welfare believed that a substance may enter the environment in quantities or concentrations that may constitute a danger to human health or the environment, they possessed the authority to i) require commercial producers of that substance or class of substances to provide the government with notification of activities and information about the substances; and ii) require producers and importers to conduct tests which the Ministers may reasonably require (Nemetz et al., 1981: 123). Thus, industry was only required to submit testing information about environmental contaminants if the Ministers had reason to believe that a substance may enter the environment in amounts that are a danger to human health or the environment based on existing information (Meek and Armstrong, 2007).

Toner (2002: 76-77) contends that the Liberal government’s lack of enforcement was a result of their “lack of political will” to challenge: i) claims from the provinces that federal regulatory efforts were a jurisdictional infringement; and ii) claims from industry stakeholders that environmental regulation would result in an undue burden and in job loss. Like other federal statutes, the *Environmental Contaminants Act* could only be meaningful and effective when specific regulations were made under it (Nemetz et al.,

1981: 124). In this context, Environment Canada lacked the resources to effectively administer the *Environmental Contaminants Act*. For instance, Environment Canada only assessed five chemicals over a period of ten years (Leiss, 2001: 202-03). A Consultative Committee was established in 1985 to review proposals to strengthen the *Environmental Contaminants Act* (Environment Canada, 2002; Environmental Contaminants Act Consultative Committee, 1986). Consistent with Page's (1978) assessment of new environmental risk problems, the legislative review determined that the *Environmental Contaminants Act* was unable to adequately address the scope of problems associated with environmental contaminants.

Not only has the number of chemicals increased dramatically over the past 20 years or so, but so have the quantities of them that are produced. Global production of organic chemicals, for example, increased from about 1 million tonnes a year in the 1930s to 7 million in 1950, 63 million in 1970 and about 250 million in 1985. Annual production now tends to double every seven or eight years (House of Commons Standing Committee on Environment and Sustainable Development, 1995: 22).

The Canadian Environmental Protection Act, 1988 (CEPA)

After a process involving extensive public consultation and task force recommendations, including the legislative review conducted by the Environmental Contaminants Act Consultative Committee, a bill was drafted to provide a revised approach and include multiple aspects of environmental protection under one statute. A more comprehensive approach to chemicals management was recommended in order to manage the complete life cycle of toxic substances from the "cradle to grave" (Douglas and Hébert, 1998; House of Commons Standing Committee on Environment and Sustainable Development, 1995; Toner, 2002). Bill C-74, the *Canadian Environmental*

*Protection Act*²⁷ was introduced to the House of Commons in June 1987 under the Progressive Conservative government. Extensive amendments were made to Bill C-74 in Committee over the following year and the Bill was passed and became active legislation on June 30, 1988 (House of Commons Standing Committee on Environment and Sustainable Development, 1995; McRobert and Cooper, 2000).

Lucien Bouchard, Minister of the Environment in 1988 promoted the need for a “strong federal role” in environmental protection:

If there is a special role for the federal government, it is the development of national environmental protection standards and practices. The very nature of environmental problems demands this. Too often, the solutions adopted to control polluting emissions or hazardous waste, for example, differ from province to province...Ottawa must play a key role in the harmonization of standards and methods (Harrison, 1996: 121).

CEPA became Canada’s primary legislation aimed at protecting the environment. In addition to the *Environmental Contaminants Act*, CEPA also replaced or combined environmental protection statutes including the *Clean Air Act*, the *Ocean Dumping Control Act*, and parts of both the *Canada Water Act* and the *Department of the Environment Act* into one single piece of larger legislation (Meek and Armstrong, 2007: 592). Part II of CEPA created a regulatory regime that allowed the Government of Canada to control toxic substances, including processes of manufacturing, importation and disposal. One of CEPA’s guiding principles is the management of pollution, and Environment Canada and Health Canada²⁸ became jointly responsible for the risk

²⁷ Canadian Environmental Protection Act, R.S.C. 1988; herein after described as CEPA.

²⁸ Health Canada promotes its commitment to improving the lives of Canadian citizens and to making Canada’s population among the healthiest in the world in terms of longevity, lifestyle and effective use of the public health care system (Health Canada, 2008a: 1). The objectives of the federal department include

assessment and management of toxic substances (Health Canada, 1995: 19). A substance is defined in section 3 as any distinguishable kind of organic or inorganic matter, whether animate or inanimate. Under section 11, a substance will be considered toxic if it enters or may enter the environment in a quantity or concentration under conditions that i) have or may have an immediate or long-term effect on the environment; ii) constitute or may constitute a danger to the environment on which life depends; or iii) constitute or may constitute a danger in Canada to human life or health. The inclusion of the word “may” when considering the danger to human life or health reflects a change in the language which allows for the potential of harm from that used in the *Environmental Contaminants Act*.

preventing and reducing risks to the individual health of Canadians and the overall environment; promoting healthier lifestyles; ensuring high quality health services that are both efficient and accessible; integrating renewal of the health care system with longer term plans in the areas of health prevention, promotion and protection; and reducing health inequalities to help Canadian citizens make informed decisions about their health (Health Canada, 2007b). Health Canada (2008a: 31-3) offers four strategic outcomes that guide their attempt to provide long-term benefits to Canadians:

- i) *An accessible and sustainable health system responsive to the health needs of Canadians* in order to promote the national coordination and development of a knowledge base to address health and health care priorities. Health Canada seeks to facilitate health system adaptation towards change in technology, society, industry, and the environment in order to protect Canadian citizens from health risks and provide access to quality health care;
- ii) *Access to safe and effective health products, food and information for healthy choices* to protect the health and safety of Canadian citizens. Scientific and technical expertise is emphasized in research conducted to contribute to evidence-based decision-making and regulation. Evidence-based decision-making has gained increased attention within the health policy environment and Health Canada seeks to advance evidence-based policy and regulatory decision-making within the department (Dobrow et al, 2004; Health Canada, 2008a);
- iii) *Reduced health and environmental risks from products and substances, and sustainable living and working environments*. Health Canada aims to advance scientific research and utilize evidence-based research to develop health promotion and harm prevention programs, policies and regulations; and
- iv) *Improve health outcomes and the reduction of health inequalities between First Nations and Inuit and other Canadians*. Health Canada will use science and research to accurately define health risks, trends and emerging issues related to the health status of First Nations and Inuit Canadians in order to support the effective design and delivery of health programs.

While toxicity is understood to involve the “inherent capability of a substance to cause harm” and does not include considerations of exposure, section 11 of CEPA equates toxicity with risk and the understanding that “harm to the environment or human health is a function of both the intrinsic toxicity...and the extent of exposure” (Health Canada, 1994: 2). The inclusion of the exposure component in determining if a substance is classified as toxic under CEPA means that a substance “cannot be regulated merely for having the inherent potential to cause harm; it must also be shown to be entering or likely to enter the environment at levels sufficient to cause harm” (Cooper et al., 2000: 202). Health Canada (1994: 2) finds that the definition of toxic under section 11 allows for principles of health risk assessment, but that the three risk assessment endpoints do not address any aspects of risk management including: i) a finding of “toxic” under CEPA; ii) a finding of “not considered to be toxic” under CEPA; or iii) a finding of “insufficient information to conclude whether or not the compound is toxic.”

CEPA includes two broad categories of substances. Under section 25, the Minister of the Environment was required to compile a list of substances for the first category, the Domestic Substances List. The Domestic Substances List includes existing substances that were manufactured or imported into Canada in a quantity of not less than 100 kilograms in any one calendar year, or were in commerce or used for commercial manufacturing purposes in Canada between January 1, 1984 and December 31, 1986. Due to limitations in the notification and information gathering provisions of the prior legislation, the *Environmental Contaminants Act*, the majority of the 23,000 existing substances, also known as “legacy chemicals,” were put into the marketplace without any

risk assessment that evaluated them for potential detrimental effects on human health and the environment (House of Commons Standing Committee on Environment and Sustainable Development, 1995: 22).

CEPA also required the Minister of the Environment to compile a list of substances which were new to Canadian society and commerce after 1986 and were not part of the Domestic Substances List. The Non-Domestic Substances List is based on the United States Environmental Protection Agency's *Toxic Substances Control Act* (TSCA) Chemical Substances Inventory for 1985 and includes more than 58,000 substances (Environment Canada, 2010b). It required that an assessment be conducted on all new substances for their potential impact on human health and the environment before their introduction into the Canadian market (House of Commons Standing Committee on Environment and Sustainable Development, 1995). Substances on the Non-Domestic Substances List are subject to less onerous notification requirements than the Domestic Substances List (Lucas, 1999; Environment Canada, 2010b).

Both the Domestic Substances List and Non-Domestic Substances List were published in a Supplement of the *Canada Gazette* on January 25, 1991 (Lucas, 1998: 155), and the Domestic Substances List was published in Part II, the Official Regulations of the *Canada Gazette* on May 4, 1994 (Health Canada, 2003a: 22). Under section 33, if a substance is determined to be toxic by meeting the requirements outlined in section 11, the Minister of the Environment and Minister of Health can recommend to the Governor in Council that the substance be placed on the Toxic Substances List in Schedule 1 of the Act. Twenty-six substances were originally placed on the Toxic Substances List under

CEPA, including asbestos, benzene, mercury, lead, and chlorofluorocarbons (CFCs) (Environment Canada, 2010c; Health Canada, 1994).²⁹

Section 12 of CEPA required that the Minister of Health and Minister of the Environment establish a Priority Substances List which “identifies substances to be assessed on a priority basis to determine whether they are toxic” under CEPA and where the substances pose a risk to the environment or the health of Canadians (Environment Canada, 2011a). A priority substance may involve a chemical, a group or class of chemicals, effluents, or wastes (Environment Canada, 2011a). The requirements of the Priority Substances Assessment Program include an in-depth assessment of the substance to determine the risks to the environment and human health. The assessment reports must include the characteristics of the substance, how it enters the environment, and the effects of and risks to human health and the environment as a result of exposure to the substance (Environment Canada, n/da). A report and summary must be published in the *Canada Gazette* with the decision of the Minister of Health and the Minister of the Environment regarding a whether a substance on the Priority Substances List will be listed as toxic under Schedule 1 of CEPA. The assessment must be completed within five years of publication in the *Canada Gazette* and if it has not been completed, a Canadian citizen can file a notice of objection to the Minister of the Environment requesting a review

²⁹ The twenty-six substances placed on the Schedule 1 List of Toxic Substances of CEPA included asbestos, 1, 1, 1-trichloroethane, benzene, bis(chloromethyl) ether, bromochlorodifluoromethane, bromofluorocarbons, bromotrifluoromethane, chlorobiphenyls, chlorofluorocarbon, chloromethyl methyl ether, dibenzo-para-dioxin, dibenzofuran, dibromotetrafluoroethane, dodecachloropentacyclo [5.3.0.02,6.03,9.04,8] decane (Mirex), fuel containing toxic substances that are dangerous goods within the meaning of section 2 of the *Transportation of Dangerous Goods Act*, 1992, hydrobromofluorocarbons, hydrochlorofluorocarbons, lead, mercury, methyl bromide, polybrominated biphenyls, polychlorinated dibenzo-para-dioxins, polychlorinated dibenzofurans, polychlorinated terphenyls, tetrachloromethane (carbon tetrachloride), and vinyl chloride (Environment Canada, 2010c).

board inquire whether the substance under consideration is toxic or capable of becoming toxic (sections 14 and 89(5)).

Environmental assessments and human health assessments were completed under the Priority Substances Assessments Program (Environment Canada, 2008). The first Priority Substances List (PSL1) was published in the *Canada Gazette* on February 11, 1989 and included 44 substances or groups of substances (Health Canada, 1994).³⁰ If a substance on the Priority Substances List was found to be “not toxic” under CEPA, the substance was deleted from the list as was the case for methyl tertiarybutyl ether and toluene (Lucas, 1998: 155). Twenty-five substances of the original 44 that were assessed under the first Priority Substances List met the criteria for being classified in CEPA. Based on the recommendations of a multi-stakeholder Expert Advisory Panel, those 25 substances were added to the second Priority Substances List (PSL2) of CEPA (Environment Canada, n/da; Environment Canada, 2008).

The second Priority Substances List was published in the *Canada Gazette* on December 16, 1995 and contained 25 substances or classes of substances including single

³⁰ The substances on the first Priority Substances List include 1,1,1-trichloroethane, 1,1,2,2-tetrachloroethane, 1,2-dichlorobenzene, 1,2-dichloroethane, 1,4-dichlorobenzene, 3,3'-dichlorobenzidine, 3,5-dimethylaniline, benzene, benzidine, bis (2-chloroethyl) ether, bis (2-ethylhexyl) phthalate, bis (chloromethyl) ether, chlorinated paraffins, chlorinated wastewater effluents, chlorobenzene, chloromethyl methyl ether, creosote-contaminated sites, dibutyl phthalate, dichloromethane, di-n-octyl phthalate, effluents from pulp mills using bleaching, hexachlorobenzene, hexavalent chromium compounds, inorganic arsenic compounds, inorganic cadmium compounds, inorganic fluorides, methyl methacrylate, methyl tertiary-butyl ether, organotin compounds, oxidic, sulphidic and soluble, inorganic nickel compounds, pentachlorobenzene, polychlorinated dibenzodioxins, polychlorinated dibenzofurans, polycyclic aromatic hydrocarbons, refractory ceramic fibre, styrene, tetrachlorobenzenes, tetrachloroethylene, trichlorobenzenes, trichloroethylene, toluene, used crankcase oils, and xylenes (Environment Canada, 2008).

chemicals, mixtures and effluents.³¹ Environment Canada and Health Canada have completed risk assessments that consider the impact on both the environment and human health for the second Priority Substances List. The draft assessment reports are available for a 60-day comment period to the public and then revised and a final copy is published with the determination of whether a substance is considered to be toxic under CEPA (Environment Canada, 2006). If a substance is determined to be toxic under CEPA, the Minister of the Environment and Minister of Health can choose from risk management control options including environmental quality or releases, guidelines, codes of conduct, or specific regulations controlling the release, handling, storage, transportation, or disposal of a toxic substance. The proposed regulation must be published in Part I of the *Canada Gazette* (Lucas, 1998: 156).

There is a legislative requirement that the Government of Canada must review CEPA every five years under a process that involves public consultation (section 139 of the Act). The House of Commons Standing Committee of Environment and Sustainable Development was tasked with conducting the first review of CEPA on June 10, 1994. The five years of the review period are described as being “characterized by highly charged tension among champions of health, environment, labour and other public

³¹ The substances on the second Priority Substances List include acetaldehyde, acrolein, acrylonitrile, aluminum chloride, aluminum nitrate and aluminum sulphate, ammonia in the aquatic environment, 1,3-butadiene, butylbenzylphthalate (BBP), carbon disulfide, chloroform, N,N-dimethylformamide (DMF), ethylene glycol, ethylene oxide, formaldehyde, hexachlorobutadiene (HCBd), inorganic chloramines, 2-methoxy ethanol, 2-ethoxy ethanol, 2-butoxy ethanol, N-nitrosodimethylamine (NDMA), nonylphenol and its ethoxylates (NPE), phenol, releases from primary and secondary copper smelters and copper refineries, releases from primary and secondary zinc smelters and zinc refineries, releases of radionuclides from nuclear facilities (effects on non-human species), respirable particulate matter less than or equal to 10 microns, road salts, and textile mill effluents (Environment Canada, 2006).

interests, the government, and the regulated chemical and other affected industries” (Kwasniak, 1999).

Toxic Substances Management Policy

During the CEPA review period, the *Toxic Substances Management Policy* was developed by the Liberal government after consultations with stakeholders held between September 1994 and April 1995 (Environment Canada, 1995). The *Toxic Substances Management Policy* was released in June 1995 and is still operational today. According to Environment Canada (1995: 1), it is designed around a “preventive and precautionary approach to deal with all substances that enter the environment” which may negatively impact the environment or human health. This policy is intended to guide regulatory and non-regulatory programs within federal jurisdiction, and is designed to help determine the risk assessment and management processes for toxic substances in Canada. The risk assessment process under the *Toxic Substances Management Policy* estimates the degree and likelihood of adverse effects as a result of exposure to a toxic substance in the environment. Risk management under this policy involves selecting and implementing management options around a particular risk associated with toxic substances while considering a range of legal, economic and social factors (Environment Canada, 1995: 7).

A toxic substance will be considered for systematic assessment if a federal, provincial, or international program or a Canadian citizen identifies a substance as potentially harmful to the environment and/or human health (Environment Canada, 1995). The key objectives of the *Toxic Substances Management Policy* include the assessment and management of two specific groups of substances. In order to be

classified as a Track 1 substance, the substance must meet four criteria including being toxic under CEPA, persistent, bioaccumulative, and anthropogenic. The precise details of the criteria include:

- *CEPA-toxic*: A substance is considered toxic if it meets the criteria as defined in section 11 of CEPA where a substance is entering or may enter the environment in a concentration or under conditions that i) have or may have an immediate or long-term harmful effect on the environment or its biological diversity; ii) constitute or may constitute a danger to the environment on which life depends; or iii) constitute or may constitute a danger in Canada to human life or health;
- *Persistence*: A substance can be defined as persistent in air, water, sediment, or soil where environmental persistence refers to the “length of time in environmental media and is usually defined in terms of half-life – the time required for the concentration of a substance to diminish to half its original value” (Environment Canada, 1995: 8);
- *Bioaccumulation*: A substance can be considered bioaccumulative through a process in which the “substance accumulates in a living organism either from the surrounding medium or through food containing the substance” (Environment Canada, 1995: 8); and
- *Predominantly Anthropogenic*: A substance must be primarily produced as a result of human activity as opposed to contributions to the environmental medium from natural sources (Environment Canada, 1995: 8).

It is noted that persistence and bioaccumulation ranges may vary as they are influenced by factors such as the intrinsic properties of a substance, conditions in the environment, and the ecosystem under consideration. Thus, expert judgment and weight of scientific evidence are used to determine if the four criteria are fulfilled (Environment Canada, 1995: 9).

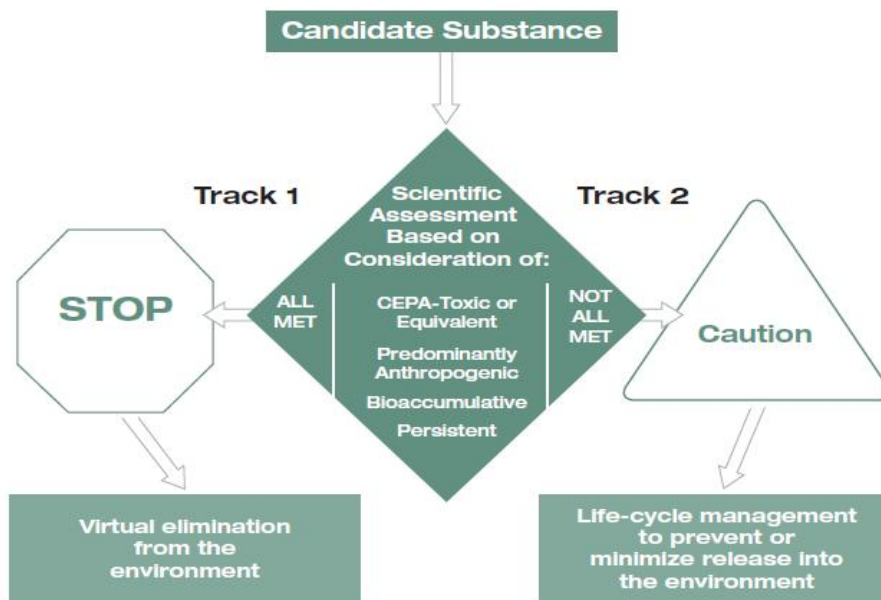
The *Toxic Substances Management Policy* proposes pollution prevention strategies to avoid the measurable release of Track 1 substances in order to minimize exposure to the environment and human health. If a Track 1 substance meets the required

criteria and cannot be adequately managed throughout its lifecycle, it may qualify for “virtual elimination.” The persistence and bioaccumulation criteria for individual chemical substances cannot be used for complex mixtures or groups of substances. However, a Track 1 substance that is present in a complex mixture can be a candidate for virtual elimination if the assessment and management process accounts for this (Environment Canada, 1995: 9). The *Toxic Substances Management Policy* proposes to achieve virtual elimination by “addressing sources of release to the environment or by removing or managing the substance if it is already in the environment” (Environment Canada, 1995: 5). This policy places the onus of responsibility on the producers or users of a Track 1 substance to prove that it will not be released into the Canadian environment in measurable concentrations during its life cycle. While the policy claims the objective of the virtual elimination of a substance from the environment is established regardless of socioeconomic factors, it also clearly states that “management plans such as targets and schedules to achieve that long-term objective will be based on analyses of environmental and human health risks as well as social, economic and technical considerations” (Environment Canada, 1995: 5). Track 1 substances are to be monitored in the environment to ensure the compliance with and effectiveness of the risk management process (Environment Canada, 1995).

The second category of chemicals addressed by the *Toxic Substances Management Policy* involves Track 2 substances which do not meet the four criteria including being anthropogenic, bioaccumulative, persistent, and CEPA-toxic. In this case, rather than a virtual elimination approach, risk management for these substances includes

a “life-cycle management” approach that focuses on pollution prevention, pollution control, and remediation in order to prevent or minimize the release of Track 2 substances into the environment. Legal, economic and social factors are included in determining the risk management process. While pollution control or remediation strategies may be utilized, the federal government considers pollution prevention to be the most cost-effective risk management strategy (Environment Canada, 1995: 7).

An overview of the overall risk assessment and management process in the *Toxic Substances Management Policy* can be seen in figure below:



(Environment Canada, 1995: 4).

Ultimately, the *Toxic Substances Management Policy* is promoted as a precautionary approach in the identification of toxic substances and the implementation of cost-effective measures to prevent negative impacts on the environment and human health.

This policy is publicized as serving as “the centrepiece for the country’s position on

managing toxic substances in discussions and negotiations with the world community” (Environment Canada, 1995: 4). The *Toxic Substances Management Policy* was released just two weeks before the House of Commons Standing Committee on Environment and Sustainable Development was scheduled to release its federally mandated review of CEPA, which focused on the effectiveness of the legislation and recommended changes to strengthen the Act in order to protect the Canadian environment and human health (House of Commons Standing Committee on Environment and Sustainable Development, 1995). The Canadian Environmental Law Association and the Canadian Institute for Environmental Law and Policy³² (1996) critiqued the *Toxic Substances Management Policy* by pointing to concerns raised during the public consultation process which were not incorporated into the final policy. Further, they argued that the House of Commons Standing Committee on Environment and Sustainable Development was responsible for reviewing the same issues as part of their legislative review. It is suggested that there is an “inescapable conclusion that the TSMP [*Toxic Substances Management Policy*] was released to pre-empt a more full and comprehensive debate and to thwart the kinds of reforms that were to be forthcoming by the Standing Committee” (CELA and CIELAP, 1996: 101).

³² The Canadian Environmental Law Association (CELA) was established in 1970 as a non-profit, public interest organization to use existing laws to protect the environment and to advocate for environmental law reforms. One of CELA’s primary objectives is to prevent harm to human and ecosystem health through the use of precautionary measures (CELA, 2012a). The Canadian Institute for Environmental Law and Policy (CIELAP) was founded in 1970 as not-for-profit research and education organization and one of Canada’s top environmental think tanks (CIELAP, n/d). CIELAP is no longer actively performing research and analysis after a decision by the Board in 2011 based on changes in funding and an overlap with CELA (CIELAP, 2011).

CEPA Parliamentary Review

Under the Liberal government, the House of Commons Standing Committee on Environment and Sustainable Development³³ conducted extensive hearings as part of its review process including nation-wide consultations with stakeholders comprised of members of the public, as well as representatives from environment, health and labour organizations, government, academia, and industry. The Standing Committee released *It's About Our Health! Towards Pollution Prevention: CEPA Revisited* in June 1995. The in-depth and detailed report contains 382 pages reviewing CEPA and provides 141 recommendations to the Government of Canada with the potential to strengthen and improve the legislation (House of Commons Standing Committee on Environment and Sustainable Development, 1995).

The Standing Committee cites Environment Canada's 1991 report, *The State of Canada's Environment* to illustrate the challenges involved with the use of chemicals in industrialized society.

In seeking to reap the abundant benefits they offer, people may also inadvertently run the risk of doing serious harm to the environment and human health. The problem that Canada faces, as a society that is highly dependent on chemicals, is

³³ Members of the Standing Committee on Environment and Sustainable Development included: *Chair*: Charles Caccia, M.P., for Davenport; *Vice-Chairs*: Karen Kraft Sloan, M.P., for York-Simcoe and Monica Guay, M.P., for Laurentides; *Members*: Peter Adams, M.P., for Peterborough, Paul DeVillers, M.P., for Simcoe North, John Finlay, M.P., for Oxford, Paul Forseth, M.P., for New Westminster-Burnaby, Bill Gilmour, M.P., for Comox-Alberni, Clifford Lincoln, M.P., for Lachine-Lac-Saint-Louis, Pat O'Brien, M.P., for London-Middlesex, and Roger Pomerleau, M.P., for Anou-Rivière-des-Prairies; *Associate Members*: Jim Abott, M.P., for Kootenay East, Rex Crawford, M.P., for Kent, Stan Dromisky, M.P., for Thunder Bay-Atikokan, Bob Mills, M.P., for Red Deer, Len Taylor, M.P., for The Battlefords-Meadow Lake, and Andrew Telegdi, M.P., for Waterloo; and *Other Member Who Participated*: Benoît Sauvageau, M.P., for Terrebonne. The *Clerk of the Committee* was Normand Radford. *Research Staff of the Committee* included Pascale Collas, Thomas Curran, Monique Hébert, Margaret Smith, and Ruth Wherry (seconded to the Committee by Environment Canada) from the Research Branch, Library of Parliament, and François Bregha and John Moffett from Resource Futures International. *Other Staff* included Susan Waters (House of Commons Standing Committee on Environment and Sustainable Development, 1995: iv).

how to realize the benefits of these substances while avoiding the damage they may cause or, at least, reducing the risk of such damage to acceptable levels (Environment Canada cited in House of Commons Standing Committee on Environment and Sustainable Development, 1995: 30).

This demonstrates an early recognition of the risks associated with toxic substances and understanding about the level of acceptability surrounding those environment and health risks.

The House of Commons Standing Committee on Environment and Sustainable Development (1995) specifically notes the capacity of toxic substances to persist and bioaccumulate in the environment to the point where they pose a danger to both ecosystem and human health. The Committee acknowledges the

...mounting evidence [which] continue[s] to reinforce concerns about the effects of persistent toxic substances. Long-term exposure of fish, wildlife and humans to these substances has been linked to reproductive, metabolic, neurological and behavioural abnormalities; to immunity suppression leading to susceptibility to infections and other life-threatening problems; and to increasing levels of breast and other cancers. Available evidence also points to the long-term reproductive and intergenerational effects (International Joint Commission cited in House of Commons Standing Committee on Environment and Sustainable Development, 1995: 30).³⁴

In its brief submitted to the Standing Committee, the Canadian Environmental Law Association speaks to concerns around toxic substances which have the potential to act as endocrine disruptors. The Standing Committee recognizes the increasing body of evidence around toxic substances, particularly those with persistent and bioaccumulative properties, including the potential for detrimental health outcomes such as reproductive,

³⁴ The International Joint Commission between Canada and the United States recognizes that each country is impacted by the other's actions related to lake and river systems located on the border with the purpose of managing and preventing pollution. The International Joint Commission publishes biennial reports on the water quality of the Great Lakes which can be found at http://www.ijc.org/en/_Biennial_Reports (International Joint Commission, 2013).

developmental and behavioural abnormalities. The report states that the “possible effects of such chemicals on the reproductive integrity of humans, particularly the suggested estrogenic properties of some pollutants, have now developed into a priority issue” (House of Commons Standing Committee on Environment and Sustainable Development, 1995: 33).

Consistent with Beck’s (1992) theory of the risk society and argument that contemporary chemical threats are unlimited across both space and time as they cross territorial borders and have the potential to affect future generations, the Committee contends that pollution can no longer be viewed only as a local problem. For instance, pesticides and PCBs produced in industrial and agricultural regions of North America are evident in wildlife in Northern Canada and high levels of PCBs have been found in the breast milk of aboriginal women in northern communities (House of Commons Standing Committee on Environment and Sustainable Development, 1995: 30-31).

The House of Commons Standing Committee on Environment and Sustainable Development expressed concern with the definition of toxic under section 11 of CEPA which determines a substance to be toxic if it enters or may enter the environment in a quantity or concentration under conditions that i) have or may have an immediate or long-term effect on the environment; ii) constitute or may constitute a danger to the environment on which life depends; or iii) constitute or may constitute a danger in Canada to human life or health. In this definition of toxic, “there must be a possibility that the substance will *enter* the environment, that living organisms will be *exposed* to the substance, and that there will be an actual or probable *effect* resulting from that exposure”

(House of Commons Standing Committee on Environment and Sustainable Development, 1995: 61). Accordingly, an *entry assessment*, *exposure assessment* and *effects assessment* must be conducted as part of the environmental and human health risk assessment processes under CEPA. The entry assessment determines whether a substance is entering or may enter the environment, and thus it requires that the major sources and releases of the substance be quantified. The exposure assessment must establish and quantify the relationship of exposure to the substance and the living organisms and human population by measuring the concentrations in air, soil, water, and sediment, and in the case of human health extrapolating those findings into probable exposures to humans. Finally, the effects assessment must determine acceptable concentrations for natural populations, communities and ecosystems exposed to the substance, and establish whether acceptable concentrations are exceeded in the environment (House of Commons Standing Committee on Environment and Sustainable Development, 1995: 61-62). An acceptable concentration of a substance is defined in Environment Canada's risk assessment guidelines as the "maximum substance concentration that causes no immediate or long-term harmful effect to the (natural) population, community or ecosystem under consideration" (House of Commons Standing Committee on Environment and Sustainable Development, 1995: 62).

The House of Commons Standing Committee on Environment and Sustainable Development (1995: 59) found that Canadian citizens have an expectation of protective legislation and rigorous enforcement of standards around toxic substances which may contain carcinogenic and endocrine disrupting properties. A key component in CEPA's

potential to protect the environment and human health from the effects of toxic substances lies in the risk assessment process. This is the “pivotal point around which turn the functions of risk management – including scheduling, regulations, compliance, and enforcement” (House of Commons Standing Committee on Environment and Sustainable Development, 1995: 59). Unlike the assessment and management of Track 1 and Track 2 substances which were proposed (and subsequently adopted and implemented) as part of the *Toxic Substances Management Policy*, the Standing Committee recommended three tracks for the assessment and management of toxic substances. The three tracks included:

- *Track 1 substances* which would establish a presumption of sunseting for any substance that is sunsetted or banned in a Canadian province or a member nation of the OECD, as well as for any substance that is persistent, bioaccumulative and inherently toxic;
- *Track 2 substances* which would involve a designation of toxic for any substance that is regulated in any Canadian province or in a member nation of the OECD, unless the proponent can demonstrate extraordinary reasons why the substance should not be regulated; and
- *Track 3 substances* which would involve the continued assessment of existing substances through the Priority Substances List process. The Priority Substances List program should be revised to include more classes of substances, effluents and waste streams, as well as applying a “stop-clock” provision for substances for which there is insufficient information needed to complete an assessment. The Minister of the Environment should have the authority to declare the substance toxic under CEPA even if the needed information is not available or forthcoming (Douglas et al., 1997; House of Commons Standing Committee on Environment and Sustainable Development, 1995: xxii).

The Standing Committee expressed concern with both the timing of the release of the *Toxic Substances Management Policy* and its content (Douglas et al., 1997).³⁵ The *Toxic Substances Management Policy* continues to use the section 11 definition of toxic, which equates toxicity with risk, and includes a risk assessment approach in which the exposure component plays a pivotal role. The risk assessment process under section 11 of CEPA considers the toxicity of a substance and the extent of exposure of a population to that substance (Health Canada, 1994). During the legislative review process, the Standing Committee received feedback suggesting that a hazard assessment process may be more appropriate than risk assessment where hazard is the “intrinsic capability of a substance to do harm, while risk is the probability of harm associated with exposure to various levels of a substance” (Health Canada, 1995: 13; House of Commons Standing Committee on Environment and Sustainable Development, 1995). A hazard assessment approach considers the intrinsic or inherent toxicity of a substance as the primary component in determining regulation and risk management strategies, rather than exposure. “The issue of how much of the substance enters the environment is not taken into account. The possibility that an inherently toxic substance *might* enter the environment is accepted as reason enough to trigger the regulatory process” (House of Commons Standing Committee on Environment and Sustainable Development, 1995: 60).

³⁵ The Standing Committee was critical of the *Toxic Substances Management Policy* because substances that were toxic, persistent and bioaccumulative would be allowed to be used in commerce if the proponent could demonstrate that the substance would not be released into the environment. The Standing Committee’s proposal for assessing and managing toxic substances would have “cast a wider net, thereby leading to the eventual elimination of a greater number of substances of concern” (Douglas et al., 1997).

The human health risk assessment conducted under CEPA focuses on both risk and exposure, but not hazard (House of Commons Standing Committee on Environment and Sustainable Development, 1995). Health Canada (1995: 13) contends that the approach to protecting human health from toxic substances must “be aimed at controlling those substances that will have the greatest potential impact on the public’s health...[which is] a function of both intrinsic toxicity and exposure.”³⁶ Health Canada (1995: 40) does not recommend the use of hazard assessment over risk assessment because the potential for harmful effects is “wholly dependent upon the extent of exposure.” It is argued that the level of risk increases with an increase in exposure (Health Canada, 1995).

In contrast, in the Canadian Institute for Environmental Law and Policy’s submission to the Standing Committee, it was suggested that the definition of toxic under CEPA be revised to emphasize the intrinsic characteristics of a substance and the potential to cause harm to the environment or human health, rather than the exposure component which considers the quantity or concentration of a substance that will cause a negative effect (CIELAP, 1994: 9). Recognizing the merits associated with the hazard assessment process, the House of Commons Standing Committee on Environment and Sustainable Development (1995: xxii) recommended revising CEPA’s definition of toxic to include both risk assessment and hazard assessment.

³⁶ Health Canada (1995: 13-14) provides an illustrative example using knives to contrast hazard- and risk-based approaches. The intrinsic property of knives being sharp demonstrates the hazard associated with the object. Rather than just considering the hazard associated with children and knives which would require that knives be removed from the home entirely, an exposure-based approach is recommended in which the knives should be placed in a locked drawer which reduces the risk by preventing exposure.

While the precautionary principle has been associated with the protection of the environment, it had not yet been traditionally or explicitly linked to preventing the health outcomes associated with exposure to toxic substances (Health Canada, 1995: 10). The House of Commons Standing Committee on Environment and Sustainable Development (1995: 54) concluded that precautionary measures should be used under circumstances where an activity or substance poses a serious threat of harm to the environment or human health, even if the outcome is uncertain. The precautionary principle was said to promote sustainable development and was supported by many of the stakeholders involved in the consultation process as part of the legislative review of CEPA. For instance, the Canadian Bar Association indicated that CEPA would benefit from the precautionary principle.

The determination of a toxic chemical is arrived at through a classification process and the restriction of the release of that toxic chemical appears to be based on nothing short of scientific certainty. The same process is subsequently applied (substance by substance) for each and every other toxic chemical. Because this approach is proving too lengthy to attain its objectives within a reasonable time period, it does not fit with the notion of sustainable development. Instead, amendments should be made to Part II of CEPA that reflect a precautionary approach to managing toxic chemicals (House of Commons Standing Committee on Environment and Sustainable Development, 1995: 55).

Health Canada (1995: 11) suggested that the precautionary principle is an inherent part of the human health risk assessments conducted under CEPA, but allows that it may be appropriate to explicitly highlight the precautionary principle in the Act and refer to it in the Preamble. The Standing Committee formally recommended that the precautionary principle be incorporated as a guiding principle of CEPA, included in the Preamble of the Act, and that all provisions of CEPA should be interpreted within the framework of the

precautionary principle. “CEPA should define the precautionary principle to mean that, in respect of all substances suspected of posing a threat to the environment or to human health on the basis of weight of evidence, lack of full scientific certainty shall not be sufficient reasons for postponing preventive or remedial measures” (House of Commons Standing Committee on Environment and Sustainable Development, 1995: 56).

The two Standing Committee members from the Official Opposition, the Environment and Sustainable Development critic and the Deputy critic, both members of the Bloc Québécois, wrote a dissenting opinion which was included in the submission (House of Commons Standing Committee on Environment and Sustainable Development, 1995). Despite allowing that CEPA did not succeed in its intended impact, they “disagreed profoundly with the solutions proposed by the Committee for improving the effectiveness of CEPA and of environmental issues generally” (Douglas et al., 1997). While federal environmental legislation was intended to resolve jurisdictional issues and overlap between and among the provinces, territories and the country, there were still those who favoured a secular approach and localized regulatory regimes (Girard et al., 2010). The Opposition members rejected the report in its entirety stating that it was unfairly biased against the provinces by advocating a federal, centralized approach to environmental management in Canada (Douglas et al., 1997).³⁷

³⁷ It should be noted that the Quebec government was the strongest provincial opponent to CEPA. However, “provincial efforts to resist federal involvement in the environmental field may have resulted in a more intrusive state” (Harrison, 1996: 131). CEPA acknowledges provincial authority, but it contains strict equivalency standards with the intent of promoting national standards (Harrison, 1996).

Under Standing Order 109, the House of Commons Standing Committee on Environment and Sustainable Development requested that the federal government deliver a response to the recommendations within 150 days (Douglas et al., 1997). The official response from the Government of Canada was tabled on December 14, 1995 in a document entitled *Environmental Protection Legislation Designed for the Future – A Renewed CEPA*. It stated that the domestic and international agenda had changed dramatically since CEPA's proclamation in 1988:

New concepts and approaches, such as sustainable development, the precautionary principle and pollution prevention, have evolved since CEPA first came into effect. Consequently, the renewed *Act* would be based on guiding principles. They would include statements on pollution prevention, the ecosystem approach, biodiversity, intergovernmental cooperation, science and the precautionary principle, economic responsibility and user/producer responsibility (Minister of Supply and Services Canada, 1995: 7).

There is agreement with the Standing Committee's interpretation of section 11 of CEPA in that the Government must consider whether the substance is entering or may enter the environment, the degree of exposure as a result, and the levels of exposure that can cause adverse effects to occur. The Government agreed that it "must consider the risk posed by substances before rendering a conclusion. Understanding the nature (including sources) and extent of the risk enables the Government to prioritize dangers to human health and the environment and to focus controls where they will have the greatest benefit" (Minister of Supply and Services Canada, 1995: 70). While the Government agreed that inherent toxicity plays a role in determining the risk associated with a substance, it resisted considering an approach that would include hazard assessment and concluded that the ultimate role of inherent toxicity is to be used in conjunction with data on

exposure in order to form the basis for assessing risk (Minister of Supply and Services Canada, 1995: 70).

Overall, the Government's response is very much focused on the *Toxic Substances Management Policy*, both in its content and as a precursor to the upcoming revisions to CEPA. The *Toxic Substances Management Policy* established the direction for all federal government departments around the assessment and management of risk associated with toxic substances (Minister of Supply and Services Canada, 1995: 71). At the time, the Government of Canada established that the key policy direction of the *Toxic Substances Management Policy* was strongly supported by industry, and would be incorporated into a revised CEPA, consistent with the Government's regulatory reform agenda (Minister of Supply and Services Canada, 1995: 5). The House of Commons Standing Committee on Environment and Sustainable Development (1996) expressed significant concerns and criticisms around the Government's response its report.³⁸

³⁸ The House of Commons Standing Committee on Environment and Sustainable Development's (1996) response to the Government proposal to reform CEPA included an extensive list of signatories who formally endorsed the document. The organizations included Action! Environment, NFLD; Alberta Federation of Labour, AB; Allergy Foundation of Canada, SK; Amis de l'environnement de Brandon, PQ; Animal Alliance, ON; APT Environment, ON; Banff Recycling Society, AB; Biomedical Waste Incineration Ban Incineration, ON; Bruce Peninsula Environment Group, ON; Canadian Auto Workers, ON; Canadian Auto Workers Lower Mainland-Environment Committee, BC; Canadian Environmental Law Association, ON; Canadian Institute for Environmental Law and Policy, ON; Canadian Labour Congress, ON; Canadian Organic Growers Inc., ON; Canadian Union of Public Employees, ON; CAW Windsor Regional Environment Council, ON; Centre for Long Term Environmental Action, NFLD; CHOICES!, MB; Citizens' Clearinghouse on Waste Management, ON; Citizens Environment Alliance of Southwestern Ontario, ON; Citizens for Renewable Energy, ON; Citizens' Network on Waste Management, ON; Clean North, ON; Clean Nova Scotia, NS; Coalition of Ontario Doctors for the Environment, ON; Common Frontiers, ON; Concerned Citizens of Ashfield and Area, ON; Concerned Citizens of Manitoba, MB; Conservation Council of New Brunswick, NB; Cosy Covers Corporation, ON; Earth Wise, ON; East Coast Environmental Law Association, NS; Ecology Awareness Group Landscape and Environment, ON; Environmental Coalition of Prince Edward Island, PEI; Environmental Component Public Service Alliance of Canada, ON; Environmental Law Centre, AB; Environmental Mining Council of British Columbia, BC; Environmental Resource Centre, AB; Friends of Lily Lake, AB; Friends of the Earth, ON; Furiously Opposed to All Dumping, ON; Georgia Strait Alliance, BC; Great Lakes United, PQ;

Despite the Committee's recommendations, industry and pro-industry departments – like Natural Resources Canada, Industry Canada and Agriculture Canada – attempted to discredit the Standing Committee's report. Their efforts contributed to the tabling of a weak, dilute government response to the report. The government response [...] does not reflect the breadth and scope of the Committee recommendations (House of Commons Standing Committee on Environment and Sustainable Development, 1996: 2).

In particular, the House of Commons Standing Committee on Environment and Sustainable Development suggested that the government's response inadequately responded to concerns around pollution prevention and toxic substances. The Standing Committee took issue with the lack of a clear commitment to phase out production and use of substances which are inherently dangerous, persistent, bioaccumulative, or disruptive to the endocrine system. For instance, substances with toxic properties such as toluene may still be declared non-toxic under CEPA (House of Commons Standing Committee on Environment and Sustainable Development, 1996: 5; CELA and CIELAP, 1996).

Green Alternatives Institute of Alberta, AB; Greenpeace, ON; Greensville Against Serious Pollution, ON; Guideposts for a Sustainable Future, ON; Healthy Sustainable Communities Association (National Capital Region), ON; Hickory Falls Rate Payers Association, ON; Housing Fairness Association, ON; Human Ecology Liaison People, BC; Incineration Counteracts the Environment, ON; Learning Disabilities Association of Canada, ON; Manitoba Federation of Labour, MB; Manitoba Future Forest Alliance, MB; National Farmers Union, SK; National Union of Public and General Employees, ON; Northwatch, ON; Nova Scotia Public Interest Research Group, NS; Ocean Voice International, ON; Ontario Federation of Labour, ON; Ontario Health Advocacy Association, ON; Ontario Health Care, ON; Ontario Public Health Association Environment Work Group, ON; Ontario Streams, ON; Ontario Toxic Waste Research Coalition, ON; Pembina Institute for Appropriate Development, AB; Pictou Harbour Environmental Protection Project, NS; Poetical Asylum, PEI; Pollution Probe, ON; Prairie Acid Rain Coalition, AB; Prince Edward Island Stranding Network, PEI; Protect Our Water and Environmental Resources, ON; Research for Unbleached, BC; Sierra Club of Canada, ON; Sierra Club of Eastern Canada, ON; Sierra Club Prairie Chapter, MB; St. Clair River International Citizens' Network, ON; Stop and Tell Our Politicians Society, AB; Stop Environmental Deregulation in Canada, York University, ON; Stop Incineration United in Yards Anywhere, ON; Time to Respect Earth's Ecosystem, MB; Toronto Environmental Alliance, ON; Town of Pickering Waste Reduction Committee, ON; Toxics Watch Society, AB; Tuskent River Environmental Protection Association, NS; Voice of the Earth Society, NS; Waste Not; ON; Wastewise, ON; Western Canada Wilderness Committee, AB; Windsor and Area Coalition for Social Justice, ON; Windsor and District Labour Council Environment Committee, ON; Women's Network on Health and the Environment, ON; and the World Wildlife Fund Canada, ON.

In a detailed reaction to the Government's official response, referenced in the Standing Committee's response, the Canadian Environmental Law Association and Canadian Institute for Environmental Law and Policy (1996) expressed concerns that under the *Toxic Substances Management Policy*, the "environment" does not include the occupational environment, and the definitions of virtual elimination, persistence and bioaccumulation which are inconsistent with those set by agencies such as the International Joint Commission and the government's pollution prevention policy statement. The required criteria for substances to be classified as Track 1 are suggested to be too limited and that a combination of toxicity and persistence, or toxicity and bioaccumulation should be sufficient rather than toxicity, persistence *and* bioaccumulation. The deliberate use and management of Track 1 substances are also allowed to continue within the "no measurable release" provisions of the virtual elimination requirement of the *Toxic Substances Management Policy* (CELA and CIELAP, 1996: 100-01). In a response to the government proposal to reform CEPA, the House of Commons Standing Committee on Environment and Sustainable Development (1996: 2) contends that Canadians expected a strong federal regulatory leadership to be reflected the Government's response and expressed disappointment in the Government's proposal which fails to "implement aggressive [pollution] prevention and regulation of toxic chemicals."

The Canadian Environmental Protection Act, 1999 (CEPA 1999)

A year after submitting its response to the House of Commons Standing Committee on Environment and Sustainable Development's recommendations, the

Liberal government introduced Bill C-74 which was tabled in Parliament in December 1996, but did not receive a second reading and died when the general federal election was called in April 1997 (Douglas et al., 1997). Subsequently Bill C-32 was introduced to the House of Commons in March 1998, received a second reading in April 1998, was studied for a year by the House of Commons Standing Committee on Environment and Sustainable Development, and then received a third reading in June 1999. Bill C-32 replaced CEPA at this time and the *Canadian Environmental Protection Act, 1999*³⁹ was implemented (Douglas and Hébert, 1999a, 1999b). The lengthy review of CEPA resulted in a statute that was five times longer than the original Act and included new concepts such as “sustainable development” and the “precautionary principle” which had not yet been applied to the management of toxic substances (Government of Canada, 2005a; House of Commons Standing Committee on Environment and Sustainable Development, 2007: 4). The operative parts of CEPA 1999 are divided into administration; public participation; information gathering, objectives, guidelines and codes of practice; pollution prevention; controlling toxic substances; animate products of biotechnology; controlling pollution and managing wastes; environmental matters related to emergencies; government operations and federal and aboriginal land; enforcement; miscellaneous matters; and consequential amendments, repeal, transitional provision and coming into force. For the purposes of this dissertation and its focus on the regulatory

³⁹ Canadian Environmental Protection Act, R.S.C. 1999, c. 33; herein after described as CEPA 1999.

regime for chemicals, the most relevant sections include pollution prevention and controlling toxic substances.

CEPA 1999 is designated as an “Act respecting pollution prevention and the protection of the environment and human health in order to contribute to sustainable development” where the environment involves the components of the Earth including air, land and water; all layers of the atmosphere; all organic and inorganic matter and living organisms; and the interacting natural systems that include the former components. Sustainable development in CEPA 1999 refers to development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The Government of Canada (2005a) promotes the revised Act as contributing to sustainable development by preventing pollution; promoting coordinated action with provinces, territories, Aboriginal governments, and federal departments in order to achieve the highest level of environmental quality for the health of Canadian citizens; managing risks from harmful substances⁴⁰; and virtually eliminating the releases of the substances determined to be the most dangerous.

The new principles outlined in the preamble of CEPA 1999 are grounded in concepts including sustainable development, pollution prevention, an ecosystem approach, and the precautionary principle. The role of the Government of Canada is to demonstrate national leadership and fulfil international obligations in establishing

⁴⁰ A substance in CEPA was defined as any distinguishable kind of organic or inorganic matter, whether animate or inanimate. This definition has been expanded in CEPA 1999 to include “any distinguishable kind of organic or inorganic matter, whether animate or inanimate, and includes...any mixture that is a combination of substances...or any complex mixtures of different molecules that are contained in effluents, emissions or wastes that result from any work, undertaking or activity.” Health Canada (2003: 24) notes that the substances “encompass...discrete chemical compounds, classes of chemicals, emissions and effluents and products of biotechnology, including microorganisms.”

environmental standards, ecosystem objectives and environmental quality guidelines and codes of practice. The responsibilities of Environment Canada and Health Canada include:

- a commitment to implementing pollution prevention as a national goal and a priority for environmental protection;
- acknowledging the need to virtually eliminate the most persistent and bioaccumulative toxic substances;
- the need to control and manage pollutants and wastes if their release into the environment cannot be prevented;
- recognizing the risks associated with toxic substances in the environment and that substances cannot be contained within geographic boundaries once released; and
- removing threats to biological diversity through pollution prevention, controlling and managing the risk of adverse effects associated with the use and release of toxic substances, and the virtual elimination of persistent bioaccumulative toxic substances.

A number of the inclusions in CEPA 1999 such as the ecosystem approach, the role of pollution prevention and the precautionary principle were recommended by the House of Commons Standing Committee on Environment and Sustainable Development's (1995) review of the original Act. Pollution prevention as the cornerstone of CEPA 1999 reflected a shift in focus from the management of pollution which was one of the guiding principles of the original CEPA (Environment Canada, 2010a). This shift was consistent with the Liberal Party's 1993 platform which made toxic substances a significant focus, and emphasized that pollution would be reduced at the source (Swimmer, 1997; Toner, 2002; Juillet and Toner, 1997).

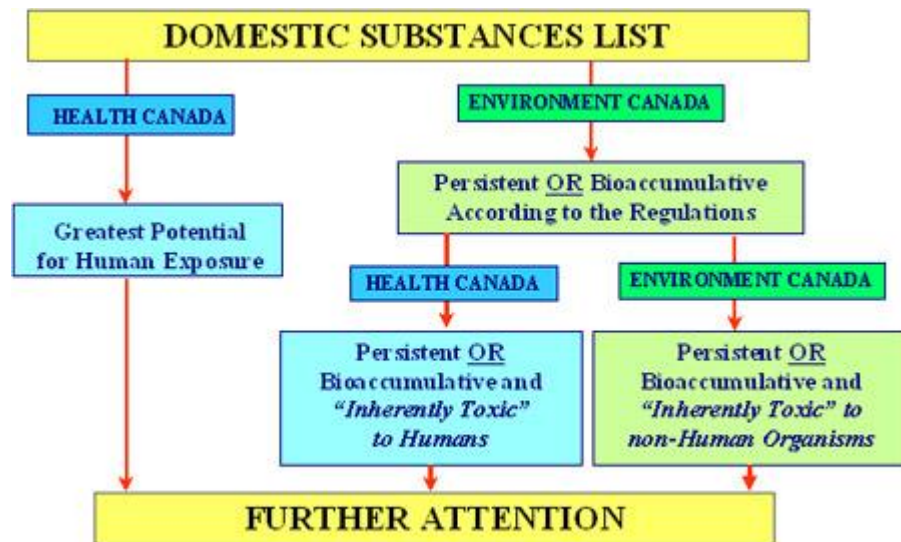
A substance is considered to be toxic under section 64 of CEPA 1999, with the exception of "inherently toxic," if it is entering or may enter the environment in a

quantity or concentration or under conditions that i) have or may have an immediate or long term harmful effect on the environment or its biological diversity; ii) constitute or may constitute a danger to the environment on which life depends; or iii) constitute or may constitute a danger in Canada to human life or health. The assessment and management of risks from toxic substances are the principal objectives of CEPA 1999, and are promoted by Environment Canada as being proactive, preventive and precautionary (Environment Canada, n/da). The risk management tools under CEPA 1999 “range from guidelines or codes of practice through to requiring the preparation and implementation of pollution prevention plans, environmental emergency plans and regulations, including economic instruments” (Government of Canada, 2005b: 2).

The revised Act continues work with the Domestic Substances List established in the original CEPA. This includes the 23,000 existing substances as outlined in section 25 of CEPA and section 66 of CEPA 1999, which were manufactured or imported into Canada in a quantity of not less than 100 kilograms in any one calendar year, or were in commerce or used for commercial manufacturing purposes in Canada between January 1, 1984 and December 31, 1986. CEPA 1999 provides a “framework for the identification/prioritization of [e]xisting [s]ubstances for risk assessment and the control or management of those considered to pose a risk to human health and/or the environment. This framework is broad, evidence-based, open and transparent and builds upon work done in other jurisdictions” (Health Canada, 2003a: 16). Section 73(1) of CEPA 1999 required the Minister of the Environment and the Minister of Health to *categorize* the 23,000 existing substances on the Domestic Substances List which

- (a) may present, to individuals in Canada, the greatest potential for exposure; or
- (b) are persistent or bioaccumulative in accordance with the regulations, and inherently toxic to human beings or to nonhuman organisms, as determined by laboratory or other studies.

It should be noted that the concept of inherent toxicity is not defined in CEPA 1999. The toxic substances on the Domestic Substances List that are used in the highest quantities and that come into direct contact with the general public are considered to have the greatest potential for exposure (Health Canada, 2003a: 21). A basic overview of the categorization process can be seen below:



(Environment Canada, 2011b).

The Act included a provision requiring the categorization of existing substances to be completed within seven years of its Royal Assent. The mandate of the categorization process is to identify the substances to be considered in subsequent phases of assessment including screening assessments under section 74 and in-depth assessments for Priority Assessment under section 76 of CEPA 1999 (Health Canada, 2005c: 5). Section 74 requires the Minister of the Environment and Minister of Health to conduct

screening assessments of substances in order to determine whether a substance is toxic or capable of becoming toxic. A screening assessment is conducted if the Ministers determine that a substance on the Domestic Substances List has the greatest potential for exposure, or is persistent or bioaccumulative, and inherently toxic. Section 76 requires the Minister of the Environment and the Minister of Health to compile the Priority Substances List which includes the substances that the Ministers are satisfied should be given priority in assessing whether they are toxic or capable of becoming toxic. After the screening assessment has been conducted, the Ministers can propose one of the measures outlined in section 77(2) which may include: taking no further action in respect of the substance; adding the substance to the Priority Substances List if it is not already included; or recommending that the substance be added to the List of Toxic Substances in Schedule 1, and the implementation of virtual elimination under subsection 65(3) where applicable.⁴¹

Virtual elimination of toxic substances released into the environment as a result of human activity was a new addition to CEPA 1999. Under section 65(1) the virtual elimination of a toxic substance is defined as the ultimate reduction of the quantity or concentration of the substance in the release below the level of quantification specified by the Ministers in the Virtual Elimination List. The level of quantification is defined in section 65.1 as the lowest concentration that can be accurately measured using sensitive but routine sampling and analytical methods. When the level of quantification for a

⁴¹ The Ministers are required to publish their preliminary findings including a summary of the science for feedback from the public over 60 days. After considering the public comments, the Ministers must publish a final proposal (Environment Canada and Health Canada, 2006).

substance on the Virtual Elimination List has been specified, the Ministers are required to prescribe the quantity or concentration of the substance that may be released into the environment either alone or in combination with any other substance from any source or type of source, and must account for environmental and health risks, as well as any relevant social, economic or technical matters.

The List of Toxic Substances in Schedule 1 of the original CEPA was “rolled over” and incorporated into Schedule 1 of CEPA 1999. It was determined that no assessment under section 64 of CEPA 1999 would be required for the twenty-six substances on Schedule 1 as they all met the criteria for toxic (Environment Canada, 2010c). Environment Canada and Health Canada (2006: 14) explain that CEPA 1999 does not provide specific information about the type of assessment to be conducted under the main risk assessment pathways including the screening assessment, Priority Substances List, and addition to Schedule 1. Policy must be used to determine the difference between a screening assessment and a Priority Substances List assessment, the latter of which may be used under situations that require in-depth input from the public (Environment Canada and Health Canada, 2006: 14).

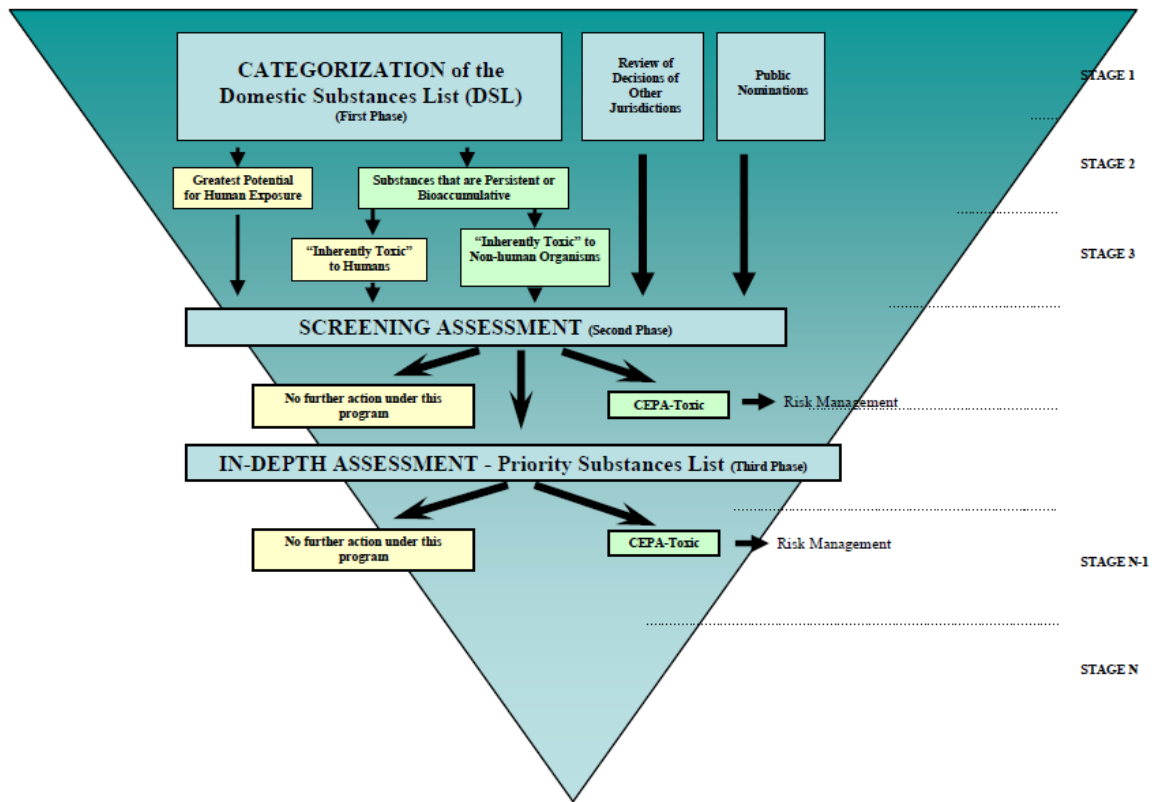
Health Canada’s responsibilities as part of this process included categorizing all 23,000 substances on the Domestic Substances List in order to determine which substances are potentially harmful to human health and thus require further consideration. The substances were studied and categorized as to whether they possess the greatest potential for human exposure, and are persistent, bioaccumulative and inherently toxic to humans under section 73 of CEPA 1999 (Health Canada, 2005c; Health Canada,

2009b).⁴² This process falls under section 68 of CEPA 1999 in which a Minister may collect or generate data and conduct investigations respecting any matter in relation to a toxic substance; correlate and evaluate any data collected or generated and publish results of any investigations; and provide information and make recommendations respecting any matter in relation to a toxic substance, including measures to control the presence of the substance in the environment. If a substance is declared to be CEPA-toxic, a health risk assessment involves:

- the identification of the critical adverse health effect associated with exposure to the substance;
- analysis of the dose-response relationship; and
- the determination of the extent to which the population or subset of the population are exposed to the substance; and relating the exposure to a measure of the dose-response relationship for the critical effect (Health Canada, 2004c: 10).

A more detailed diagram of the assessment process of the Domestic Substance List under CEPA 1999 which can be seen below:

⁴² Under section 73 of CEPA 1999, Environment Canada is responsible for the categorization of substances on the Domestic Substances List that are persistent and/or bioaccumulative and inherently toxic to non-human organisms.



(Health Canada, 2009b: 1).

When it began in 2000, it was anticipated that approximately 4700 of the 23,000 substances assessed would meet the categorization criteria and those substances would undergo a screening assessment (Environment Canada and Health Canada, 2006). When it was completed in 2006, Canada claimed to be the “first country in the world to have examined the hazardous properties of all its ‘existing substances’ providing an information baseline on all of those substances” (Environment Canada and Health Canada, 2006: 16).⁴³

⁴³ Environment Canada and Health Canada (2006: 12) do acknowledge other similar initiatives including the High Production Volume initiative by the Organisation for Economic Cooperation and Development (OECD) and the European Union’s Registration, Evaluation and Authorization of Chemicals (REACH) program. The High Production Volume Chemicals Initiative was launched in 1998 with the OECD and the International Council of Chemicals Associations (IICA). This program collected screening-level data to be

The results determined that 4300 of the 23,000 substances examined were classified as priorities for further action under the newly implemented *Chemicals Management Plan* (Health Canada, 2010a). The remaining 19,000 substances did not meet the criteria for categorization (Environment Canada, 2010e). However, the House of Commons Standing Committee on Environment and Sustainable Development (2007: 12) suggested that these 19,000 substances should not be identified as “safe” based on the results of the categorization process. These substances may possess persistent, bioaccumulative or inherently toxic properties. It is also noted that persistence may be an issue of concern not only “because they break down slowly in the environment, but because there is a continuous supply of [the substance]” (House of Commons Standing Committee on Environment and Sustainable Development, 2007: 13). Five hundred chemicals were classified as the highest priorities for immediate action, 2600 were classified as medium priorities, and 1200 chemicals were classified as low priorities. Environment Canada and Health Canada must determine the priorities for the risk assessment and management of the substances that meet the categorization criteria on the

used in hazard assessments which consider acute toxicity, repeat dose toxicity, reproductive and developmental toxicity, genetic toxicity, ecotoxicity, and the environmental fate of the chemical (IICA, 2013; OECD, 2013a). The OECD’s Cooperative Chemicals Assessment Programme was established based on the High Production Volume Chemicals Programme in order to assess more chemicals in a shorter time period, address all chemicals on the market; and avoid duplication of work occurring in other member countries. The focus of the Cooperative Chemicals Assessment Programme includes the dissemination of the hazards associated with chemicals; development and application of integrated approaches to testing and assessment; avoiding duplication among member countries; and providing a forum to exchange experience (OECD, 2013b). REACH became active legislation in the European Union in 2007 and seeks to “improve the protection of human health and the environment through the better and earlier identification of the intrinsic properties of chemical substances” by placing the burden of proof on industry (Europa, 2013). Manufacturers and importers of chemicals are required to manage the risks associated with the toxic substances and to provide safety information. REACH also calls for substitution when suitable alternatives can be utilized. The provisions of REACH are being phased-in over an 11 year period (Europa, 2013).

Domestic Substances List, as well as disseminate the categorization results to the public (Environment Canada and Health Canada, 2006: 16).

CEPA 1999 Parliamentary Review

CEPA 1999 requires a mandatory Parliamentary review every five years under section 343 and a review was scheduled for March 31, 2005. In preparation for the parliamentary review and under the Liberal government, Environment Canada and Health Canada (2004) published a scoping review to provide background information for a public engagement process; created a website to provide Canadian citizens with information on the CEPA 1999 review process and accept comments submitted online; and held six regional workshops across Canada in 2005 for feedback from the public about CEPA 1999. Environment Canada and Health Canada consulted with municipal governments, Aboriginal organizations, industry and business interests, and civil society, and solicited advice from provincial and territorial governments in advance of producing an *Issues Paper* on CEPA 1999 under the new Conservative federal government in 2006 (Environment Canada and Health Canada, 2006; Environment Canada, 2012).⁴⁴ The new federal government presents itself as being

⁴⁴ The Canadian Environmental Network Toxics Caucus was involved in the consultation process and submitted an agenda representing environmental non-governmental organizations across Canada. It concluded that despite efforts to control pollution under CEPA 1999, “the volume of dangerous chemicals released into Canada’s environment continues to increase” (Canadian Environmental Network Toxics Caucus, 2005: 3). This report was supported and endorsed by the Allergy and Environmental Health Association of Quebec, Beyond Factory Farming Coalition, Canadian Environmental Law Association, Canadian Network for Environmental Education and Communication, Citizens Environment Alliance of Southwestern Ontario, Citizens Network on Waste Management, Coalition for Alternatives to Pesticides, Environmental Defence, Environmental Health Association of Nova Scotia, Great Lakes United, Inter-Church Uranium Committee Educational Cooperative, New Brunswick Lung Association, Ontario Toxic Waste Research Coalition, Sierra Legal Defence Fund, Sierra Youth Coalition, South Peace Environment Association, STORM Coalition, Under the Sleeping Buffalo Research, and World Wildlife Fund Canada (Canadian Environmental Network Toxics Caucus, 2005).

committed to ensuring the environmental laws and policies promote the overarching national goal of attaining the highest levels of environmental quality so as to enhance the well-being of Canadians, protect human health, preserve the quality of the environment and advance the country's long-term economic competitiveness (Environment Canada and Health Canada, 2006: 3).

Environment Canada and Health Canada (2006) conclude that CEPA 1999 provides a solid basis for continuing to protect the environment and human health, but concede that there are opportunities for improving the implementation of Act.

Two Parliamentary Committees were appointed in April 2006 to formally review CEPA 1999 including the House of Commons Standing Committee on Environment and Sustainable Development⁴⁵ and the House of Commons Standing Committee on Energy, the Environment and Natural Resources⁴⁶ (Environment Canada, 2012).⁴⁷ Under the

⁴⁵ Members of the Standing Committee on Environment and Sustainable Development included: *Chair*: Bob Mills, M.P.; *Vice-Chairs*: Bernard Bigras and Hon. Geoff Regan; *Members*: Mike Allen, Nathan Cullen, Luc Harvey, Marcel Lussier, David McGuinty, Anthona Rota, Francis Scarpaleggia, Maurice Vellacott, and Mark Warawa; and *Other Members Who Participated*: Catherine Bell, Don H. Bell, Dennis Bevington, Steven Blaney, Hon. Scott Brison, Paule Brunelle, Blaine Calkins, Rodger Cuzner, Jean-Claude D'Amours, Patricia Davidson, Dean Del Mastro, Paul Dewar, Ken Epp, Mark Eyking, Hon. John Godfrey, Laurie Hawn, Mark Holland, Michael Ignatieff, Brian Jean, Hon. Marlene Jennings, Hon. Lawrence MacAulay, Luc Malo, Pat Martin, Christian Ouellet, Daniel Petit, Pierre Poilievre, Pablo Rodriguez, Denise Savoie, Mario Silva, Scott Simms, Lloyd St. Amand, Paul Steckle Hon. Gilbert Thibault, Chris Warkentin, Jeff Watson, Blair Wilson, and Borys Wrzesnewskyj. The *Clerk of the Committee* was Justin Vaive. *Research Staff of the Committee* included Tim Williams, Sam Banks and Kriten Douglas from the Library of Parliament, Parliamentary Information and Research Service (House of Commons Standing Committee on Environment and Sustainable Development, 2007: iii).

⁴⁶ Members of the Standing Senate Committee on Energy, the Environment and Natural Resources included: *Chair*: the Honorable Tommy Banks, *Deputy Chair*: the Honorable Pierre Claude Nolin, and the Honorable Willie Adams, the Honorable Bert Brown, the Honorable Ethel Cochrane, the Honorable Colin Kenny, the Honorable Elaine McCoy, the Honorable Lorna Milne, the Honorable Grant Mitchell, the Honorable Nick Sibbeston, the Honorable Mira Spivack, and the Honorable Marilyn Trenholme Counsell. *Ex-officio members of the committee* included the Honorable Senators Hervieux-Payette P.C., (or Tardif) and LeBreton, P.C., (or Comeau), and the Honourable Senators Angus, Campbell, Carney, Chaput, Cordy, Cowan, Dawson, Fox, Fraser, Grafstein, Hubley, Lavigne, Mercer, Nolin, Nancy Ruth, Peterson, Robichaud, Segal and Tkachuk. *Research Staff of the Committee* included Kristen Douglas (principal), Lynne Myers, Sam Banks, analysts and Amelia Bellamy-Royds from the Library of Parliament, Parliamentary Information and Research Services. The *Clerk of the Committee* was Eric Jacques, Committees Directorate, and the *Administrative Assistant* was Nicole Bédard, Administrative Assistant,

legislation, the Standing Committees have up to one year to complete their review, though an extension may be granted if necessary. CEPA 1999 requires the final reports to be submitted to Parliament, and the Government of Canada has 150 days to provide a response as to whether or how the Act will be revised (s. 343(2), CEPA 1999; Environment Canada and Health Canada, 2004).

The House of Commons Standing Committee on Environment and Sustainable Development presented its report to the House of Commons in May 2007 with a seventy-five page report which included thirty-one recommendations. *The Canadian Environmental Protection Act, 1999 – Five Year Review: Closing the Gaps* focused primarily on examining the content and implementation of Part 5 of the Act, Controlling Toxic Substances. The objectives of CEPA 1999 include contributing to sustainable development through pollution prevention; promoting coordinated access across the country to achieve the highest environmental quality for the health of all Canadian citizens; and managing risks from harmful substances, while virtually eliminating releases of the most dangerous toxic substances. However, questions are raised about the

Committees Directorate (House of Commons Standing Senate Committee on Energy, the Environment and Natural Resources, 2008: i).

⁴⁷ The Parliamentary Review Committees received formal submissions from environmental organizations critiquing the implementation of CEPA 1999. A submission by Pollution Watch (representing the Canadian Environmental Law Association and Environmental Defence) included 34 specific recommendations to revise and reform CEPA 1999 in order to “address key gaps in federal law that enable ongoing exposure to toxic substances” (Pollution Watch, 2006: 3). The recommendations included shorter assessment periods, stronger mandatory deadlines and including the role of sensitive stages of human development and vulnerable populations in risk assessment processes (Lafrenière, n/d; Pollution Watch, 2006). Submissions by both Pollution Watch (2006) and the Ontario Public Health Association (2006) note the increasing incidence of detrimental health outcomes linked to exposure to toxic substances and the subsequent healthcare costs. It is suggested that the review of CEPA 1999 offered an opportunity to address these issues and to “close gaps in our regulatory system thus ensuring that Canadian’s health and the environment are adequately protected” (Ontario Public Health Association, 2006: 3).

efficacy of CEPA 1999 and whether the objectives of the Act were being met; the report specifically notes the increasing emissions of toxic substances; and the very limited use of virtual elimination provisions to date (House of Commons Standing Committee on Environment and Sustainable Development, 2007: 6). As of 2007, the Government of Canada had not implemented many of the provisions under CEPA 1999 including:

- the authority to create regulations that control products containing toxic substances (never been used);
- the authority to create interim orders regarding potentially dangerous substances (never been used);
- the authority to request information on substances that the Minister of Health or Environment suspects are or could become toxic (limited use); and
- the authority to require virtually elimination of persistent, bioaccumulative and inherently toxic substances (occurred for only one substance which was not in commerce) (House of Commons Standing Committee on Environment and Sustainable Development, 2007: 5).

The Standing Committee considered how the Government of Canada might improve the implementation of CEPA 1999 so the objectives of the Act might be met (House of Commons Standing Committee on Environment and Sustainable Development, 2007).

The House of Commons Standing Senate Committee on Energy, the Environment and Natural Resources extended its timeline three times during the review period, from October 31, 2007 to February 29, 2008, and ultimately submitted its final report on March 4, 2008 (Environment Canada, 2012). *The Canadian Environmental Protection Act (1999, c. 33) Rx: Strengthen and Apply Diligently* is a fifty-five page report which utilizes two comprehensive case studies, on mercury and perfluorinated compounds, in order to consider “whether, how and to what extent...[toxic substances] are currently

being managed under the Act, and how successful the management has been in protecting the health and well being of Canadians and the environment” (House of Commons Standing Committee on Energy, the Environment and Natural Resources, 2008: 6). The Senate Standing Committee provides twenty-four recommendations and suggests that the ineffectiveness of CEPA 1999 is related to a lack of will to implement and enforce the Act, as well as failure to devote the necessary resources for the implementation and enforcement (House of Commons Standing Senate Committee on Energy, the Environment and Natural Resources, 2008: 3).

Both the House of Commons Standing Committee on Environment and Sustainability (2007) and the House of Commons Standing Senate Committee on Energy, the Environment and Natural Resources (2008) criticize the Government of Canada for a lack of reporting on information about pollution and environmental and human health. Section 44(1)(f) of CEPA 1999 requires the Minister of the Environment to publish a periodic report on the state of the Canadian environment. Specifically, the Minister will publish, arrange for the publication of or distribute through an information clearinghouse, information respecting pollution prevention; pertinent information with respect to all aspects of environmental quality; and a periodic report on the state of the Canadian environment. The goals of these reports are to provide “timely, accurate, and accessible environmental information, integrated with socioeconomic factors, to improve decision-making and support progress towards sustainability” (House of Commons Standing Committee on Environment and Sustainability, 2007: 8). It is argued that this practice of monitoring, reporting and communicating was “virtually abandoned” since the in-depth

publications on the state of Canada's environment in 1991 and 1996 (House of Commons Standing Committee on Environment and Sustainability, 2007). While CEPA 1999 does not include specific information as to how often the reports on the state of the environment should be completed, the Standing Committee on Environment and Sustainable Development (2007) recommends the reinstatement of timely reports and the Standing Senate Committee on Energy, the Environment and Natural Resources (2008) suggests that reports should be published no less frequently than every ten years.

Both the House of Commons Standing Committee on Environment and Sustainable Development (2007) and the Standing Senate Committee on Energy, the Environment and Natural Resources (2008) note the necessity of meeting reasonable and mandated timelines. Mandatory timelines have tended to be effective where they exist in CEPA 1999, such as the seven years to complete the categorization process as part of the Domestic Substances List. However, concerns were expressed around the required screening level assessments which determine if the substances are CEPA-toxic, because no timeline was specified in the legislation for them to be completed. The Standing Committee recommended that if the screening assessment determines that a substance is toxic, there should be a maximum of two years from the assessment to the implementation of a risk management plan, and five years if the screening concludes the need for a full Priority Substances List assessment (House of Commons Standing Senate Committee on Energy, the Environment and Natural Resources, 2008: 24-27).⁴⁸

⁴⁸ The House of Commons Standing Committee on Environment and Sustainable Development (2007: 26) provides this discussion around the importance of "reasonable timelines" based on examples where the assessment of toxic substances did not occur in a timely fashion. For instance, the listing of

The Government tabled an interim response to the House of Commons Standing Committee on Environment and Sustainable Development report in October 2007 (Parliament of Canada, 2007). The interim response was vague and non-specific in addressing the Standing Committee's recommendations; it did not specify how or if they would be addressed. The interim response indicated while CEPA 1999 is fundamentally sound and does not require significant changes, refinements to the Act would strengthen its implementation (Parliament of Canada, 2007). After the House of Commons Standing Committee on Energy, the Environment and Natural Resources submitted its report in 2008, the Government of Canada was to table a final consolidated response to both committee reports addressing the recommendations and potentially proposing various improvements to the Act (Environment Canada, 2012; Parliament of Canada, 2007). However, a final response from the government was not released. There have been no official revisions to the legislation as it is not mandatory to incorporate the Standing Committees' recommendations from the review period. The next five year review of CEPA 1999 should have been triggered on March 31, 2010 but the review was suspended (Environment Canada, 2011a). Despite comprehensive reviews and being officially scheduled for review twice, CEPA 1999 has not changed since the Act was implemented in 1999. It should be scheduled for another review as of March 31, 2015.

Chemicals Management Plan

Toner (2008) notes that when the Conservative government came into power in 2006, it had shown little commitment to prioritizing the environment in its electoral

trichloroethylene on the Priority Substances List to the publication of its management plan took over thirteen years.

campaign or the first Speech from the Throne. However, there was a shift in public opinion in 2006-2007 with Canadian citizens prioritizing the environment as a policy issue of concern (Toner, 2008: 3). The launch of Canada's *Chemicals Management Plan* was announced by Prime Minister Stephen Harper, Minister of Health Rona Ambrose and Minister of the Environment Tony Clement in December 2006. The government promoted an approach that was "tough on toxics" as part a "comprehensive environmental agenda" (Bueckert, 2006; Champion-Smith, 2006; Conservative, 2013; Prime Minister of Canada, 2006a; Scott, 2009b; Weeks, 2006). CEPA 1999 is the primary statute under which the *Chemicals Management Plan* is implemented. The Government indicated that the *Chemicals Management Plan* was designed to assess and manage the risk of all chemical substances categorized as part of the Domestic Substances List as potentially harmful to human health or the environment by 2020.

Prime Minister Harper promoted the *Chemicals Management Plan* as including

realistic and enforceable measures that will substantially increase protection of Canadians from dangerous chemicals. In fact, it will make Canada a world leader in the testing and regulation of chemicals that are used in thousands of industrial and consumer products...Over the next four years, we will tighten regulations and accelerate risk assessment for thousands of chemicals. Our plan will require substantial investment of public funds, but in the long run it will save money by reducing expenditures on public health and the clean-up of contaminated land and water.

While Canada has always been responsible when it comes to chemical management, I'm proud to say that we will become a world leader because of today's announcement. Although since 1994, new chemicals substances produced or imported into our country have been subject to rigorous assessment by federal government scientists, some 23,000 "legacy" chemicals have not undergone the assessment required of new substances. All developed countries face the same challenge, and all have committed to safely manage chemicals by 2020.

Canada has now become the first country in the world to achieve full categorization of our legacy chemicals. We are ahead of America and Europe, and Canada's New Government is committed to keeping our nation at the forefront of health and environmental protection. Our chemicals management plan is the next step in the process (Prime Minister of Canada, 2006b).

The *Chemicals Management Plan* is managed by Environment Canada and Health Canada and incorporates all the existing federal chemical programs into one single strategic policy in order to address routes of exposure to chronic and acute hazardous substances (Treasury Board of Canada, 2012). Health Canada (2010: 35) promotes the *Chemicals Management Plan* and its

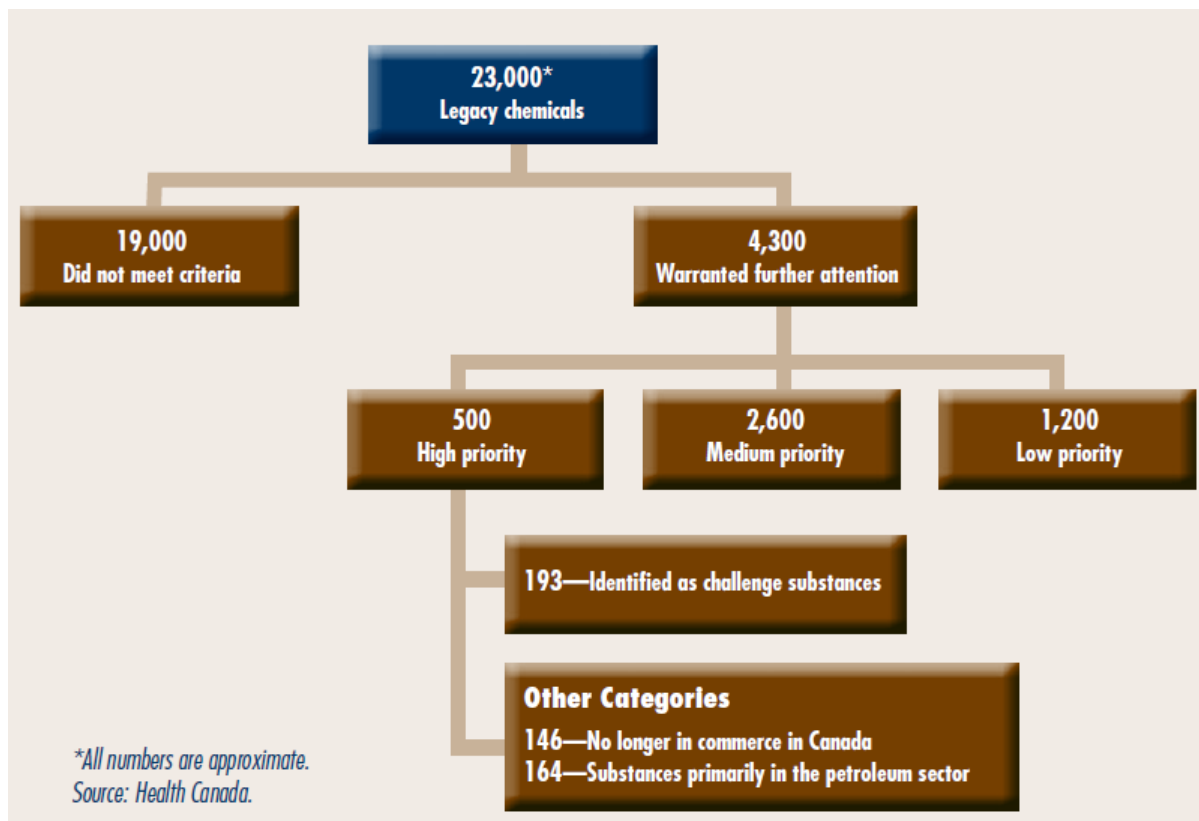
innovative approach to regulation [which] supports the use of the best-placed and most effective Act to address the potential risks of a chemical substance...[The] government's regulatory actions should be proportional to the identified risks, as well as be the most cost effective and efficient in achieving the risk-management objective.

The *Chemicals Management Plan* is designed to protect human health and the environment by taking immediate action on chemical substances of high concern; undertaking regulatory activities to address sectors such as consumer products, food, pharmaceuticals, personal care products, and pesticides by using the most-appropriate Act; investing in research including biomonitoring to examine the health impacts associated with chemical exposures; and evaluating the success of risk management and control measures (Health Canada, 2010a: 34). The three key elements of the *Chemicals Management Plan* include a challenge to industry and stakeholders for immediate action on toxic substances of high concern; regulatory activities around food, cosmetics, drugs, and pesticides; and investment in research and monitoring about both the effects of toxic

substances on human health and the environment, and as a way to measure the success of risk management processes (Government of Canada, 2011a: 1-2).

The 500 high priority substances identified during the categorization process will be addressed through three mechanisms including the Ministerial Challenge Program (also known as “the Challenge”), the Petroleum Sector Stream Approach⁴⁹ and through the Significant New Activities (SNAc) provisions. Of the chemicals that were classified as the highest priorities for immediate action, 193 substances were identified as part of the Challenge, with assessments to be completed between 2007-2010, 146 were no longer in commerce and classified under the significant new activity provisions, and 164 were substances used primarily in the petroleum sector (Health Canada, 2010a). An overview of the “Chemicals Categorization Process: A Large-Scale Priority-Setting Exercise” can be seen in the diagram below:

⁴⁹ The Petroleum Sector Stream approach includes 160 substances identified as high priorities through the categorization process. The majority of high priority petroleum substances are used or manufactured during petroleum refining or bitumen/heavy crude oil upgrading activities. Environment Canada and Health Canada are responsible for the assessment and management of risk associated with these substances (Government of Canada, 2013a).



(Health Canada, 2010a: 33)

The Challenge involves collecting data from industry under the information gathering provisions of section 71 of CEPA 1999. It includes a notice published in the *Canada Gazette* and a Challenge Questionnaire. Information required as part of the questionnaire includes details about the total quantity of a substance that was manufactured, imported, released, used, or sold for use in Canada; the concentration of the substance in a mixture, product or manufactured item; and use pattern codes and North American Industry Classification system codes that apply to the use of a substance (Government of Canada, 2009a). There is also a non-mandatory request that industry and stakeholders submit additional information that may be used as part of the risk

assessment process, and to develop best practices around risk management and product stewardship (Government of Canada, 2011b). For instance, information may be provided about the import, manufacture and use quantities; substance and product use details; releases to the environment and protocols for spill management; current and potential risk management and product stewardship actions; existing legislative and regulatory programs which control or manage the substance; and information to support the development of a regulatory impact assessment. The information is intended to assist the government in designing approaches and tools for the risk management of the Challenge substances (Government of Canada, 2009a, 2010a).

The 193 substances as part of the Challenge were divided into twelve smaller groups called “batches” to be addressed sequentially and launched within a three-year timeframe. Beginning in February 2007, a new group of 15-30 substances were released every three months for a six-month comment period from industry and stakeholder groups (Government of Canada, 2009a; 2010a). Screening risk assessments were conducted for each batch of substances by Health Canada and Environment Canada (Tilman and Rochon Ford, 2010).

The *Chemicals Management Plan* utilizes a risk management approach which includes scientific assessment and monitoring, combined with a variety of tools for the protection of human and environmental health (Health Canada, 2010a). The non-governmental organization, Environmental Defence⁵⁰, reported in 2011 that of the 193

⁵⁰ Environmental Defense is a Canadian environmental action organization whose research and campaigns focus on banning harmful chemicals, protecting green space, greening power sources, cleaning beaches, greening the economy, and detoxing Canadians (Environment Defense, 2013a).

high priority substances assessed as part of the Challenge between 2007 and 2010, twenty-five substances were determined to be toxic under CEPA 1999 and added to the Toxic Substances List, fourteen were determined to be toxic and proposed for addition to the Toxic Substances List, and six will likely be concluded as toxic in final assessments and proposed for addition to the Toxic Substances List (Environmental Defence, 2011: 14). Batches one and two each found nine substances to be toxic. However, the number of substances found to be toxic decreased in subsequent batches with three substances in batch three, four substances in batch four, two substances in batch five, one substance in batch six, and three substances in batch seven. There has been frequent use of the “future use notification” measure⁵¹ and the proposed cosmetic ingredient hotlist⁵² which are both

⁵¹ The future use notification tool was identified early in the Challenge, but it was determined that the SNAc provisions of CEPA 1999 would fulfill this risk management measure. The future use notification tool wording was replaced with Significant New Activity provisions wording, eliminating the need to develop another regulatory initiative (Environment Canada, 2013a).

⁵² The Cosmetic Ingredient Hotlist contains a list of prohibited and restricted cosmetic ingredients in Canada (Government of Canada, 2011c; Health Canada, 2011a, 2011b). The Hotlist is based in legislation including section 2 of the *Food and Drugs Act* which addresses the definitions of regulated products; section 16 of the *Food and Drugs Act* which states that no person shall sell a cosmetic product that contains a substance that may injure the health of the user; and section 24 of the *Cosmetic Regulations* which requires that the label of a cosmetic product presenting an avoidable hazard include directions for safe use. If a restricted ingredient is in a product, a “cautionary statement of direction for use associated with an ingredient mitigates the hazard of the product” (Health Canada, 2011b). Health Canada scientists use evidence-based decision making and weight of evidence in their risk assessments (CCTFA, 2007). Evidence-based decision-making is the “systematic application of the best available evidence in the evaluation of options for decision-making in clinical, management and policy settings” (Ham, 2001: 99). While evidence-based medicine focuses on the individual-clinical level, evidence-based decision-making and health policy focuses on the population-policy level (Dobrow et al, 2004: 208). The fundamental concepts of an evidence-based decision are evidence and context. It is the interaction between evidence and context in evidence-based decision making that is most critical to the development of evidence-based health policy (Dobrow et al, 2004). Health Canada may implement risk management measures including banning ingredients or restricting use through the Hotlist, requiring labelling, or requiring the product be removed from stores (CCTFA, 2007). Manufacturers may have to remove the ingredient from the formulation; reduce the concentration of the ingredient to an acceptable level; provide evidence that the product is safe for its intended use; confirm that the product is labelled as required; and confirm that the product is sold in child-resistant packaging (Health Canada, 2011b). However, the Hotlist has been criticized as it has no legal authority and cannot be enforced (David Suzuki Foundation, n/d). de Leon and

non-regulatory risk management measures. At the same time, the number of significant new activity (SNAc) provisions have steadily increased from batch one through batch seven and were applied to thirty-three substances while only three substances have been scheduled for virtual elimination (de Leon, 2010).

Under section 80 of CEPA 1999, significant new activity (SNAc) provisions apply when the Minister of the Environment or Health conclude that a substance is entering the environment in a quantity which is significantly greater than the previous release. These provisions may also apply if the substance is entering the environment in a manner that is significantly different than the previous release into the environment. The significant new activity provisions were applied to 146 substances classified as high priority under the *Chemicals Management Plan*. These substances were categorized as persistent, bioaccumulative and inherently toxic, but were not currently in commerce in Canada. If the Minister of the Environment or the Minister of Health is concerned that a significant new activity of a substance on the Domestic Substances List is being reintroduced into Canadian commerce which may result in the substance being classified

Madray (2009) note important gaps in the Hotlist such as a lack of clarity around whether manufacturers or importers abide by the provided limits, and the Hotlist does not require exporters of cosmetic products to comply with the regulations. “This is a significant flaw, not only of the Hotlist but of the management regime for toxic chemicals in Canada. The use of CEPA toxic chemicals should not be permitted for products intended for the export market” (de Leon and Madray, 2009: 2). The Hotlist does not provide consideration for the impact on vulnerable populations who are exposed to the substances (de Leon and Madray, 2009). For a full discussion of vulnerable populations and exposure to toxic substances, refer to chapter 5. It should also be noted that personal care products which may be classified as drugs are not regulated under the *Food and Drugs Act* because they possess a therapeutic function, such as antiperspirants, face cream with a UV rating, anti-aging lotion, toothpaste, and hand sanitizers. Products which may be regulated as natural health products if they contain natural ingredients with a therapeutic function are also not regulated under the Act. Despite substances which are found to be toxic under section 64 of CEPA 1999, the Hotlist and labelling requirements in the *Cosmetic Regulations* do not apply to personal care products which are classified as drugs or natural health products (David Suzuki Foundation, n/d).

as CEPA-toxic, the Minister of the Environment may amend the Domestic Substances List under section 87(3) so that the new use of the new substance is evaluated (de Leon, 2010; Government of Canada, 2012a, 2012b). The outcomes of an assessment of a significant new activity may result in the substance being suspected of being toxic or capable of becoming toxic for the proposed activities, or not suspected of being toxic or capable of becoming toxic for the proposed activities. If the substance is suspected of being toxic or capable of becoming toxic, the Ministers may

- i) permit any person to manufacture or import the substance in relation to the Significant New Activity, subject to any conditions that the Ministers may specify;
- ii) prohibit any person from importing or manufacturing the substance in relation to the Significant New Activity; or
- iii) request any person to provide any additional information or submit the results of any testing that the Ministers consider necessary for assessing whether the substance is toxic or capable of becoming toxic, as a result of the Significant New Activity (Government of Canada, 2012b).

In a letter to the Director Generals of Environment Canada and Health Canada, de Leon et al. (2010) suggest that there has been an over-reliance on Significant New Activity provisions under the *Chemicals Management Plan* and express concern around the high priority substances that were identified for Significant New Activity Notices. “Prior to the release of the CMP [(*Chemicals Management Plan*)], the original intention was to apply SNACs to substances considered “new” to Canada and subject to the New Substances Notification Regulation. Under the CMP, we have noticed a continuing trend toward issuing SNACs to high hazard-low volume ‘existing’ substances without designating them as CEPA toxic” (de Leon et al., 2010: 7). A number of specific

concerns around the Significant New Activity provisions under the *Chemicals*

Management Plan are raised including:

- The threshold for reporting use is 100kg which means that there may be uses of the substance below the reporting threshold and that does not apply to a Significant New Activity issuance;
- The Significant New Activity approach requires further assessment of toxic substances under the New Substances Program and these results are not required to apply elimination or reduction strategies as part of risk management, regardless of the original data gathered in the categorization process;
- The substances to be assessed and managed under the Significant New Activity approach of the *Chemicals Management Plan* include 146 from the high priority substances and thirty-three from batches one through seven. A more protective and precautionary approach would involve listing all these substances as toxic under CEPA 1999 and proposing to add them to CEPA's Prohibition of Specific Toxic Chemicals Regulations; and
- Despite the efforts by environmental non-governmental organizations to raise the issue of applying Significant New Activity notices under the *Chemicals Management Plan*, there has been very limited public policy debate around this issue (de Leon et al., 2010: 7-8).

The Significant New Activity approach does not fully protect human health and the environment. de Leon et al. (2010) conclude in urging the government to designate substances that meet the hazard criteria and are not in use, manufactured or imported into Canada as toxic under CEPA 1999, and add the CEPA-toxic chemicals to Schedule 1.

Other provisions under the *Chemicals Management Plan* include assessing the medium priority substances, monitoring and research including the Canadian Health Measures Survey and the Maternal Infant Research on Environmental Chemicals; mandatory ingredient labelling of cosmetics⁵³, regulations to address environmental risks

⁵³ Importantly, this labelling does not include "fragrance" or "parfum" ingredients which are protected by proprietary conditions.

from pharmaceuticals and personal care products under the *Food and Drugs Act*; rapid screening of lower risk chemicals; and accelerated re-evaluation of pesticides under the *Pest Control Products Act* (Government of Canada, 2010b; 2011a).

In October 2011, the federal government announced the second phase of the *Chemicals Management Plan* focused on consumer product safety. Minister of the Environment, Peter Kent stated that this phase “is both an investment in the health of the Canadian economy and our environment. Canadians want to have confidence in the products they use everyday, and reassurance that they are not harmful to the environment” (Health Canada, 2011d). Specifically, the Government stated that this phase will focus on continuing to improve product safety in Canada; completing assessments of 500 substances across nine categories; and investing in additional research for substances such as bisphenol A (BPA), flame retardants, and substances that affect hormone function and the environment. There are approximately 1,000 additional substances to be assessed over a five year period through other initiatives including the rapid screening of substances which pose “little or no risk” (Health Canada, 2011d).

As part of the second phase of the *Chemicals Management Plan*, the Substance Groupings Initiative involves assessment of priority substances between 2011 and 2016 in order to assess and manage the potential health and environmental risks associated with nine groups of substances including aromatic azo- and benzidine-based substances, boron-containing substances, internationally classified substances, certain organic flame retardants, cobalt-containing substances, methyldiphenyl diisocyanates and diamines, phthalates, selenium-containing substances, and substituted diphenylamines (Government

of Canada, 2012c, 2013b, 2013c; Laemy, 2012). This initiative emerged as a result of longstanding critiques, including from other jurisdictions, of the substance-by-substance approach rather than focusing on classes of substances (Denmark Ministry of the Environment Environmental Protection Agency, 2013; House of Commons Standing Committee on Environment and Sustainable Development, 1995; McClenaghan et al., 2003).

The substance groupings were chosen based on structural or functional similarities and assembled based on considerations of the ability to support informed substitution decisions, timing of international actions, stakeholder implications, assessment efficiencies, potential exposure to children and human health, and risk management efficiencies (Laemy, 2012: 6). The priorities for the assessment of the groupings initiative include potential hazard and exposure of the substances; efficiencies and effectiveness of risk assessment and risk management; transparency in the assessment and engagement with stakeholders throughout the process; and adaptability with the process regarding sub-groupings that may be revised as information becomes available (Government of Canada, 2011d).

The second phase of the *Chemicals Management Plan* also involves an inventory update for the Domestic Substances List as the original data for these substances may be out of date, some substances may no longer be in commerce, or their use and volume may have changed. There were originally 23,000 substances published on the Domestic Substances List in 1994, but there are currently 28,000 listed substances. Information from the updated Domestic Substances List will be used for risk assessment and

management activities, monitoring trends, and priority setting. Phase one of the update was launched in 2009 and included approximately 500 toxic substances. Phase two was launched in December 2012 and will involve approximately 2700 substances requiring reporting on chemicals manufactured or imported over 100kg alone or in a mixture in the 2011 calendar year, as well as polymers manufactured or imported over 1000kg alone or in a mixture in the 2011 calendar year (Government of Canada, 2013c; Télasco, 2012).

Conclusions

The proliferation of chemical contaminants used in industry, agriculture and consumer products in industrialized societies has led to increasing concern among Canadian citizens. Specific issues of concern are the health effects of exposure to environmental contaminants and particularly the long-term exposure to low-doses of contaminants, as well as the effects on developing foetuses, infants and young children (Health Canada, 2002b: 6). The measurement of the impact of environmental contaminants on human health is an important public policy challenge (Health Canada, 2002b). Public health and environmental policies have the potential to reduce environment-related diseases and contribute to significant improvements in public health.

Health Canada (2010a) has a wide range of instruments available that may be used in an attempt to achieve its public policy objectives including regulatory instruments such as legislation and regulations which are legally binding, and less formal non-regulatory instruments that encourage particular behaviours or actions such as economic incentives or disincentives and public education campaigns (Health Canada, 2010a: 7). The department works from the position that a completely risk-free environment is

neither realistic nor achievable, but rather that governments need a systematic decision-making process to determine the level of risk that is acceptable to both the environment and public health. Health Canada's approach to hazard identification, risk assessment and risk management is to develop a course of action that is evidence-based and cost effective. Risk should be reduced while also accounting for social, cultural, ethical, political, economic, and legal considerations (Health Canada, 2002b: 7). The importance of national environmental standards are emphasized as the only way to "ensure the right of all Canadians to the same minimum levels of health and environmental protection" (House of Commons Standing Committee on Environment and Sustainable Development, 1995: 15). The following chapters will investigate whether this claim is implemented in practice.

Chapter 4

Tracing Toxics: Considering Toxicity, Exposure, Precaution and Accountability

Introduction

In order to understand how the concept has evolved, this chapter examines the history of the concept of “toxicity” in Canadian legislation and the tensions between stakeholder groups during the regulatory review process. It explores how toxicity is grounded in risk assessment processes which are designed to assess the impact of toxic substances on the environment and human health. It also considers the role of toxicity in exposure assessments, threshold and non-threshold effects of exposure to toxic substances, and the requirements for virtual elimination under CEPA 1999. The chapter provides a brief overview of the case of siloxane D5, which was declared toxic under CEPA 1999 as part of the Challenge. This declaration was reversed after an objection was filed by the Silicones Environmental, Health and Safety Council of North America. The case study raises central questions about the regulation of toxic substances, risk, precaution, the contested nature of toxicity, and the influence of socioeconomic interests. This chapter also explores the precautionary principle which was included in Canadian legislation for the first time in CEPA 1999. However, the legislation is critiqued for not operationalizing the principle in the assessment of toxic substances. It provides an overview of the growing concern of the effects of endocrine disrupting chemicals, their inclusion in CEPA 1999 and whether the precautionary principle has been adequately implemented in risk management practices. Finally, it examines the debate between exposure-based and hazard-based assessments of risk and considers the efficacy of

Canadian law, policy and practice in preventing detrimental health outcomes and enacting primary prevention.

Tracing Toxicity, Risk and Exposure

In light of continued contestation around environmental health outcomes, it is interesting to reflect upon the history and context of environmental health and risk. Issues of (in)visibility of environmental contaminants and a tendency to emphasize some risks over others were recognized when the *Environmental Contaminants Act* was implemented (Page, 1978). A paper written by the Economic Council of Canada on the regulation of toxic chemicals in the environment in 1981 acknowledged the latent, long-term health effects of environmental contaminants. It emphasized that exposure to environmental contaminants can result in the development of cancer, birth defects, genetic damage, and other acute and chronic diseases (Nemetz et al., 1981). During the parliamentary review process of CEPA 1988, ninety percent of people surveyed were concerned about the effect of pollution on human health and additional surveys conducted at this time revealed that the presence of toxic chemicals in the environment was a major concern for Canadian citizens (House of Commons Standing Committee on Environment and Sustainable Development, 1995).

The Lalonde Report, which highlighted the environment as a determinant of health status, was an early indicator of environments as causal factors related to health outcomes (Lalonde, 1974). There has been an evolution in the language and terminology around toxic substances, as well as the formal definition of a “toxic substance” in Canada. Concerns were raised about the language used to describe environmental

chemicals at each stage of the parliamentary review of environmental legislation. Industry stakeholders felt that the use of “contaminants” to describe substances of concern in the *Environmental Contaminants Act* of 1975 unfairly stigmatized the industry and the substances themselves. The introduction of the term “toxic substances” in CEPA 1988 was meant to be less value-laden (House of Commons Standing Committee on Environment and Sustainable Development, 1995).

But industry representatives also expressed concerns with the use of the term “toxic substances” and the name of Schedule 1, the List of Toxic Substances under CEPA 1999. Because the Minister of the Environment and Minister of Health consider both the hazard and exposure of a substance that is defined as CEPA-toxic before placing it on Schedule 1, it was noted that a substance may be placed on the List of Toxic Substances as a result of detrimental effects at a high exposure level, but may be commonly (and safely, in their view) used under other circumstances. Industry representatives argued that “because of this, their products were being given an unfair stigma” (House of Commons Standing Committee on Environment and Sustainable Development, 1995: 45). For instance, the examples of road salt and ammonia were repeatedly raised in stakeholder consultations. Road salt⁵⁴ met two of the criteria to be defined as toxic including the potential to have an immediate or long-term harmful effect on the environment or its biological diversity, and the potential to constitute a danger to the environment on which life depends, although it was not added to Schedule 1. Ammonia was added to Schedule 1

⁵⁴ Similar to Health Canada’s (1995) illustrative example using knives to contrast hazard- and risk-based approaches in chapter three, it is suggested that the public may easily confuse “toxic” and “high hazard” and may think they are “sprinkling such a substance on their french fries” (House of Commons Standing Committee on Environment and Sustainable Development, 1995: 45-46).

after a risk assessment of ammonia in the aquatic environment determined that it has the potential to have immediate or long-term effects on the environment or biological diversity. The main objection to the use of the word “toxic” by industry is that “it gives all Schedule 1 substances the same connotation of being something to be avoided at all costs” (House of Commons Standing Committee on Environment and Sustainable Development, 1995: 45). Industry stakeholders recommended removing “toxic” entirely and replacing it with “substances to be managed,” while stakeholders from environmental and health organizations suggested that the removal of the toxic substances language could diminish the importance of the impact of the regulatory decisions. While there have not been any revisions to CEPA 1999 during legislative review, there were two attempts to remove “toxic” from all or parts of the Act in Bill C-43 from the 38th Parliament, first session in 2005, and Bill C-30 of the 39th Parliament, first session in 2007 (House of Commons Standing Committee on Environment and Sustainable Development, 2007: 45-46).

Under section 64 of CEPA 1999, a substance is considered “toxic” if

it is entering or may enter the environment in a quantity or concentration or under conditions that i) have or may have an immediate or long-term harmful effect on the environment or its biological diversity; ii) constitute or may constitute a danger to the environment on which life depends; or iii) constitute or may constitute a danger in Canada to human life or health.

Health Canada (2007c) equates the concept of risk with the definition of toxic under CEPA 1999 as it encompasses both the exposure to a substance and the hazard or inherent toxicity of a substance. Simply put, toxicity is equated with risk and this is the understanding that is used in Health Canada’s decision-making framework for risk

assessment and risk management. In order to evaluate the potential impact of a toxic substance on human health, Health Canada (2013a) assesses the risk by: i) reviewing relevant decisions of other jurisdictions; ii) conducting initial screening assessments which consider the hazardous properties of the substance, routes of exposure and the potential to harm human health; and iii) conducting in-depth assessments for substances which are placed on the Priority Substances List which includes a critical and comprehensive analysis of the risks to human health (Health Canada, 2008b).⁵⁵ The risk assessments consider the use, hazard, exposure, and environmental fate of the substance, as well as the risk to human health. They consider acute exposure at the individual-level and chronic exposure at the population-level (Environment Canada, 2013b; Saner, 2010).

A risk assessment is designed to determine a range of toxicological effects by utilizing the dose-response relationship. The traditional dose-response relationship posits that the “nature, number, severity, incidence[,] and/or prevalence of specific toxicological effects *increase with increasing exposure*, as determined by the dose, duration and frequency” of the toxic substance (Health Canada, 2007c, emphasis added).

Toxicological effects may be classified as “threshold” or “non-threshold.” Threshold effects only occur above a certain level of exposure (Health Canada, 2007c; Saner, 2010).

Health Canada (2010: 6) defines a toxicological threshold as a “dose below which no adverse effects to the exposed organism will occur.” Under this model small doses of a toxic substance are expected to be tolerated by the human body because of metabolic

⁵⁵ Refer to chapter three for additional detail on human health risk assessments and these processes in CEPA 1999.

detoxification, physiological homeostasis, and cellular adaptation and repairs. Risk assessments attempt to identify the highest dose of a substance that does not result in adverse health outcomes, also known as the “No-Observed-(Adverse)-Effect-Level” (NO(A)EL) (Health Canada, 2007c: 6).⁵⁶

Non-threshold effects, in contrast, are considered to occur at any level of exposure to a substance. During screening level assessments of existing substances under CEPA 1999, a non-threshold risk for a cancer endpoint results in the substance being found CEPA-toxic (Health Canada, 2000; Saner, 2010: 11). After this designation, the exposure component is considered in subsequent decisions, such as determining whether the substance will be added to Schedule 1 of the Act, and which risk management measures will be taken (Health Canada, 2007c: 6-7).⁵⁷

Ultimately, determinations of toxicity are dependent upon “whether or not the potential level of exposure is below that for which the health risk is considered significant, or for which the health risk is considered negligible” (Health Canada, 2007c: 3). Risk assessments utilize “margins of exposure” in order to determine the ratio between the NOE(A)L and estimated exposure level of the substance (Barnes and Dourson, 1988; Scott and Lewis, forthcoming; USEPA, 2000). The margin of exposure

⁵⁶ If the data does not allow for the determination of a NO(A)EL, the “Lowest-Observed-Adverse-Effect-Level” (LOAEL) would be used indicating the lowest dose at which an adverse effect occurs (Health Canada, 2007c: 6).

⁵⁷ For new substances, hazard and exposure are considered concurrently. A *de minimus* (“essentially negligible”) risk level is determined for new substances which do not have a threshold effect. Substances will be classified as Group 1 (“Carcinogenic to Humans”) or Group 2 (“Probably Carcinogenic to Humans”) where the substance will be considered toxic if its risk is not negligible. Substances will be classified as Group 3 (“Possibly Carcinogenic to Humans,” “Possible Human Germ Cell Mutagen” or if the weight of evidence indicates genotoxicity in somatic cells) where the substance will be suspected of being toxic if the risk is not negligible (Health Canada, 2007c: 8).

may be used in determining both non-cancer and cancer endpoints and are based on broad, population-level estimates (Environment Canada, n/db; Government of Canada, 2013d).

Human health exposure assessments consider exposure through a variety of sources including food, air, water, dust, soil, and consumer products, and a variety of pathways including ingestion, inhalation and dermal absorption. The exposure assessments consider scenarios including direct exposure and environmental (indirect) exposure. Direct exposure to toxic substances occurs most often through inhalation and dermal contact. Direct exposure of the general public results from “direct contact with, or close proximity to, the chemical during any part of its lifecycle, whether knowingly or not” (Health Canada, 2007c: 4). Environmental (indirect) exposure occurs when there are toxic substances present in food, drinking water, domestic and recreational water, air, dust, and soil. Environmental exposure occurs as a result of substances entering the “general environment through industrial waste streams, from releases from intended industrial uses, air emissions, household wastewater and landfill sites” (Health Canada, 2007c: 5). Direct human exposure is distinguished from indirect exposure, as there is no pathway in the environment that interferes between the point of release and the point of exposure. However, it may not always be possible to make a distinction between the two exposures. The toxicological effects which may occur are evaluated as part of the exposure assessment and include organ- or system-specific effects such as cardiovascular or neurological/behavioural; reproductive and developmental; immunological; carcinogenic; or mutagenic effects (Health Canada, 2007c: 4-5).

Section 65(1) of CEPA 1999 gives a legislative basis for the virtual elimination requirement of the Toxic Substances Management Policy for Track 1 substances. Here, virtual elimination is defined as the ultimate reduction of the quantity or concentration of the substance in the release below the level of quantification specified by the Ministers in the Virtual Elimination List. Section 77(4) of CEPA 1999 states that when

i) the substance is persistent and bioaccumulative in accordance with the regulations; ii) the presence of the substance in the environment results primarily as a result of human activity; and iii) the substance is not a naturally occurring radionuclide or a naturally occurring inorganic substance, the Ministers shall propose the implementation of virtual elimination under subsection 65(3).

Both Williams (2006) and the House of Commons Standing Senate Committee on Energy, the Environment and Natural Resources (2008) raised concerns about substances needing to be *both* persistent and bioaccumulative in order to qualify for virtual elimination. This requirement means that substances that are CEPA-toxic and persistent, but do not bioaccumulate, are not targeted for virtual elimination under CEPA 1999. It is suggested that the definition of virtual elimination be revised to be broader in scope, similar to the one used in the International Joint Commission and the Great Lakes Water Quality Agreement (Williams, 2006; House of Commons Standing Senate Committee on Energy, the Environment and Natural Resources, 2008).

The Standing Senate Committee (2008) conducted a case study that focused on perfluorinated compounds and on perfluorooctane sulfonate (PFOS) in particular. PFOS is a synthetic chemical that was imported from the United States to Canada to be used in numerous processes and products including water, oil, soil, and grease repellents, firefighting foams, hydraulic fluids, mining and oil surfactants, and carpet spot removers.

A State of the Science report prepared by Health Canada as part of a screening health assessment for PFOS determined that the majority of Canadian citizens have low levels of perfluorinated compounds, including PFOS, in their blood. However, the report ultimately concluded that there are adequate margins of exposure to prevent detrimental health outcomes (Health Canada, 2006; Health Canada, 2007d). Health Canada concluded that PFOS and its salts meet the criteria for persistence under CEPA 1999 and that “while the weight of scientific evidence indicates that PFOS and its salts are also bioaccumulative[.]...the relevant data for these substances do not meet the numeric criteria for bioaccumulation as defined in the CEPA 1999 *Persistence and Bioaccumulation Regulations*” (House of Commons Standing Senate Committee on Energy, the Environment and Natural Resources, 2008: 33). Based on this result, PFOS did not qualify for virtual elimination under CEPA 1999 and environmental non-governmental organizations suggested that the criteria for bioaccumulation be expanded. Consequently, a Member of Parliament introduced the Private Member’s Bill C-298 to Parliament in October 2007 to add PFOS to the Virtual Elimination list and the Bill received Royal Assent in April 2008 (House of Commons Standing Senate Committee on Energy, the Environment and Natural Resources, 2008; Parliament of Canada, 2008b).

In the next section, I illustrate the degree to which findings of toxicity are contested in the case of siloxane D5 which was determined to be a toxic substance under CEPA 1999. The Silicones Environmental, Health, and Safety Council of North America subsequently filed an objection which reflects the deeply vested interests around issues of production and risk.

Case Study: Siloxane D5 (CEPA-toxic?)

Siloxane D5 (cyclopentasiloxane, decamethyl-) is an industrial chemical used in a variety of products and processes. It is not manufactured in Canada, but it is imported into the country as a pure substance, in mixtures with other cyclic siloxanes, as a residual in silicone polymers, and in finished consumer products. Based on information received as part of a notice published under section 71 of CEPA 1999, between 1,000,000 and 10,000,000 kilograms of siloxane D5 were imported into Canada in 2006 (Environment Canada and Health Canada, 2008a). The most common use of siloxane D5 in Canada is in blending and formulating personal care products, such as hair and skin care products, antiperspirants and deodorants. It is also used in manufacturing silicone polymers, and in textiles, paints, sealants, lubricants, plastics, non-medical ingredients in pharmaceuticals, silicone polymers, food additives, surface treatments for wounds, and medical devices (Environment Canada, 2012f; Government of Canada, 2012d). Siloxane D5 may be released into the environment as a result of industrial processes and from the use and disposal of personal care products. Thus, air, wastewater and soil are the “principal receiving environmental media for [siloxane] D5 based on its physical-chemical properties and its use patterns” (Environment Canada and Health Canada, 2008: ii).

It was determined during the categorization process of the Domestic Substances List that siloxane D5 was in commerce in Canada, and met the ecological criteria for persistence, bioaccumulation potential, and inherent toxicity to non-human organisms. This substance was identified as a high priority for screening assessment and included in the Challenge of the *Chemicals Management Plan*. Siloxane D5 was originally assessed

as part of Batch 2 under the Challenge (Environment Canada and Health Canada, 2008a). A notice announcing the release of the final screening assessment report for siloxane D5 was published in the *Canada Gazette* in January 2009 (Government of Canada, 2009b, 2012e). The screening assessment conducted by Environment Canada and Health Canada (2008a: 51) concluded that siloxane D5 has the potential to cause ecological harm and meets the criteria for being defined as “toxic” under section 64 of CEPA 1999. It was determined by the Minister of the Environment that siloxane D5 “is entering or may be entering the environment in a quantity or concentration or under conditions that have or may have an immediate or long-term harmful effect on the environment or its biological diversity” (Environment Canada and Health Canada, 2008a: 51).

Siloxane D5 was not classified as a priority for in-depth assessment of the potential risks to human health during the categorization process. However, a human health assessment was conducted based on its structure and use pattern similarity to siloxane D4 (octamethylcyclotetrasiloxane) which was determined to be a high priority for assessment for risks to the environment and human health under CEPA 1999. The screening assessment of siloxane D5 considered exposure, health effects and the characterization of risk to human health. The estimates of exposure relied on the use of models and use pattern data which were not from Canadian studies. It is suggested that the extent of use of the substance in personal care products and in other products may be lower than the estimated dose and that exposure estimates from personal care products may be overestimated (Environment Canada and Health Canada, 2008a: 43-45).

The health effects of siloxanes are not covered extensively in the literature. It is noted in the health effects assessment that siloxane D5 has not been classified for carcinogenicity, genotoxicity or reproductive/developmental toxicity by an international agency. The assessment does reference reports by the Danish Environmental Protection Agency and the United States Environmental Protection Agency (Environment Canada and Health Canada, 2008a). While acute toxicity, irritant effects, sensitization and genotoxicity are not reported to be health effects of concern for siloxane D5, Lassen (2005) found that there are potential health effects related to repeated exposure to the lung and potential carcinogenic effects including uterine tumours. This is consistent with a study submitted by Dow Corning to the United States Environmental Protection Agency under the *Toxic Substances Control Act*. The study evaluated chronic toxicity and carcinogenicity of siloxane D5 on rats and concluded that the highest level of exposure resulted in a significant increase in uterine tumours (USEPA, 2009). Environment Canada and Health Canada (2008a) suggest that the high exposure levels related to these findings may be due to threshold effects.

The screening assessment identified considerable uncertainties in the risk of siloxane D5 to human health. For example, it noted that the assessment did not:

take into consideration a full analysis of the mechanism of action of decamethylcyclopentasiloxane and it does not take into account possible differences between humans and experimental species in sensitivity to effects induced by this substance. There is uncertainty surrounding the mechanism of carcinogenicity following exposure via the inhalation route....There is uncertainty regarding the estimation of exposure and systemic dose because of the use of modelling and a lack of Canadian data (Environment Canada and Health Canada, 2008a: 50-51).

However, based on the available information and the overall findings of the screening assessment, it was determined that siloxane D5 is not entering the environment in a quantity or concentration or under conditions that constitute or may constitute a danger to human life or health in Canada (Environment Canada and Health Canada, 2008a). Thus, the finding of toxicity made under the Challenge was based on meeting the criteria for ecological toxicity alone.

A proposed order to add siloxane D5 to Schedule 1, List of Toxic Substances under CEPA 1999 was published in the *Canada Gazette* in May 2009. The Government stated that the addition of siloxane D5 to Schedule 1 under section 90(1) would allow for the development of regulatory and non-regulatory measures to manage the human health and/or environmental risks (Government of Canada, 2009c). As risk management measures, the Government of Canada proposed the creation of concentration limits for siloxane D5 in order to minimize its release into municipal wastewater streams through the use of personal care products. It also proposed limiting the release of the substance into the environment from wastewater produced as part of manufacturing processes (Environment Canada, 2010f).

Within two months, in July 2009, a Notice of Objection was filed by the Silicones Environmental, Health, and Safety Council of North America which is a not-for-profit trade association representing silicone chemical producers and importers in North America (Thomas, 2009).⁵⁸ The trade association requested the establishment of a formal

⁵⁸ After a forty year history, the Silicones Environmental, Health, and Safety Council transitioned to become the Silicones Environmental, Health, and Safety Center in January 2013. The Silicones Environmental, Health, and Safety Center is a sector group of the American Chemistry Council with membership representing over ninety percent of the silicone chemical manufacturing capacity in North

Board of Review in response to the proposal to add siloxane D5 to Schedule 1. Under section 333(2) of CEPA 1999, the Minister of the Environment may establish a board of review to conduct an inquiry “into the nature and extent of danger” posed by siloxane D5. The Notice of Objection was filed by Karluss Thomas, Executive Director of the Silicones Environmental, Health, and Safety Council of North America and argued that a Board of Review

is warranted as the Proposed Order to add...[siloxane] D5 to Schedule 1 is based on final screening assessments...that have been conducted in a manner that is not consistent with the best available science. Use of the best available science would not have resulted in the conclusion that...[siloxane] D5 “may cause adverse effects to aquatic organisms in certain Canadian environments” and “have the potential to cause ecological harm” (Thomas, 2009).

The Notice of Objection is primarily concerned with conflicting evidence around the bioaccumulative potential of siloxane D5. Further, the Silicones Environmental, Health, and Safety Council of North America contended that there would be potential socioeconomic consequences if siloxane D5 were listed on Schedule 1, including “severe global market impacts to Canadian companies importing, processing, and using, these substances.” The trade association called for a Board of Review to “be convened to prevent a premature, inadequately supported Schedule 1 listing” (Thomas, 2009).

Upon receiving the Notice of Objection, the Government of Canada (2012e) considered new scientific information on siloxane D5 which became available from industry studies submitted to Environment Canada in January 2010, as well as scientific studies conducted by Environment Canada and in other jurisdictions. Based on the

America including Bluestar Silicones, Dow Corning Corporation, Evonik Goldschmidt Corporation, Momentive Performance Materials, Shin-Etsu Silicones of America, Milliken (formerly SiVance), and Wacker Chemical Corporation (American Chemistry Council, Inc., 2013).

availability of new information, the Minister of the Environment established a Board of Review in August 2010. According to the terms of reference, the Board of Review would conduct an inquiry into the nature and extent of the danger posed by siloxane D5 and submit a final report to the Minister of the Environment before March 31, 2011 (Government of Canada, 2010c). The Chair of the Board of Review submitted a letter dated November 12, 2010 to the Minister of the Environment requesting an extension for the final report. The Board received information suggesting that new information would not be available until the end of 2010 or early 2011 and required an adequate amount of time in order to conduct a “thorough and comprehensive review of the nature and extent of the dangers posed by Siloxane D5.” The Board committed to submitting its final report and recommendations by September 30, 2011. The Board of Review received a letter from the Minister of the Environment acknowledging this request on August 30, 2011. This letter required the report be translated into French and extended the final deadline for submission to October 31, 2011 (Siloxane D5 Board of Review, 2011: 76-77).

The Minister of the Environment appointed three toxicologists⁵⁹ to serve on the Board of Review. The Board consulted with each of the parties involved in the proceedings including Environment Canada; the applicant, Silicones Environmental, Health and Safety Council of North America; and the interveners, the Canadian

⁵⁹ The three members of the Board of Review included Chair, Dr. John Giesy who is the Canada Research Chair of Environmental Toxicology, Department of Veterinary Biomedical Sciences and Toxicology Centre at the University of Saskatchewan and a Distinguished Professor of Zoology Emeritus at Michigan State University; Dr. Sam Kacew who is the Associate Director of Toxicology at the McLaughlin Centre for Population Health Risk Assessment and Professor in the Department of Cellular and Molecular Medicine at the University of Ottawa; and Dr. Keith Ross Solomon who is a Professor Emeritus in the Department of Environmental Science and Director of the Centre for Toxicology at the University of Guelph (Government of Canada, 2011e).

Cosmetic, Toiletry and Fragrance Association, and a coalition consisting of the Canadian Environmental Law Association, the International Institute of Concern for Public Health, Chemical Sensitivities Manitoba, and the Crooked Creek Conservancy Society of Athabasca. The Board of Review determined that it would focus its review on the nature and extent of the danger posed by siloxane D5 to the environment based on the initial screening assessment, additional information that became available, and direction from the Minister of the Environment (Government of Canada, 2010c; Siloxane D5 Board of Review, 2011).

The Board of Review investigated the nature and extent of the risk posed by siloxane D5 to the environment and whether detrimental effects may occur as a result of exposure to siloxane D5. The Board conducted a *de novo* risk assessment⁶⁰ that considered all available information surrounding the intrinsic physical and chemical properties of siloxane D5, as well as its toxicity, uses, exposures, and effects (Siloxane D5 Board of Review, 2011: 10). Specific findings of the Board of Review included:

- Siloxane D5 exceeds the regulatory threshold for persistence, but does not exceed the thresholds established in the *Persistence and Bioaccumulation Regulations*;
- While siloxane D5 can be accumulated into organisms from environmental matrices or food, it does not biomagnify through the foodchain; and
- Siloxane D5 will not accumulate to sufficient concentrations to cause detrimental effects in organisms in air, water, soils, or sediments (Siloxane D5 Board of Review, 2011: 9).

Thus, the Board of Review concluded that siloxane D5 does not pose a danger to the environment or its biological diversity (Siloxane D5 Board of Review, 2011: 9).

⁶⁰ A *de novo* risk assessment means that the Board of Review did not assess whether the conclusions of the Ministers of the Environment and Health were reasonable, but rather conducted its own assessment.

Based on the conclusions provided by the Board of Review, the federal government published a revised decision on siloxane D5 in February 2012. In reversing its decision, the Government concluded that siloxane D5 does not meet any of the criteria under section 64 of CEPA 1999 and that this substance is not entering the environment in a quantity or under conditions that constitute a danger to the environment. The Government formally annulled the original decision to add siloxane D5 to the List of Toxic Substances and all related risk management activities (Government of Canada, 2012e, 2012f).

The Board of Review for siloxane D5 was the first to be established under CEPA 1999. The reversal of the original decision by the Government of Canada, prompted by the Silicones Environmental, Health, and Safety Council of North America, raises questions about the application of the precautionary principle and may set a precedent for future regulation of toxic substances. In particular, the Board's conclusions "may make it more difficult for federal scientists to build a case for restricting problematic chemicals in future, particularly at a time when Environment Canada is already facing severe cuts to its overall budgets and still faces the task of completing assessments of approximately 1500 chemicals under Canada's Chemicals Management Plan over the next few years" (CELA, 2012b).

The Role of the Precautionary Principle

Decision-making under CEPA 1999 is said to be guided by the application of the precautionary principle. The precautionary principle is often promoted by environmental health advocates as an approach that encourages regulatory action when some evidence

of harm exists, despite uncertainty or contestation (Ley, 2009: 81). Vogel (2012: 75) suggests that it may be “the dangers that we do not yet adequately understand or know about [that] are likely to be more serious than those about which we already know.” The precautionary principle is grounded in “anticipatory action in the absence of complete proof of harm, particularly where there is scientific uncertainty about causal links” and allows for decision-makers to act in a precautionary and protective manner in order to prevent harm to humans and the environment from exposure to toxic substances (Tickner, 1997). This principle guides a precautionary approach to decision-making in order to make risk assessment and management decisions around pollution prevention and the release of toxic substances into the environment (Ogilvie, 2001; Tickner, 1997).

The preamble of CEPA 1999 commits the Government of Canada to implementing the precautionary principle “where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.” This is consistent with the most widely used definition of the precautionary principle from the Rio Declaration on Environment and Development which was established in 1992 (Ogilvie, 2001). Principle 15 states that “[i]n order to protect the environment, the precautionary approach shall be widely applied.... Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation” (United Nations, 1992).

Vlek (2009) considers the Rio Declaration version of the precautionary principle used in CEPA 1999 to be weaker than the definition proposed at the Wingspread Conference in 1998 by treaty negotiators, activists, academics, and scientists from Canada, the United States and Europe. Participants in the conference

believe existing environmental regulations and other decisions, particularly those based on risk assessment, have failed to protect adequately human health and the environment...[T]here is compelling evidence that damage to humans and the worldwide environment is of such magnitude and seriousness that new principles for conducting human activities are necessary (Science and Environmental Health Network, 2013).

The Wingspread Consensus Statement promotes the implementation of the precautionary principle when “an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context the proponent of an activity, rather than the public, should bear the burden of proof” (Science and Environmental Health Network, 2013; Wilson, 2005). Unlike the definition in CEPA 1999, the Wingspread definition does not include provisions around “serious or irreversible damage” or cost-effectiveness. Many health and environmental groups promote the Wingspread definition as an alternative to the Rio Declaration definition used in CEPA 1999 because it also implies a duty to act (McClenaghan et al. 2003; Ogilvie, 2001).

The precautionary principle is also included in the administrative duties of CEPA 1999 under section 2(1) where the government must

(a) exercise its powers in a manner that protects the environment and human health, applies the precautionary principle that, where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as reason for postponing cost-effective measures to prevent environmental degradation, and promotes and reinforces enforceable pollution prevention approaches;

(j) protect the environment, including its biological diversity, and human health, from the risk of any adverse effects of the use and release of toxic substances, pollutants and wastes; and

(k) endeavour to act expeditiously and diligently to assess whether existing substances or those new to Canada are toxic or capable of becoming toxic and assess the risk that such substances pose to the environment and human life and health.

While the precautionary principle allows for the justification of taking action, Environment Canada and Health Canada (2004: 11) note that the complexity of environment and health issues mean that most decisions cannot reflect absolute certainty and the use of the precautionary principle will vary from case-to-case depending on the degree of scientific certainty and the irreversibility or potential damage.

The House of Commons Standing Committee on Environment and Sustainable Development (2007) contends that the inclusion of the precautionary principle in the administrative principles of the Act means that the government is obliged to apply it. However, CEPA 1999 is critiqued for not operationalizing the precautionary principle in the assessment of toxic substances (Scott and Lewis, forthcoming). Environment and health advocates argue that there is a duty to act in accordance with the precautionary principle, to protect human health and the environment from exposure to substances which are CEPA-toxic and substances which are inherently toxic and have the potential to cause harm.

The House of Commons Standing Committee on Energy, the Environment and Natural Resources (2008: 4) note concerns that the legislation is sound but inadequately implemented. The Committee “believes that the lack of will to implement and enforce the

Act, and a shortage of necessary resources for that implementation and enforcement, are the weak links in the effectiveness of the CEPA [1999] environmental protection regime.” There has been “little to no action taken to limit or manage a chemical before a complicated legal and political process confirms its toxicity” (CELA, 2007: 49). Dr. Kapil Khatter of PollutionWatch also pointed to the mechanisms under CEPA 1999 that had not yet been utilized.

CEPA [1999] gives the federal government the powers to regulate any substance that it deems to endanger our health or the environment. It offers the government a range of tools to reduce pollution and to prevent harm. CEPA [1999], though, has not been effective in reducing pollution in Canada or in getting the worst chemicals off the market (House of Commons Standing Committee on Energy, the Environment and Natural Resources, 2008: 4).

The regulatory system is based on the principle that a certain level of risk is unavoidable which raises questions about the “acceptability of risk.” Early risk management was based around the idea that the public could be completely protected from all risks (Health Canada, 1998). This is simply not possible within the risk society where we are exposed to substances which are invisible, do not respect territorial boundaries and have lengthy latency periods. These risks and subsequent health outcomes are often not the result of one single high-dose exposure, but rather the result of synergistic exposure to long-term cumulative doses of complex mixtures of substances. There is a lack of consensus around levels of acceptability and the risks associated with exposure to toxic substances. For example, in 1999, a Member of Parliament, the Honourable Charles Caccia asked “[w]hat comfort is it to Canadians if toxic chemicals get catalogued and assessed, but not necessarily eliminated?” (Batt, 2002: 5; Parliament of Canada, 1999).

Industry stakeholders propose that risk is acceptable in the name of socioeconomic progress. By factoring “*financial* risks and benefits into the same equation as *health* risks and benefits, risk management frames illness as an acceptable trade-off for economic prosperity and/or jobs” (Batt, 2002: 6). Among the general public, it is suggested that the degree of acceptance for risks related to health is low (Bouder, 2006). Environmental and breast cancer activists question the ethics around the acceptability of exposing populations to toxic substances which may result in detrimental health outcomes; exposing pregnant women to toxic substances which may result in their child developing health issues later in life; and exposing women to toxic substances which may result in the development of breast cancer.

The acceptable levels of risk associated with established guidelines and margins of exposure vary up to a million-fold (Health Canada, 1998: 9). Based on the notion that risk is unavoidable and to some degree, acceptable, there has been an emphasis on risk management over precaution (Scott and Lewis, forthcoming). Health Canada (1998: 2) concludes that risk management strategies provide a “high degree of health protection, based on the absence of observable health effects using epidemiological methodology.” The risk management approach emphasizes control or reduction rather than elimination or substitution (CELA, 2007). As Scott (2009b: 70-71) notes:

[i]t is increasingly clear that the central assumptions of our risk assessment models are completely ineffective at capturing the complexity that characterizes contemporary pollution harms. Advocates believe that ‘precaution’ demands allegiance to ‘an entirely new set of assumptions’, including the vulnerability of the ‘environment’ and ‘bodies’, and the serious limitations of our science with respect to the accurate prediction of the interactions between chemicals, between environments and bodies, and between chemicals and bodies. Most importantly,

precaution assumes the availability of alternative, less harmful processes and products.

In this respect, precaution becomes particularly relevant in the case of exposure to endocrine disrupting chemicals, which are ubiquitous, display complex mechanisms and may result in detrimental health outcomes at low doses.

Endocrine Disrupting Chemicals

There has been growing concern from the public about the effects of endocrine disrupting chemicals on the environment and human health. The House of Commons Standing Committee on Environment and Sustainable Development received testimony about this issue as early as the legislative review of CEPA 1988. In their briefing to the Committee submitted in 1994, the Canadian Environmental Law Association raised concerns about the effects of endocrine disrupting chemicals.

In recent years there has been growing concern that some chemicals – particularly persistent, bioaccumulative, chlorinated hydrocarbons – may be the cause of a variety of serious effects, including reproductive, developmental and behavioural abnormalities, in both humans and other species. The possible effects of such chemicals on the reproductive integrity of humans, particularly the suggested estrogenic properties of some pollutants, have now developed into a priority issue (House of Commons Standing Committee on Environment and Sustainable Development, 1995: 33).

Consistent with Beck's (1992) argument that toxic substances do not respect territorial boundaries, stakeholders expressed concern about pesticides and PCBs which originated in the southern industrial and agricultural regions of North America, Europe and Asia and are detected in wildlife in northern Canada and in the breast milk of northern aboriginal women (House of Commons Standing Committee on Environment and Sustainable Development, 1995).

It is suggested that the precautionary principle should be utilized in the management of endocrine disrupting chemicals (Servos et al., 2001; World Wildlife Fund Canada, 1998). Industries and sites of concern around endocrine disrupting chemicals include municipal effluents, agriculture, textile mill effluents, pulp and paper sector, mining and metal work, automotive, food canning, bars, casinos and racetracks, historically contaminated sites, identified areas of concern such as the Great Lakes, and contaminants in the Arctic including aboriginal food sources (Brophy et al., 2012; Servos et al., 2001). There is potential for risk assessment processes to “be used to identify effects produced via endocrine disrupting mechanisms, but subtle effects on growth, reproduction and development must also be considered” (Servos et al., 2001: 337). In order to adequately account for the impacts of endocrine disrupting chemicals, risk assessments need to consider sensitive life history stages, windows of susceptibility, the significance of delayed responses and effects, and the effects of mixtures and mixture interactions (Servos et al., 2001: 337).

Unlike the original Act, CEPA 1999 requires the Minister of the Environment and the Minister of Health to conduct research on hormone disrupting substances (Environment Canada, 2010e; Environment Canada and Health Canada, 2004).⁶¹ Part 3, Section 44(4) under the Monitoring, Research and Publication requirements of CEPA 1999 involves research on the health and environmental impacts of endocrine disrupting chemicals. Specifically, the Minister of the Environment and Minister of Health must

⁶¹ Hormone disrupting substances are defined under section 43 in CEPA 1999 as a “substance having the ability to disrupt the synthesis, secretion, transport, binding, action or elimination of natural hormones in an organism, or its progeny, that are responsible for the maintenance of homeostasis, reproduction, development or behaviour of the organism.”

conduct research or studies relating to hormone disrupting substances, methods related to their detection, methods to determine their actual or likely short-term or long-term effect on the environment and human health, and preventive, control and abatement measures to deal with those substances to protect the environment and human health.

Section 45 also requires the Minister of Health to i) conduct research and studies relating to the role of substances in illnesses or health problems; ii) collect, process, correlate and publish on a periodic basis data from any completed research or studies; and iii) distribute the available information to inform the public about the effects of substances on human health. This requirement has the potential to play an important role in preventing diseases such as breast cancer which are influenced by the role of endocrine disrupting substances. However, the ways in which the government is required to follow-through are unclear and the requirements in CEPA 1999 lack specificity with vague timelines such as a “periodic basis” that are open to interpretation. Ecojustice and the Canadian Environmental Law Association submitted a petition to the Office of the Auditor General of Canada in July 2012 seeking information about the federal research activities under Environment Canada and Health Canada on the effects of hormone disrupting substances as required by CEPA 1999. The petition inquires about how the data is collected on substances considered new under CEPA 1999; about the budget allocated to research and the involvement of Canada in international research initiatives; and how Environment Canada and Health Canada are using research results for risk assessment and risk management under CEPA 1999. Replies to the petition from Environment Canada and Health Canada are not yet available (Office of the Auditor General of Canada, 2012).

PBDE Flame Retardants and Phthalates

The House of Commons Standing Committee on Environment and Sustainable Development (2007) suggests that other federal governments have applied the precautionary principle more rigorously than Canada in cases such as polybrominated diphenyl ether (PBDE) flame retardants and phthalates in the European Union (House of Commons Standing Committee on Environment and Sustainable Development, 2007). PBDE flame retardants are lipophilic, bioaccumulative and have endocrine disrupting properties. These substances are an issue of global concern; their chemical structure is similar to PCBs and DDT and their distribution in the environment follows similar patterns as they are widespread moving beyond territorial boundaries (Rahman et al., 2001). The Restriction of the use of certain Hazardous Substances in electrical and electric equipment (RoHS) in the European Union bans new electrical and electronic equipment containing more than designated maximum allowable levels of PBDE flame retardants as of 2006 (Bromine Science and Environmental Forum, 2013; Steven Engineering Inc., 2013). This directive also requires that polybrominated diphenyl ether and polybrominated biphenyl flame retardants and heavy metals including lead, mercury, cadmium, and hexavalent chromium are substituted by safer alternatives (European Commission, 2013).

Exposure to endocrine disrupting phthalates is ubiquitous. The European Union ministers voted unanimously in 2004 to ban the use of di(2-ethylhexyl) (DEHP), di-n-butyl (DBP) and n-butyl benzyl (BBP) phthalates from use in children's toys in concentrations greater than 0.1 percent. This decision was grounded in the precautionary

principle and is viewed as protective of health and the environment (Euractiv, 2004). The European Union listed phthalates DEHP, DBP and BBP on the REACH Candidate List in October 2008, they were subsequently included on the Authorisation List in February 2011 and are scheduled to be phased-out by February 2015 (Plasticisers and Flexible PVC Information Centre, 2010). Danish Minister of the Environment announced a complete ban of DEHP, DBP, BBP, and DIBP (diisobutyl) phthalates in a wide range of consumer products and has also proposed banning the four phthalates at the EU level (Euractiv, 2012). Denmark has developed a progressive Phthalate Strategy which is grounded in the precautionary principle in its concern about the environmental health implications as a result of exposure to phthalates. It also recognizes the “cocktail effect” of the mixture of substances and proposes to address the class of substances rather than the substance-by-substance approach. “It is neither efficient nor enough to introduce legislation on phthalates one by one. With this long-term strategy, we take into account that several phthalates have the same effect on the body, and that we are often exposed to several phthalates at once” (Denmark Ministry of the Environment Environmental Protection Agency, 2013; McClenaghan et al., 2003). The current legislation around phthalates in the European Union and Denmark involves processes including

- *Classification:* Twelve phthalates have European Union-harmonized classification with eleven classified as toxic to reproduction;
- *Authorization:* Seven phthalates have been included in the European Union Candidate List of Substances of Very High Concern; and
- *Restrictions:* There are concentration limits for six phthalates in toys and childcare articles in the European Union. Four phthalates have been banned in Denmark in a wide range of products in concentrations higher than 0.1 percent, and all phthalates have been banned in Denmark in toys and childcare articles for

children ages 0-3 years in concentrations higher than 0.05 percent (Danish Environmental Protection Agency, 2013: 7).

The aim of the Danish Phthalate Strategy is to generate new knowledge about the risks associated with these substances and will potentially result in the restriction of other phthalates (Ministry of the Environment Environmental Protection Agency, 2013). In order to adequately address endocrine disrupting substances within Canada's legislative and regulatory frameworks, a specific national risk management strategy would need to be developed (Servos et al., 2001: 337).

Applying Precaution in the Assessment and Management of Risk

The precautionary principle has not been meaningfully applied in the regulation of toxic substances through CEPA 1999 and the *Chemicals Management Plan*. If the regulatory regime were to truly utilize the precautionary principle, the focus would shift to being precautionary rather than reactionary and would not assume that humans are meant to possess a body burden of toxic substances (Lewis, 2010; Seager, 2003). "It is seen as acceptable for there to be delays in responding or refusals to act based on gaps in the research data...[The government] has rarely taken preventive measures in the face of these uncertainties and has thereby allowed existing exposures to continue" (Lewis, 2010: 25). The duty to act and to assess and manage risks associated with toxic substances does not adequately incorporate the precautionary principle which will be further explored in the following discussion about exposure and hazard.

Risk and Hazard Assessment

Concerns about the mandatory exposure requirement in the definition of CEPA-toxic were raised as early as the Parliamentary Review of CEPA 1988. The House of

Commons Standing Committee on Environment and Sustainable Development (1995) recommended changing the definition of CEPA-toxic to include both a risk assessment and a hazard assessment. A hazard assessment does not contain an exposure requirement but rather includes an assessment of the intrinsic hazard or intrinsic toxicity of the substance and its potential to cause harm. This discussion continued as part of Pollution Probe's report on standard setting for toxic substances in Canada which was released in 2001. Non-governmental and non-industry participants promoted hazard assessment as either an alternative or in addition to risk assessment under CEPA 1999 that would be able to "trigger the use of the precautionary principle, which requires actions to be taken to remove or minimize the potential risk" (Ogilvie, 2001: 57). Despite being raised as significant concerns as early as 1995, there have been no changes to the exposure requirement of CEPA-toxic or the risk assessment process as part of CEPA 1999. As a result, a toxic substance in Canada "cannot be regulated merely for having the inherent potential to cause harm" (Cooper et al., 2000: 202; Scott and Lewis, forthcoming).

The Canadian Environmental Law Association and Canadian Institute for Environmental Law and Policy (1996) cite toluene as an example of a toxic substance that possesses inherently toxic properties but was found to be not toxic under CEPA because of the exposure requirement. Toluene is an aromatic hydrocarbon which is used in cosmetics including nail polish and as a petrochemical solvent and paint thinner. This substance is linked to numerous health concerns including developmental and reproductive toxicity, neurotoxicity, and organ system toxicity (Environmental Working Group, 2013; Office of Environmental Health Hazard Assessment, n/d). "Toluene is

listed in virtually every provincial hazardous waste and occupational health and safety regulation in the country” (CELA and CIELAP, 1996: 106). However, while toluene was originally included on the Priority Substances List, it was subsequently found to be not toxic under CEPA⁶² and, as such, is not subject to risk management provisions (Environment Canada and Health Canada, 1992; Health Canada, 2007e).

In California, toluene falls under the risk management provisions of the *Safe Drinking Water and Toxic Enforcement Act* of 1986, also known as Proposition 65. Proposition 65 requires the State to publish a list of toxic substances that are known to cause cancer, birth defects or other reproductive harm and which must be updated at least once a year. Industry and businesses must notify citizens about “significant amounts of chemicals in the products they purchase, in their homes or workplaces, or that are released into the environment” (Office of Environmental Health Hazard Assessment, 2013). The list is currently comprised of approximately 800 chemicals, including toluene (Office of Environmental Health Hazard Assessment, 2013; State of California, 2013a). To some extent, the onus of responsibility is placed on the individual to use the information provided through Proposition 65 to reduce exposures that may not be

⁶² The Government of Canada addressed paragraph 11 under CEPA in assessing the potential impact of toluene exposure on the environment and human health. Paragraph 11(c) considers the effects on human life or health and it was concluded that the estimated total average daily intake of toluene for the Canadian population is between 50-670 times less than the tolerable daily intake derived from bioassays in animal studies and data from clinical studies (Environment Canada and Health Canada, 1992: 16-17). However, it is noted that the available epidemiological data are unable to adequately assess the carcinogenicity of toluene in humans (Environment Canada and Health Canada, 1992: 15). Based on these findings, the Ministers of Environment Canada and Health Canada concluded that “the current concentrations of toluene present in the environment do not constitute a danger in Canada to the environment or to the environment on which human life depends or to human life or health. Therefore, toluene is not considered to be ‘toxic’ as interpreted under section 11 of the *Canadian Environmental Protection Act*” (Environment Canada and Health Canada, 1992: v).

adequately controlled under other state or federal regulation. However, it is also noted that this law has created incentives for manufacturers to remove toxic substances that are listed as part of this initiative. For example, following their inclusion on the list, toluene was removed from many nail care products, and the carcinogens trichloroethylene and methylene chloride are no longer used in most correction fluids and reformulated paint strippers (Office of Environmental Health Hazard Assessment, 2013).

The European Union placed restrictions on toluene in 2004 so that the substance “shall not be placed on the market, or used, as a substance or in mixtures in a concentration equal or greater than 0.1% by weight where the substance or mixture is used in adhesives or spray paints intended for supply to the general public” (Armstrong and Dupont, 2012: 52). Seventy-four percent of member states (twenty countries) carried out enforcement action on toluene by 2012 (Armstrong and Dupont, 2012). The European Union has also restricted the content of toluene in nail products to twenty-five percent and included conditions of use which require that the label must contain warnings that the products be kept out of reach of children and used by adults only (Verheugen, 2009).

Traditional risk assessment and management processes fall short in the risk society (Beck, 1992). The risk assessment process determines toxicological effects utilizing threshold values and the dose-response relationship. The use of threshold values in the risk assessment process suggests that threshold effects occur only at a specific level of exposure, whereas non-threshold effects occur at any level of exposure to a substance or product. Health Canada (2007c: 6) contends that a toxicological threshold exists below which adverse effects do not occur.

Below a certain minimum dose, ...compensatory mechanisms can mitigate the adverse effects of a substance, even on a continuing basis. At higher dose levels, however, the ability of the organisms to compensate or adapt becomes overwhelmed, leading to an impairment in organ function or development of disease state (Health Canada, 2007c: 6).

However, exposure data and threshold effects, the premise of risk assessment, do not adequately account for the possibility of substances such as endocrine disrupting chemicals that have low dose effects or result in cumulative exposures. There is a significant critique from the field of epidemiology of the dose-response relationship which is utilized in risk assessment processes and is based on traditional toxicology.

The traditional dose-response relationship posits that toxicological effects increase with increased exposure and dose of a toxic substance (Health Canada, 2007c). The high dose animal testing and linear extrapolation utilized in toxicology does not allow for the potential of health effects occurring below the “safe” levels utilized in evaluating threshold values (Birnbaum, 2012; Brophy et al., 2013). Vandenberg et al. (2012) analyzed hundreds of epidemiological studies in order to demonstrate the impact of low-dose effects of endocrine disrupting chemicals on human health in comparing the role of non-monotonic responses⁶³ and the traditional dose- response relationship.

Whether low doses of EDCs [(endocrine disrupting chemicals)] influence certain human disorders is no longer conjecture, because epidemiological studies show that environmental exposures to EDCs are associated with human diseases and disabilities...[W]hen nonmonotonic dose response curves occur, the effects of low doses cannot be predicted by the effects at high doses. Thus, fundamental changes in chemical testing and safety determination are needed to protect human health (Vandenberg et al., 2012).

⁶³ Traditional monotonic dose response curves demonstrate the relationship between the concentration of a toxic substance and an adverse effect (i.e., “the dose makes the poison”). However, non-monotonic dose response curves demonstrate situations where the effect of a toxic substance may be greater at lower doses than at higher doses (USEPA, 2013b).

In demonstrating the continued debate and contested nature around low dose exposures to endocrine disrupting substances, the United States Environmental Protection Agency (2013a) has recently produced a *State of the Science Report* to evaluate the impact of potential non-monotonic dose response relationships to estrogen-, androgen-, and thyroid-based modes of action and the current risk assessment and management processes. This comes in response to the Vandenberg et al. (2012) article that reviewed hormones and endocrine disrupting chemicals and in particular, their low-dose effects and non-monotonic dose responses. The article “criticized the [US] government’s decades old-strategy for testing the safety of many chemicals found in the environment and in consumer products” (Bienkowski, 2013b). The Environmental Protection Agency’s draft report concludes that the current testing of endocrine disrupting chemicals is adequate for detecting low-dose effects of toxic substances; the “current testing strategies are unlikely to mischaracterize, as a consequence of NMDR [non-monotonic dose responses], a chemical that has the potential for adverse perturbations of the estrogen, androgen or thyroid pathways” (USEPA, 2013c: 15). A trade association, the American Chemistry Council, praised these conclusions stating that this “affirms what mainstream scientists have expressed for years: the purported scientific evidence for non-monotonic low dose exposures leading to endocrine disruption and adverse effects is, at best, very weak” (Bienkowski, 2013b). However, lead author of the *Endocrine Reviews* article, Dr. Laura Vandenberg criticized the draft report and the suggestion that high dose testing cannot predict safety or a lack of risk at low doses as it “flies in the face of our knowledge of how hormones work...[Endocrine disrupting chemicals] are overtly toxic

at high doses but act like hormones, with completely different actions, at low doses” (Bienkowski, 2013b). She also suggests that the Environmental Protection Agency has used out-of-date studies on both atrazine and BPA (Bienkowski, 2013b). The draft report will be peer reviewed through the National Academies of Science and through a public comment process (USEPA, 2013d).

Endocrinologists and other environmental health researchers and advocates are raising competing paradigms to contest the reliance on toxicology and the dose-response relationship in risk assessment processes (Darbre and Fernandez, 2013; Grossman, 2012, 2013; Pesch et al., 2004; Ritter, 2011; Vandenberg et al., 2009, 2012). This debate is clearly demonstrated by the divergent positions in recently published editorials by Dietrich et al. (2013) and a subsequent response by Gore et al. (2013). Editors of toxicology and pharmacology journals prepared the Dietrich et al. (2013) editorial which demonstrates the contestation around issues of the risk assessment of endocrine disrupting chemicals, threshold values and the precautionary principle. They contend that detrimental effects associated with endocrine disrupting chemicals can be determined exclusively through toxicity studies. The authors argue that

regulations that profoundly affect human activities, that legally impose significant fines and even detention, should not be based on irrelevant tests forced to be regarded as relevant by administrative dictates, and on arbitrary default assumptions of no thresholds. Such standards would be contrary not only to science, but to the very principles of an enlightened governance and social contract. Not only scientists but society itself would pay dearly if unscientific approaches were to undermine our everyday practice of science, and the stringency of data analysis and evaluation developed by scientific thinking over the past centuries (Dietrich et al., 2013: A1).

Gore et al. (2013) published a formal response refuting Dietrich et al. in *Endocrinology*.

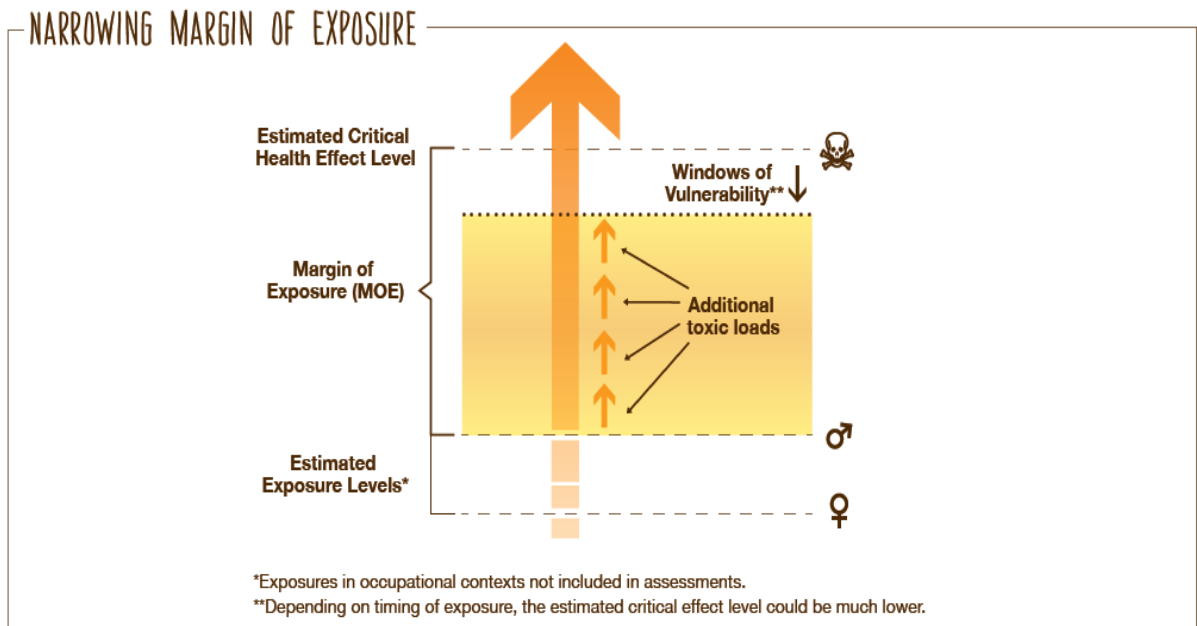
It is suggested that the latter article is “neither based on the fundamental principles of how the endocrine system works and how chemicals can interfere with its normal function, nor does it consider the consequences of that interference...[It] also ignores a growing and rigorous body of literature on both endogenous hormonal and exogenous EDC effects” (Gore et al., 2013: 3958). The authors contend that regulation of endocrine disrupting chemicals should be based on science and expertise from reproductive biology, endocrinology, medicine, genetics, behaviour, developmental biology, and toxicology (Gore et al., 2013).

The role of scientists in influencing law, policy and practice of the federal government has been diminishing in recent years in Canada. This is reflected in the 700 jobs cuts at Environment Canada in 2011 and repeated accusations of “muzzling” federal scientists from speaking publicly about peer-reviewed research results (CBC, 2011c, 2011d, 2013b; De Souza, 2013; Fitzpatrick, 2011; Gatehouse, 2013; Klinkenborg, 2013; Makuch, 2013; McLeod, 2013; Woods, 2013). However, the current regulatory regime remains highly dependent on very specific types of expertise, including the exclusive reliance on toxicology for the risk assessment processes associated with toxic substances. For instance, the Minister of the Environment appointed the representatives to the Board of Review for siloxane D5 in 2010 -- all three members are toxicologists (Government of Canada, 2011e).

The distinction between threshold and non-threshold effects is of particular concern with priority risks such environmental links to cancer (Saner, 2010). Lewis (2011: 21) notes that the margin of exposure assessment approach which is utilized in

determining whether toxic substances are “safe,” involves determining the “difference between the estimated critical health effect level of the chemical (the threshold at which a chemical is considered harmful to human health or the environment), and its estimated exposure level.” However, this approach does not account for the potential health effects of low dose and cumulative exposures or how sex and gender can affect the margin values. The current margins of exposure do not account for the timing of exposure, the impact of windows of susceptibility, and the role of gender in creating disproportionate exposure to toxic substances through domestic responsibilities (Lewis, 2011). Women may be more susceptible to exposures to toxic substances and subsequent health outcomes based on the timing of exposure and windows of susceptibility. These windows of susceptibility involve periods of development or hormonal activity in which women’s bodies may be more susceptible including the prenatal period, childhood, puberty, menstruation, pregnancy, and menopause (Birnbaum, 2009; Brophy et al., 2012; Cooper et al., 2000; Diamanti et al., 2009; Gray, 2010; Schug et al., 2011; and Schwarzman and Janssen, 2010).

It is likely that the margins of exposure used in risk assessments are vastly over-estimated in many cases. It is proposed that the margins of exposure should be narrowed in order to adequately account for the risk associated with exposure to toxic substances and specifically with the risk in relation to women’s exposure and detrimental health outcomes (Lewis, 2011; Scott and Lewis, forthcoming). An approach which narrows the margins of exposure in order to adequately account for women’s risk associated with exposure to toxic substances is reflected in the diagram below:



(Lewis, 2011: 21).

de Leon, Madray and Richardson (2010: 9) also recommend that risk management should be initiated by hazard rather than exposure data. There has been little emphasis on the elimination of toxic chemicals as an overall objective of the *Chemicals Management Plan* which is contradictory to the goal of pollution prevention as the cornerstone of CEPA 1999. The current practice of risk assessment in Canada enables widespread environmental contamination and detrimental health outcomes before the risks can be assessed and managed; the process is inherently reactionary rather than precautionary (de Leon, 2010: 6; Lewis, 2011). The regulatory process is unable to be truly precautionary as long as the exposure component is required as it becomes necessary for harm to occur before preventive measures can be established despite government endorsements of the precautionary principle.

Conclusions

There is a need for coherence across and among government policies and legislation in order to protect the health of Canadian citizens (Environment Canada and Health Canada, 2004: 13). This analysis indicates that Canada's environmental legislation is not capable of being protective with the exposure requirement in the assessment of risk. The use of an exposure-based approach in risk assessment processes rather than a hazard-based approach does not account for the inherent toxicity of a toxic substance. Despite the inclusion of the precautionary principle in CEPA 1999, the implementation of CEPA 1999 and the *Chemicals Management Plan* continues to be reactionary rather than precautionary in the assessment and management of toxic substances. The regulatory regime does not adequately account for low dose, cumulative exposures of toxic substances including endocrine disrupting chemicals. These gaps do not allow for the legislation to prevent detrimental health outcomes and enact a primary prevention approach to women's health. The following chapter will explore issues of sex, gender, risk and responsibility which emerge in Canadian law, policy and practice related to toxic substances.

Chapter 5

Toxics Regulation: Sex, Gender, Risk and Responsibility

Introduction

This chapter examines the relationship between theory and practice in an examination of the regulatory regime for toxic substances. It draws upon government publications, grey literature and media coverage in order to explore questions and tensions around risk, precaution, and prevention. The chapter begins with a discussion of the role of sex- and gender-based analysis in Canadian health policy. It asks where the burden of risk in preventing detrimental health outcomes is presumed to lie. It explores the responsabilization paradigm which places the onus of responsibility for assuming risks associated with everyday exposures on the individual, and the concept of precautionary consumption which encourages individuals to avoid everyday exposures to toxic substances through decision-making practices as consumers. The chapter then asks who is at risk of exposure to toxic substances and who the policies are designed to protect. Health Canada identifies children as a specific vulnerable population of concern, but women are not considered to be at-risk or a susceptible population. It provides an overview of the regulation of bisphenol A (BPA) in Canada and a critique of the limited scope of its regulation. It explores issues of occupational health exposures to toxic substances along with the difficulties related to accountability and compensation. Finally, this chapter also considers women's health and cancer organizations' messaging and campaigns around breast cancer which are influenced by or framed in response to government policies.

The Role of Sex- and Gender-Based Analysis in Canadian Health Policy

My focus in this research is on toxic substances management under CEPA 1999 and the *Chemicals Management Plan* and the primary prevention of breast cancer. There are, of course, broader policy areas in Canada related to breast cancer prevention, including those related to sex- and gender-based analysis. This section provides a brief overview of the policy history of health and sex- and gender-based analysis in Canada in order to provide context for a call to apply a gender lens in health research, and for the applied use of sex- and gender-based analysis within the development of regulation and policy relevant to environmental health.

In reviewing the history of breast cancer, it is evident that the disease is both highly sexed and gendered. The Women's Health Bureau of Canada was established in 1993 with a mandate of "enhancing Health Canada's capacity to promote equitable health outcomes for women and men, boys and girls in Canada" (Tudiver, 2009: 21). By signing the *Beijing Declaration and Platform for Action* at the Fourth World Conference on Women in 1995, Canada demonstrated its commitment to the recognition that both biology and social context have a significant influence on women's health. This document built upon the World Health Organization's definition of health as a "state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 2003). The declaration utilized a broad definition which additionally identified women's health as involving "their emotional, social and physical well-being and [it] is determined by the social, political and economic context of their lives, as well

as biology” (Clow et al., 2009: 6). Just as sex and gender were used interchangeably during the 1990s, “women” and “gender” were used synonymously in discussions of health (Greaves, 2009). However, it is important to note that both men and women experience health effects related to gender.⁶⁴

At the same time as the 1995 conference, the government published a federal plan entitled *Setting the Stage for the Next Century: The Federal Plan for Gender Equality* (Status of Women Canada, 1995). This report called for the implementation of gender-based analysis in federal departments and agencies including:

- the development and application of tools and methodologies to assist in the implementation of gender-based analysis;
- providing training on gender-based analysis of legislation and policies;
- the development of indicators to assess progress around gender equality;
- the collection and use of gender-disaggregated data;
- the use of gender-sensitive language across the federal government; and
- the evaluation of the effectiveness of gender-based analysis (Minister of Public Works and Government Services, 2009: 6).

The federal government also established the Women’s Health Contribution Program in 1995 which was designed to address gaps in women’s health research, as well as “improve the health status of women in Canada by enhancing the health system’s understanding of, and responsiveness to, women’s health issues” (Health Canada, 2010b).

The Women’s Health Contribution Program included the Atlantic Centre of Excellence

⁶⁴ There is a growing field of research on men’s health which utilizes a gender lens (UBC, 2011). Greaves (2009: 17) attributes both the fields of gender and health, and men’s health as positive by-products of feminist theory, activism and policy-making of the past forty years.

for Women's Health, the British Columbia Centre of Excellence for Women's Health, the Prairie Women's Health Centre of Excellence, and the Centre of Excellence for Women's Health - Consortium Université de Montréal. The Centres of Excellence⁶⁵ were established as multidisciplinary partnerships between academic researchers and community-based organizations to conduct policy-oriented research which investigates the way sex and gender interact with other determinants of health (Armstrong, 2012; Health Canada, 2003b). The Women's Health Contribution Program also funded the Canadian Women's Health Network⁶⁶, Réseau Québécois d'Action pour la Santé des

⁶⁵ The mandate of the Atlantic Centre of Excellence for Women's Health (ACEWH) includes contributing to research on women's health issues, promoting an understanding of gender as a critical variable in health outcomes, and enhancing the health system's responsiveness to the needs and concerns of women and girls. ACEWH's specific research focuses on health status and services; women's unpaid caregiving; HIV/AIDS; healthy living; obesity; sex- and gender-based analysis; gender mainstreaming; and social and economic inclusion (ACEWH, 2013). The mission of the British Columbia Centre for Excellence in Women's Health (BCCEWH) is to improve the health status of women by conducting innovative research and developing women-centred programs, practice and policies. Specific initiatives conducted by the BCCEWH include work around healthy choices in pregnancy; coalescing on women and substance use; pregnancy and smoking cessation; and developing *The Source*, a web-based resource of data sources, reports and synthesis documents related to women's health (BCCEWH, 2013). The mandate of the Prairie Women's Health Centre of Excellence (PCEWH) includes improving the health of women in Manitoba and Saskatchewan through making the health system and social systems more responsive to the health and well-being of women and girls. Program areas of the PCEWH include women and poverty; gender and health; rural, remote and Northern women's health; and Aboriginal women's health (PCEWH, 2013). Work conducted by the Centre of Excellence for Women's Health - Consortium Université de Montréal (CESAF) included caregiving, gender sensitive health indicators, experiences of immigrant and refugee women with the health care system, immigration and perinatal risk, and the health of Aboriginal women. The CESAF closed its office on August 31, 2001 (CWHN, 2012a).

⁶⁶ The Canadian Women's Health Network (CWHN) was created in 1993 as a voluntary national organization dedicated to improving the health and lives of girls and women in Canada by producing, sharing and distributing education and relevant information. In its commitment to women's health and equity, specific initiatives include establishing a visible national presence for women's health in Canada; providing user-friendly and reliable health information, resources and research; working to change inequitable health policies and practices by contributing women's voices and expertise; acting as a knowledge broker for researchers, clinicians, decision makers, media, and the public; encouraging and promoting community-based participatory research; monitoring emerging issues and trends affecting women's health; and acting as a forum for debate on women's health research and policy issues (CWHN, 2012b).

Femmes⁶⁷, the National Network on Environments and Women's Health⁶⁸, specific research projects such as the Aboriginal Women's Health and Healing Research Group⁶⁹, and working groups including Women and Health Protection and the National Coordinating Group on Health Reform and Women⁷⁰ (Health Canada, 2003b, 2010b). While the individual organizations had distinct mandates, as a group they conducted research on issues which impact women's health including the role of social, economic and physical environments.

⁶⁷ The Réseau Québécois d'Action pour la Santé des Femmes (RQASF) (Quebec Womens' Health Action Network) was founded in 1997 as a provincial, multi-disciplinary, non-profit organization. Their mission is to work closely with others in improving the physical and mental health of women, as well as their living conditions. Specific areas of interest of the RQASF include education campaigns around menopause; cognitive health and aging; homophobia and heterosexism; body image; and the medicalization of health (RQASF, 2013).

⁶⁸ The National Network on Environments and Women's Health (NNEWH) was founded in 1996 and is committed to producing policy-oriented research on the social, economic and physical environments that impact women's health. NNEWH seeks to improve the health of Canadian women through research which examines the ways in which environments impact the health status, beliefs and practices of women. NNEWH utilizes a sex-, gender- and diversity-based framework in its analysis of health research, policy development, and education materials. NNEWH benefits from expertise from academic research associates, community partners, service providers, and women's groups (NNEWH, 2013).

⁶⁹ The Aboriginal Women's Health and Healing Group represents a national network of First Nations, Métis and Inuit women researchers interested in community-based research focused on the health and healing of Aboriginal women, their families and communities. The group supports community-based health and healing research done by and with Aboriginal women, as well as developing policy recommendations (CWHN, 2012c).

⁷⁰ Women and Health Protection (WHP) is a coalition of community groups, researchers, journalists, and activists who are concerned with the safety of pharmaceutical drugs. WHP has focused on direct-to-consumer advertising, post-marketing surveillance, risk management and the precautionary principle, and the regulation of natural health products. WHP is particularly concerned with the impact of health protection legislation on Canadian women (WHP, 2010, 2012). Women and Health Care Reform (WHCR) is a multi-disciplinary, collaborative group that investigates and advises around the effects of health care reforms on women as providers, decision makers and users of health care systems. The mandate of WHCR is to coordinate research on health care reform in order to translate research into policy and practice. WHCR's areas of interest include ancillary health care work; environment; evidence about health and health care; gender and disaster management; gender and mental health of female health care workers; women and health care reform; home care; long-term care; maternity care; primary health care; principles of sex- and gender-based analysis of health care reform; private health insurance; privatization; quality of health care; and timely access to care (WHCR, 2013).

Health Canada's Women's Health's Strategy stated in 1999 that the department will "apply gender-based analysis to programs and policies in the areas of health system modernization, population health, risk management, direct services and research" (Health Canada, 1999; Health Canada, 2003b: 6). In *Exploring the Concepts of Gender and Health*, Health Canada (2003: 1) promotes the integrated use of gender-based analysis

throughout the research, policy and program development processes [which] can improve our understanding of sex and gender as determinants of health, of their interaction with other determinants, and the effectiveness of how we design and implement sex- and gender-sensitive policies and programs.

It was during this time period that there was a broader shift away from a focus on women's health and towards "gender and health." This shift is reflected in the federal government's adoption of the Gender-Based Analysis Policy in 2000. The intent of this policy was to attain gender equality through the use of gender-based analysis and fulfill the Government of Canada's domestic and international commitments to equality between men and women (Hankivsky, 2007a; Health Canada, 2010c). There was an attempt to mainstream gender issues, but some found these policies problematic as the focus on gender more broadly may be framed as a deliberate shift away from research and policy focused on women's health (Armstrong, 2012). The focus on gender may be framed as "less threatening to government than a woman-centred approach. Consequently, focusing on gender may be a way to avoid a focus on women and avoid funding women specific issues" (Saulnier et al., 1999: 7).

The Gender-Based Analysis Policy was replaced by the Health Portfolio Sex- and Gender-Based Analysis Policy in 2009 to develop, implement and evaluate research, programs and policies to address the different needs of men, women, boys, and girls. This

policy applies to the Health Portfolio of the Government of Canada which includes Assisted Human Reproduction Canada, Canadian Institutes of Health Research, Hazardous Materials Information Review Commission, Health Canada, Patented Medicine Prices Review Board, and the Public Health Agency of Canada (Health Canada, 2010c). The Health Portfolio is promoted as providing a

comprehensive understanding of variations in health status, experiences of health and illness, health service use and interaction with the health system; the development of sound science and reliable evidence that addresses sex and gender health differences between men and women, boys and girls; and the implementation of rigorous and effective research, programs and policies that address sex and gender health differences between men and women, boys and girls (Health Canada, 2010c).

Advocates of sex- and gender-based analysis contend that it is essential for improving the health of Canadians in conducting health research and in the development and implementation of health programs and policies. Recognizing that “actions to reduce gender inequality will improve health for both women and men” (Clow et al., 2009: 8), the specific policy goals of the Sex- and Gender-Based Analysis Policy adopted by the Government of Canada in 2009 include:

- a comprehensive understanding of variations in health status, experiences of health and illness, health service use and interaction with the health system;
- the development of sound science and reliable evidence that addresses sex and gender health differences between men and women, boys and girls; and
- the implementation of rigorous and effective research, programs and policies that address sex and gender health differences between men and women, boys and girls (Health Canada, 2010c).

Based upon a recommendation from the House of Commons Standing Committee on the Status of Women in April 2008, the Auditor General of Canada conducted an audit

of the implementation of sex- and gender-based analysis policy by the federal government. The Auditor General of Canada conducted an audit of seven departments including the Department of Finance Canada, Health Canada, Human Resources and Skills Development Canada, Indian and Northern Affairs Canada, the Department of Justice Canada, Transport Canada, and Veterans Affairs Canada (Minister of Public Works and Government Services Canada, 2009). The audit found that “despite the government commitment to GBA [(gender based-analysis)] since 1995, there is no government-wide policy requiring that departments and agencies perform it” (Minister of Public Works and Government Services Canada, 2009: 2).

Importantly, sex- and gender-based analysis was found to be inadequately integrated into policy development. Only four of the sixty-eight initiatives integrated sex- and gender-based analysis into policy development including two at the Department of Finance Canada and two at Indian and Northern Affairs Canada. Despite a formal commitment to sex- and gender-based analysis in the Health Portfolio of the federal government, there were zero cases in Health Canada where sex- and gender-based analysis was performed and integrated into policy options development. In one case the department provided a rationale for not performing sex- and gender-based analysis, in three cases gender impacts were considered but not documented in the policy options developed, and in two cases there was no consideration of sex- and gender-based analysis (Minister of Public Works and Government Services Canada, 2009: 16). Additionally, the audit found that while Health Canada has a departmental policy and commitment in effect along with tools and methodologies readily available, training is not regularly

offered, a champion within the department has not been appointed, and sex- and gender-based analysis practices have not been evaluated (Minister of Public Works and Government Services Canada, 2009: 11).

Sex- and gender-based analysis is argued to be:

vital to planning appropriate health programs and services, developing inclusive health policies and conducting research. It is effective because it requires policy-makers, scientists and researchers to think about who they are trying to serve and whose needs they are trying to meet (Lewis, 2011: 6).

There is also a need for an approach which incorporates intersectionality so that sex and gender are considered with other relevant factors including age, race, ethnicity, culture, geographic location, sexual orientation, and socioeconomic status (Hankivsky et al., 2010; Paterson, 2010; Tudiver, 2009). There is a call for challenging and transforming policy paradigms in the “process of engendering policy” (Hankivsky, 2005: 980; 2009: 116). Sex- and gender-based analysis should examine and critique the influence of the broader social, political and economic environments which impact health outcomes (Hankivsky, 2009).

The audit clearly demonstrates that sex-and gender-based analysis is not being adequately incorporated in health policy or legislation in Canada. Sex and gender must be accounted for in public health policy and legislation as the lack of implementation can have real implications for health outcomes among Canadian citizens (Butler-Jones, 2012). This discussion raises important questions about where the burden of risk and responsibility is presumed to lie in the prevention of disease. The Government of Canada (2011f) promotes risk as being within the control of Canadian citizens in suggesting that “we are all risk managers.”

Where is the Burden of Risk Presumed to Lie?

Responsibilization Paradigm

The majority of discussions around disease prevention still focus on personal responsibility, accountability and modifiable risk factors. “The dominant view of cancer prevention has focused almost exclusively on individual lifestyle changes” (Chernomas and Donner, 2004: 3). There is a long history which focuses on the role of lifestyle and personal behaviours in health outcomes. The role of lifestyle emerged as a key area of research and aspect of health promotion in the Lalonde Report (Lalonde, 1974). The individualization of health and illness resulted in a responsibilization paradigm (Orsini, 2007: 349). This ideology places the onus of responsibility on the individual and suggests that risk factors for health are controllable if one makes the appropriate lifestyle choices. If one does not behave accordingly or if one does and still becomes ill, there are elements of blame placed on the individual. This approach to health promotion does not recognize other social determinants of health, particularly those outside of one’s control such as environmental contaminants (Orsini, 2007; Simpson, 2000).

The role of lifestyle and personal responsibility as the primary factors in the development of cancer were established in part by Doll and Peto’s foundational monograph which was published in 1981. Doll and Peto’s work set the stage for the promotion of this paradigm in the medical and public health communities in its emphasis on personal responsibility around smoking, alcohol consumption, reproductive and sexual behaviours, and diet, while simultaneously downplaying the role of environmental and occupational risks to contributing to only two percent of cancer deaths from pollution and

four percent from occupational exposures (Clapp et al., 2006; Doll and Peto, 1981). These findings are continually cited by “commentators who argue that ‘cleaning up the environment’ is not going to make much difference in cancer rates” (Clapp et al., 2006: 62). The Harvard Center for Cancer Prevention published a report entitled *Human Causes of Cancer* in 1996 which built upon Doll and Peto’s work in its focus on modifiable risk behaviours. It suggests that “the public can become overly concerned about minimal risks while losing sight of major cancer risk factors that can be controlled or modified, in particular, tobacco use, diet, exercise, and sun exposure” (Harvard Center for Cancer Prevention, 1996: S3; Clapp et al., 2006: 63). Colditz and Hunter (2000) further develop the Harvard Center for Cancer Prevention reports in later work which continues to focus primarily on lifestyle factors regarding cancer prevention.

For major reductions in the burden of cancer to be achieved, we need broad scale interventions that will shift the behavior of the whole population. Rather than focus on individuals defined as being at “high risk”, a shift in behavior by the whole population can achieve greater reductions in cancer (Colditz and Hunter, 2000: 325-26).

While there is value in public health policy and campaigns which promote healthy lifestyles, it is highly problematic when primary prevention efforts are focused solely on modifiable behaviours and lifestyle factors. It is important to acknowledge the distinction between primary prevention in the field of environmental health and the prevention efforts focused on modifiable behaviours in traditional cancer prevention which are grounded in and directly influenced by the Doll and Peto paradigm. For instance, the Canadian Partnership Against Cancer was established in 2006 as a federally funded non-governmental organization to implement Canada’s cancer control strategy. The

prevention focus of the Canadian Partnership Against Cancer operates largely under the umbrella of healthy communities and lifestyles with a significant emphasis on modifiable behavioural factors around tobacco, nutrition, physical activity, alcohol, and ultraviolet radiation (Canadian Partnership Against Cancer, 2009a, 2009b, 2013a, 2013b).

The Cancer 2020 program was developed by Cancer Care Ontario in collaboration with the Canadian Cancer Society as a long-term plan for cancer prevention and screening. Cancer 2020 is grounded in an understanding that approximately fifty percent of cancers that will be diagnosed over a twenty year period can be either prevented or detected early and aims to provide a long-term provincial plan for cancer prevention in Ontario (Cancer 2020 Steering Committee, 2003a). The program focuses on well-established risk factors as an effective avenue for cancer prevention with specific efforts focused on methods to change the risk behaviours of Ontario citizens including promoting healthy eating and physical activity, and reducing alcohol consumption and cigarette smoking (Cancer 2020 Steering Committee, 2003a, 2003b, 2006). This program does include occupational and environmental carcinogens, though some of that focus still falls under behavioural practices such as reducing tobacco smoke and demonstrating sun-protective safety practices for workers. Occupational cancer surveillance programs are recommended and in broader environmental practices, setting standards around drinking water and reducing air pollution are suggested (Cancer 2020 Steering Committee, 2006). However, while the Cancer 2020 Program acknowledges occupational and environmental carcinogens as playing a role in the development of cancer, its focus for action remains

primarily on methods to change the risk behaviours of citizens (Cancer 2020 Steering Committee, 2003b: 17).

Precautionary Consumption

The individualization of risk is consistent with both the dominant epidemiological paradigm and the responsabilization paradigm, and is reflected in the promotion of “precautionary consumption” practices. MacKendrick (2010) observed a shift in media discourse around the bioaccumulation of chemicals and the body burden over a twenty year period from 1986 to 2006. These findings reflect a move away from collective forms of prevention around the risks associated with everyday exposures to toxic substances and towards personal responsibility through behavioural practices and precautionary consumption. The practice of precautionary consumption encourages individuals to take responsibility for protecting their health and to avoid exposure to toxic substances by purchasing “green” consumer products. Precautionary consumption promotes a sense of individual empowerment and control through the act of green consumption and chemical avoidance (MacKendrick, 2010: 127).

The ideology of this practice emphasizes the precautionary principle and the agency of individual consumers as the primary mechanisms for risk management around everyday exposures to toxic substances and the chemical body burden (MacKendrick, 2010: 43). Risks are now perceived as something that can be controlled by the individual. The risk frame “redistributes the responsibility for decision-making about risk from government agencies to self-governing ‘consumer-citizens’” (Scott, 2007: 37; MacKendrick, 2010). Women’s health and environmental organizations are influenced by

the individualization of risk and promote practices of precautionary consumption which encourage consumer-citizens to protect themselves from risks. The Women's Healthy Environments Network launched their "Wanna Be Toxic Free" campaign in 2010 to educate the public about the risks associated with toxic substances in consumer products and how to choose safer alternatives. Information about this program is made available through the organization's website, at fundraising events and as part of Community Environment Days which take place annually in neighbourhoods in Toronto from April to September. Specific substances that individuals are encouraged to avoid as part of this campaign include:

- parabens which are endocrine disrupting chemicals and suspected carcinogens, and are widely used as preservatives in the cosmetic and pharmaceutical industries;
- phthalates which are classified as reproductive toxicants in the European Union and are commonly used as plastic softeners or solvents in perfumes and fragrances;
- triclosan which is suspected to have carcinogenic and endocrine disrupting properties and is used as an antibacterial agent in toothpaste, mouth wash, deodorants, shaving creams, and hand sanitizers;
- butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT) which are suspected endocrine disrupters and carcinogens used as preservatives in moisturizers and makeup;
- sodium laureth sulfate which is a skin irritant used in shampoos and bubble baths;
- polyethylene glycol compounds (PEGs) which are potentially carcinogenic and act as foaming agents in cleansing products;
- diethylalomines (DEAs) which are used in skin lotions, shampoos and sunscreens, and have demonstrated negative health effects in mice including inhibiting brain development and spontaneous abortion;

- petrolatum which is used as an emollient in hair products, lip balms, lip sticks, and moisturizers and may be contaminated with polycyclic aromatic hydrocarbons which are carcinogenic;
- coal tar dyes which are used in some hair dyes and dandruff treatments, are potentially carcinogenic, and may be contaminated with toxic heavy metals; and
- fragrance and parfum which are used in many personal care products and the ingredients are not available to the consumer because of proprietary interests (WHEN, 2013).

Campaigns such as Wanna Be Toxic Free⁷¹ encourage individuals to exercise precaution in order to protect themselves from everyday exposures to toxic substances and subsequent health outcomes. However, these campaigns do not include a recognition that precautionary consumption is “undeniably women’s work” (Kearns, 2011; Scott and Lee, n/d). These practices create a gendered and disproportionate burden on women who often have the primary responsibility for both the sustainability of the household and the health of their family members (Lee, 2011). “This practice reinforces women’s socially prescribed roles as providers for the household, adding to their ‘care burden’ from both a physical and emotional perspective, and contributing to the gendered divisions of labour and exploitation of women’s unpaid work in the home” (Scott and Lewis, forthcoming).

The measures of precautionary consumption that are encouraged by government and women’s health and environmental organizations also make a number of assumptions about the women targeted by these campaigns. They assume a particular level of language proficiency, literacy and scientific understanding, as well as the economic ability to exercise choice, and a significant time commitment in encouraging women to

⁷¹ While the primary focus of this campaign is on precautionary consumption, the Women’s Healthy Environments Network does support the assessment and management of risk by the federal government and calls for phasing out chemicals that are carcinogens, reproductive toxins or mutagens in personal care products (WHEN, 2013).

read labels with long and complicated ingredients on cleaning, cosmetics and personal care products.

Altman et al. (2008: 426) describe the underlying flaw associated with precautionary consumption as a “consumption fallacy” which suggests that individuals can protect themselves from risks by attempting to avoid exposure to toxic substances through consumerism. Precautionary consumption practices can never truly eliminate exposure to toxic substances which are ubiquitous. For instance, Scott and Lee found that less toxic alternative products may not be available and that toxic substances such as phthalates and flame retardants are very difficult to avoid despite precautionary attempts to do so by individuals (Kearns, 2011; Scott and Lee, n/d). These substances are “so pervasive in consumer products, are rarely clearly labelled, and alternative products can be difficult or expensive to obtain, consumers are unlikely to be able to avoid exposures” (Scott and Lee, n/d).

Precautionary consumption is also unable to account for everyday exposures to toxic substances through other mechanisms including the air, soil and water, and which environmental justice research demonstrates are often unequally distributed (Brown et al., 2012b; Hoover et al., 2012; Scott and Lee, n/d). The body burden experienced by Canadian citizens may be framed as “evidence of the failure of...risk assessments to prevent universal exposure to bioaccumulative chemicals” (MacKendrick, 2010: 128). The body burden is portrayed as a “blameless phenomenon” and as a “social problem by portraying it as a personal or individual-level concern, rather than societal or collective concern” (MacKendrick, 2010: 140; 2011: 43). The emphasis on behaviour at the level of

the individual does not encourage political and collective action that may be targeted at long-term and more broadly focused solutions including regulatory reform (Kearns, 2011; Scott and Lee, n/d). This discussion of where the burden of risk is presumed to lie demonstrates that the public health of the Canadian population can never be truly protected if responsibility remains at an individual level rather than recognizing the role of government and industry in health outcomes as a result of exposure to toxic substances.

Who is at Risk and Who are the Policies Designed to Protect?

Children as a Vulnerable Population

An important question which emerges when researching environmental health legislation and public health policy asks *who* is at risk. The only “vulnerable population” specifically designated by Health Canada⁷² are children. This is reflected in the *National Strategic Framework on Children’s Environmental Health* (Health Canada, 2010c). Vulnerable populations are considered to be at-risk to environmental exposures due to “physical differences, behaviours, location and/or control over their environment” (Health Canada, 2011e). The rationale behind the focus on children as a vulnerable population of concern is framed as a result of environmental hazards disproportionately impacting children. Age-specific windows of susceptibility which impact infants and children include pre-conception, the embryonic, fetal and neonatal period during which maternal ingestion, inhalation, and dermal contact play a role, as well as the first three years of life, preschool and primary school-age, and adolescence when inhalation,

⁷² Health Canada (2011e) does acknowledge Aboriginal peoples and senior citizens as vulnerable populations, but children are the only population specifically addressed through a strategic framework.

ingestion and dermal contact occurs through the child's body (Health Canada, 2007f). Cooper et al. (2011: 130) note that cancer latency periods can span 20 to 40 years and that industrial activities result in multiple exposures to known or suspected carcinogens and endocrine disrupting chemicals. Windows of susceptibility during the prenatal exposures and early stages of development can impact cancer development and other developmental and reproductive health issues later in life.

...[C]hildren are extremely sensitive to exogenous sex steroids and endocrine disruptors with no apparent lower threshold below which hormonal effects in children and potentially severe effects in adult life, are not seen. Thus,...[it is] caution[ed] that unnecessary exposure of fetuses and children to such substances, even at very low levels, should be avoided (Cooper et al., 2011: 130).

However, focusing solely on early periods of susceptibility does not account for four critical windows of susceptibility women experience later in life including i) before menstruation, ii) menstruation to first full pregnancy, iii) first full pregnancy to menopause, and iv) after menopause (Brophy et al., 2012; Schwarzman and Janssen, 2010).⁷³

The scope of the *National Strategic Framework on Children's Environmental Health* includes chemical, biological and physical hazards related to children's exposure through air, water, soil, dust, food, consumer products, and any other features of the physical environment through pre-conception, prenatal and childhood exposures. The framework focuses on the environment as a determinant of health while also recognizing that other

⁷³ The language around critical windows of vulnerability is currently undergoing a shift. I observed this when attending the Environmental Health 2013 Conference: Science and Policy to Protect Future Generations in Boston, Massachusetts in March 2013. Key note speakers and presenters at this conference have shifted from describing the key periods of development in human bodies as "vulnerable" and are now using "windows of susceptibility."

determinants of health such as genetics, socioeconomic status and culture may influence the susceptibility of children to environmental exposures and subsequent health outcomes (Health Canada, 2010d: 9). Health Canada (2010d: 7) points to specific concerns around children's environmental health including:

- children's physiology and critical windows of vulnerability during developmental stages which may affect the absorption, metabolism and elimination of toxic substances;
- the development of the immune system which may be suppressed by exposure to persistent toxic substances;
- early exposure pathways including trans-placental transfer and consumption of breast milk;
- increased exposures related to size and weight of children compared to adults, and as a result of childhood behaviours such as close-to-ground exposures;
- children's lack of awareness and control over their own environmental risks including second-hand smoke exposure, parental occupational exposures, radiation, and microbiological hazards; and
- lack of knowledge about how to reduce environmental risks for children by parents, caregivers and health professionals.

As the primary source of authority for the assessment and management of risk associated with toxic substances, CEPA 1999 is identified as the foundation for policy direction related to toxic substance exposure (Health Canada, 2008c). Environment Canada and Health Canada (2004: 11) promote human health risk assessment and management as including research related to the exposure of the most affected population groups to toxic substances. While CEPA 1999 does not include specific reference to children's health, it is a "vital component of those activities related to the identification and assessment of existing substances that may pose a risk to the health and well-being of

children and Canadians of all ages” (Health Canada, 2008a: 6). The specific goals of the *National Strategic Framework on Children’s Environmental Health* include risk assessment in order to increase the understanding of the existing and emerging environmental health impacts on children associated with environmental contaminants; risk management in order to prevent and reduce exposure of children to environmental hazards; as well as increasing communication and capacity building related to environmental health issues and children in Canada (Health Canada, 2010d: 13-4).

Consistent with the inclusion of socioeconomic status in CEPA 1999, the strategic framework provides a compelling argument which proposes the protection of children’s environmental health as a cost-saving measure for adulthood. In accounting for health promotion, prevention and protection, Health Canada (2010d: 10) argues that “it is easier and less expensive to prevent or minimize environmental exposures which may lead to adverse outcomes, rather than to identify treatment strategies after children have been exposed or adversely affected.” While the focus on children’s health is predicted to reduce health care costs in adulthood, it does not consider important windows of susceptibility later in life that can also impact health outcomes.

The Regulation of Bisphenol A (BPA)

A recent example of a national effort focused on protecting the health of infants and children is the removal of the endocrine disruptor BPA from baby bottles. BPA is a high-production-volume industrial chemical that is widely used in the production of polycarbonate plastics including food and drink packaging and in epoxy resin linings of food and drink containers, as well as other applications such as additives in polyvinyl

chloride plastics, medical devices, automotive parts, electronics devices, compact discs, cell phones, sporting equipment, glasses, and receipts (Breast Cancer UK, 2013; Food and Agriculture Organization of the United Nations and World Health Organization, 2010; Health Canada, 2012b). The production of BPA has increased by 500% over the past thirty years reaching more than three billion kilograms per year. It is estimated to be worth approximately \$500,000 per hour to the global economy (Breast Cancer UK, 2013: 11). Exposure to BPA is ubiquitous and the chemical can be detected and measured in humans in blood, urine, amniotic fluid, follicular fluid, placental tissue, and umbilical cord blood (Soto and Sonnenschein, 2010; Vandenberg et al., 2007). Nudelman et al. (2009: 87) note that studies funded by the chemical industry contend that BPA is harmless, whereas non-industry research suggests that it is a powerful hormone disrupter with the potential to result in detrimental health outcomes. Research is raising concerns about the health implications of broader exposures to BPA, particularly the estrogenic and endocrine disrupting properties as a result of low-dose, cumulative exposures (CAPE et al., 2010). Specific health concerns associated with BPA include the development of breast, prostate and testicular cancers, reproductive and developmental disorders, fertility disorders, neurodevelopmental and behavioural impacts including attention deficit hyperactivity disorder and impaired learning, and obesity (Breast Cancer Fund, 2013a; CAPE et al., 2010; Diamanti-Kandarakis et al., 2009; Ikezuki et al., 2002; Vandenberg et al., 2009, 2012; vom Saal et al., 2012).

BPA was identified as a high priority during the categorization of the Domestic Substances List. Environment Canada and Health Canada conducted a screening

assessment in 2008 which concluded that BPA meets the criteria under paragraph 64(a) and (c) of CEPA 1999. It found that BPA is

entering or may be entering the environment in a quantity or concentration or under conditions that have or may have an immediate or long-term effect on the environment or its biological diversity....[and] in a quantity or concentration or under conditions that constitute or may constitute a danger in Canada to human life or health (Environment Canada and Health Canada, 2008b: 76).

In 2009, the Government of Canada announced its intention establish regulations to “prohibit the advertisement, sale and importation of polycarbonate plastic baby bottles that contain BPA, to reduce newborn and infant exposure to this substance” (Health Canada, 2009c). The federal government concluded that exposure levels for newborns and infants up to 18 months are below those that could cause health effects, but intends to further limit exposure due to uncertainty raised in other studies about the potential effects of low levels of BPA. The proposed regulations are part of the *Chemicals Management Plan*⁷⁴ (Health Canada, 2009c).

Health Canada hosted an international meeting about BPA in November 2010 with the Food and Agriculture Organization and the World Health Organization. The controversy associated with BPA within the scientific community was acknowledged and the meeting was organized

in light of uncertainties about the possibility of adverse human health effects at low doses of BPA, especially on reproduction, the nervous system and behavioural development, and considering the relatively higher exposure of very young children compared with adults (Food and Agriculture Organization of the United Nations and World Health Organization, 2010: vi).

⁷⁴ BPA was part of Batch 2 of the Challenge under the *Chemicals Management Plan*, along with siloxane D5 (Government of Canada, 2012e; Health Canada, 2008d).

The meeting considered acute and repeated dose toxicity, carcinogenicity, reproductive and developmental toxicity, and hazard characterization associated with exposure to BPA. It was suggested that establishing a “safe” level of exposure for BPA was complicated by a lack of data and experimental animal studies that are suitable for risk assessment. Recommendations included generating new information and studies in order to better understand the risks to human health posed by exposure to BPA (Food and Agriculture Organization of the United Nations and World Health Organization, 2010: 30, xi).

BPA concentrations were measured in Canadian citizens for the first time at a national level as part of the Canadian Health Measures Survey in 2007-2009. Statistics Canada partnered with Health Canada and the Public Health Agency of Canada to collect health and wellness data, as well as biological specimens in the most comprehensive health measures survey conducted in Canada. The Canadian Health Measures Survey is the cornerstone of the national biomonitoring component of the *Chemicals Management Plan* and is meant to be used as a tool in evaluating the success of risk management measures (Health Canada, 2010a, 2010e, 2010f). Biomonitoring involves the “direct measurements of environmental chemicals, their metabolites or reaction products in people” and are most often measured in blood or urine, as well as other tissues and fluids such as hair, nails and breast milk (Haines, 2010; Health Canada, 2007g). While CEPA 1999 requires the Minister of Health to conduct research and studies on the role of toxic substances and health outcomes, there is no specific mandate for biomonitoring (Environment Canada and Health Canada, 2004: 27). There has been limited

biomonitoring data on Canadians. The Canadian Health Measures Survey was launched in 2007 to collect and provide data on levels of environmental chemicals that “represent the overall Canadian population” (Health Canada, 2007g). The body burden associated with exposure to toxic substances that is revealed through biomonitoring processes can be viewed as representing the personalization of pollution (Altman et al., 2008).

The first cycle of the Canadian Health Measures Survey was conducted in 2007-2009 and collected blood and urine samples from approximately 5600 Canadians aged six to seventy-nine in fifteen sites across the country (Health Canada, 2010e). The second cycle of the Canadian Health Measures Survey was conducted in 2009-2011 and included blood and urine samples from approximately 6400 Canadian citizens aged three to seventy-nine from eighteen sites^{75,76} (Health Canada, 2013b). This was the first study to include biomonitoring data for children aged three to five years (Haines, 2013; Health Canada, 2013b). Chemical groups⁷⁷ that were measured in the first cycle include polybrominated flame retardants, polychlorinated biphenyls and organochlorines; metals

⁷⁵ The cycle one data collection sites included Moncton, NB; Quebec City, Montreal, Montérégie and South Mauricie, QC; Clarington, North York, Don Valley, St. Catherine's-Niagara, Kitchener-Waterloo, and Northumberland County, ON; Edmonton and Red Deer, AB; and Vancouver, Williams Lake and Quesnel, BC (Health Canada, 2010e). The cycle two data collection sites included Saint John's, NL; Colchester and Pictou Counties, NS; Laval, South Montérégie, Gaspésie, and North Shore Montreal, QC; Central and East Ottawa, South Brantford, Southwest Toronto, East Toronto, Kingston, and Oakville, ON; Edmonton and Calgary, AB; Winnipeg, MB; and Richmond, Central and East Kootenay, and Coquitlam, BC (Health Canada, 2013b).

⁷⁶ Cycle three data collection is currently underway (January 2012-December 2013) and planning is in progress for cycle four (2014-2015) and cycle 5 (2016-2017) (Haines, 2013; Health Canada, 2013c).

⁷⁷ The chemicals tested in the biomonitoring aspect of the Canadian Health Measures Survey are selected for reasons including known or suspected health effects; level of public concern; evidence of exposure in the Canadian population; new or existing requirements in public health policy; ability to detect or measure the toxic substance in humans; similarity to substances measured in national and international programs for comparison; and the costs associated with performing the analysis. The second cycle of the survey includes fifty-five percent new chemicals and forty-five percent of the same chemicals as the first cycle (Health Canada, 2013c).

and trace elements, environmental phenols, pesticides, nicotine metabolites, perfluoroalkyl substances, phthalate metabolites, and chlorophenols were measured in both cycles one and two; and cycle two also tested triclocarban with the environmental phenols, as well as benzene metabolites and polycyclic aromatic hydrocarbons (Health Canada, 2013d).

BPA was measured in both cycles of the Canadian Health Measures Survey under the “environmental phenols” group of chemicals. Ninety-one percent of Canadians aged six to seventy-nine were found to have detectable concentrations of BPA in their urine in the first cycle of the Canadian Health Measures Survey from 2007-2009 (Bushnik et al., 2010; Statistics Canada, 2011). The results of the second cycle were released in April 2013 and determined that BPA was detected in ninety-five percent of Canadian citizens (Health Canada, 2013c).

The results of the Canadian Health Measures Survey data are promoted as being used to establish national baseline levels to track trends over time and as a reference point for international comparison (Haines, 2013; Health Canada, 2012b). Health Canada’s special medical advisor, Dr. Robert Cushman stated that the “latest collection of national biomonitoring data will build on the [previous] information collected...for future monitoring and research. It will improve our understanding of human chemical exposure and help with the development of policies to protect the health of Canadians” (CBC, 2013c). Additional potential uses of the data also include providing information for priority-setting and action to protect Canadian’s health from exposure to environmental chemicals; assessing the effectiveness of health and environmental risk management

strategies related to exposures and health risks associated with environmental chemicals; supporting future research on the potential links between exposure to environmental chemicals and specific health outcomes; and contributing to international monitoring programs such as the Stockholm Convention on Persistent Organic Pollutants (Health Canada, 2013c: 3).

Health Canada (2013d) acknowledges limitations associated with the use of biomonitoring as part of the Canadian Health Measures Survey. Biomonitoring measures the amount of a specific chemical in the body, but the measurement determines exposure from any or all routes including ingestion, inhalation or dermal contact, as well as any or all sources including air, water, soil, food, and consumer products. As a result, biomonitoring cannot determine the source or route of exposure and the chemical may be the result of a single source or multiple sources of exposure. Biomonitoring in and of itself cannot determine what health effects may occur as a result of the exposure. Relevant factors in considering whether a detrimental health outcome may occur include the amount of the chemical a person was exposed to, the duration and timing of exposure, and the toxicity of the chemical. It is also important to take into account levels of susceptibility in populations at-risk such as pregnant women, developing fetuses, children, the elderly, or people with compromised immune systems. Finally, the absence of a chemical in biomonitoring results does not mean that a person has not been exposed as existing technology may not be capable of detecting small amounts, and it is also possible that the chemical may have been eliminated, or metabolized, before the measurement occurs (Health Canada, 2010f: 4, 2013d).

The target population of the Canadian Health Measures Survey involves people living at home and residing in the ten provinces and three territories aged six to seventy-nine in cycle one and aged three to seventy-nine in cycle two. It is important to note that “people living on reserves or in other Aboriginal settlements in the provinces, residents of institutions, full-time members of the Canadian forces, persons living in certain remote areas, and persons living with a low population density were excluded” (Health Canada, 2010e: 3; Health Canada, 2013c: 4). While Health Canada (2010e) promotes the survey data as intended to be a nationally representative sample of the Canadian population, its limiters also exclude people who may be at higher risk for exposure to environmental chemicals. For instance, Sarnia and the Aamjiwnaang First Nation in southwestern Ontario are bordered by forty percent of Canada’s chemical industry. The area known as “Chemical Valley” is one of the most polluted hotspots in the country (MacDonald and Rang, 2007). Residents of the Aamjiwnaang First Nation are exposed to chronic pollution including endocrine disrupting chemicals and as a result have experienced a significantly skewed sex ratio in the number of male live births compared to female (Mackenzie et al., 2005).⁷⁸ Residents have also experienced increased incidences of cancer, reproductive and developmental disorders (MacDonald and Rang, 2007).

⁷⁸ The disproportionate exposure to endocrine disrupting chemicals in this community and the resulting skewed sex ratio has resulted in an effect which is both gendered and gendering. The pollution itself may be “actively ‘producing’ sex, and to the extent that it is related, gender” (Scott, 2012a: 61, 2013). For additional discussion around exposure to toxic substances, the skewed sex ratio, and other health outcomes in Aamjiwnaang, refer to Dhillon and Young (2010), Jackson (2010), Luginaah et al. (2010), MacDonald and Rang (2007), Scott (2008, 2012a), and Wiebe (2010). For a sample of the media coverage associated with this case, refer to Colihan (2008) and Mittelstaedt (2008a, 2008b).

Environmental Defence has conducted biomonitoring research on Canadian citizens including participants from the Aamjiwnaang First Nation.⁷⁹ Biomonitoring tests were conducted on eleven individuals and five families across the country. Laboratory results detected forty-six of the sixty-eight toxic substances tested for in the body burdens of participants including five polybrominated diphenyl ethers (PBDEs), thirteen polychlorinated biphenyls (PCBs), five perfluorinated chemicals (PFCs), nine organochlorine pesticides, four organophosphate insecticide metabolites, five polycyclic aromatic hydrocarbons (PAHs), and five heavy metals. The results of the study detected thirty-eight carcinogens, twenty-three hormone disruptors, twelve respiratory toxins, thirty-eight reproductive and developmental toxins, and nineteen neurotoxins in participants (Environmental Defence, 2006: 1). However, the body burden of toxic substances in members of the family from Aamjiwnaang was among the highest in the study. The grandfather had the highest concentration of PFOS, PCBs and organochlorine pesticides, and the father had the highest total number of chemicals detected (Environmental Defence, 2006: 26). Basu et al. (2013) conducted a biomonitoring study of forty-three mother-child pairs living in Aamjiwnaang. This study found that mothers and their children are exposed to numerous environmental pollutants including metals, PAHs, PFCs, brominated flame retardants (BFRs), PCBs, and organochlorine pesticides (Basu et al., 2013). Residents of Aamjiwnaang are exposed to a “chemical cocktail” of toxic substances and the results of this study found that for some substances, the “trends

⁷⁹ For more detailed results of the biomonitoring research, refer to Environmental Defence (2005, 2006, 2007).

revealed higher exposures on the reserve than among the general population” (Dobson, 2013). The increased exposures included cadmium, mercury, DDT, organochlorine pesticides, hexachlorohexane, and some PFCs and PCBs (Basu et al., 2013). Excluding populations such as the Aamjiwnaang First Nation from the Canadian Health Measures Survey does not adequately account for potentially highly exposed and at-risk populations, nor the “manifestation of the pervasive, diffuse, and body-altering pollution that the residents report” (Scott, 2008: 297).

The federal Minister of Health, Leona Aglukkaq said in October 2010 that “[o]ur science indicated that Bisphenol A may be harmful to both human health and the environment and we were the first country to take bold action in the interest of Canadians” (Reuters, 2010). Minister Aglukkaq announced that BPA would be declared toxic making Canada the first jurisdiction to do so (Mittelstaedt, 2010). In light of BPA being added to Canada’s list of toxic substances, Minister of the Environment Jim Prentice stated that “[w]e are continuing our leadership on this issue and Canadians can rest assured that we are working hard to monitor and manage bisphenol A” (CBC, 2010a). Yet despite BPA being declared toxic under CEPA 1999, this action does not require mandatory regulatory action and risk management strategies. The risk management associated with this assessment was limited to considering the highest potential for exposure and the potential vulnerability of newborns and infants by prohibiting the advertisement, sale and importation of polycarbonate plastic baby bottles that contain BPA (Health Canada, 2010b). The limited regulatory action that has occurred

focuses solely on infants and baby bottles but does not include any of the other numerous consumer products that still contain BPA.

A major route of exposure to BPA is through diet and the epoxy resins lining the insides of canned foods and beverages, as well as the metal lids of glass containers (Mittelstaedt, 2008c). In considering exposures to BPA beyond that in polycarbonate baby bottles, Health Canada's Food Directorate concluded that the current dietary exposure through food packaging is not expected to pose a health risk to the general population, including newborns and infants (Health Canada, 2008d; 2010e). However, it is important to note that fetuses and infants are exposed to BPA as breast milk passes on the exposures of nursing mothers and pregnant women (Kuruto-Niwa et al., 2007; Mendonca et al., 2012; Scott, 2012b; Ye et al., 2006).

In the most recent *Snapshot of Environmental Health in Canada*, Health Canada (2012b) acknowledges laboratory studies which suggest that low levels of exposure to BPA during windows of susceptibility in animals can affect neural development and behaviour. Health Canada does not reference any other studies which suggest wide-ranging health outcomes in humans as a result of exposure to BPA, though it does “support the need for additional research in these areas, and scientists continue to evaluate new scientific evidence as it emerges” (Health Canada, 2012b: 15). Health Canada (2012c) conducted additional surveys since the initial 2008 risk assessment around BPA in food packaging to measure concentrations in canned drink products, bottled water products, canned food products, soft drink and beer products, and total diet samples. Based on a weight-of-evidence approach, the Food Directorate again concluded

that dietary exposure to BPA through food packaging does not pose a health risk to the general population, including newborns and young children (CBC, 2013c; Health Canada, 2012c: 4; Mittelstaedt, 2010).

The Canadian Cancer Society (2013b) and the David Suzuki Foundation (2013) encourage Canadians to reduce their exposure to BPA. The Canadian Cancer Society suggests that it may be possible to reduce, but not eliminate exposure to BPA because it is so widely used. The organization recommends individuals take steps to avoid exposure to the substance if they are concerned about potential health effects (Canadian Cancer Society, 2013b). The David Suzuki Foundation (2013) also encourages individual citizens to reduce their exposure to BPA in light of the regulatory actions being limited to polycarbonate baby bottles. While the David Suzuki Foundation does call for a more precautionary regulatory framework to protect health and the environment, both organizations are promoting individualized strategies in the form of precautionary consumption. These campaigns place the focus at the level of individual citizens and do not acknowledge the limitations of a precautionary consumption approach.⁸⁰

⁸⁰ The precautionary consumption practices recommended by the Canadian Cancer Society (2013c) include avoiding children's toys, bottles and dishes made with polycarbonate plastic; using food and drink containers made of stainless steel, glass or non-polycarbonate plastic; choosing fresh or frozen foods not stored in cans; and talking to dentists about the materials being used and the options available if having dental work. The David Suzuki Foundation (2013) recommends using glass, stainless steel or porcelain containers instead of plastic dishes, containers and kitchen appliances; choosing plastics #2, #4 and #5 instead of #3 and #7 which often contain bisphenol A; using parchment paper, glass jars, beeswax cotton wraps or recycled aluminum foil instead of plastic wrap; not using plastic containers in the freezer, microwave or dishwasher as BPA and phthalates leach at a higher rate in hot or cold temperatures; using glass or stainless steel kettles instead of plastic kettles; avoiding canned food and drinks; breastfeeding or using powdered baby formula as more BPA leaches into liquid than powdered formulas; avoiding thermal paper receipts which contain BPA; using wood and cloth toys for children instead of plastic toys; and speaking to dentists about options as dental sealants and composites can contain BPA.

Critique of the Limited Scope of Bisphenol A regulation

Despite the regulatory action around BPA and baby bottles, the scope of action remains limited and does not go far enough. Consistent with the dominant epidemiological paradigm, the onus of responsibility is still placed primarily on the public and at the level of the individual. For instance, Health Canada (2010d: 7) maintains that “[t]he environmental burden of disease, with its associated socioeconomic costs, can be reduced by both ensuring healthier environments and providing people with the information they need to protect themselves [and their children] from harmful exposures.” As Theo Colborn argues in her letter to the President of the United States about endocrine disrupting chemicals, there is no safe level for many chemicals to which fetuses and children are exposed when they penetrate the body and the womb (Colborn, 2012; The Endocrine Disruption Exchange, 2013).⁸¹ A newly published report in May 2013 by the Royal College of Obstetricians and Gynaecologists is designed to provide guidelines informing women who are pregnant or breastfeeding about the “sources and routes of chemical exposure in order for them to take positive action in regard to minimizing harm to their unborn child” (Royal College of Obstetricians and Gynaecologists, 2013a). The report recommends a “safety first approach” which assumes there is risk in exposure to toxic substances but places the onus of responsibility on the mother to reduce consumption of foods in cans and plastic containers, minimize the use of personal care products and cosmetics, avoid paint fumes and pesticides, and reduce the

⁸¹ Dr. Theo Colborn is one of the authors of the highly influential *Our Stolen Future* which was published in 1996 and explored the environmental and health effects associated with hormone disrupters and “hormone mimics” (Colborn, Dumanoski and Myers, 1996).

purchase of household furniture, fabrics, non-stick frying pans and cars while pregnant or nursing (Khatter, 2013; Royal College of Obstetricians and Gynaecologists, 2013a, 2013b).⁸²

Placing responsibility for protecting children's health at the level of the individual creates a burden on the parents and particularly on mothers. "[M]others, more than other actors, are considered primarily responsible for controlling children's exposure to chemicals, and this responsibility represents a new way mothers are held accountable for their children's well-being" (MacKendrick, 2011: 42). The precautionary consumption behaviour with which women are encouraged to engage reinforces "individualized approaches to managing new forms of risk and simultaneously reinforce[s] mothering as a singular, but total responsibility for children's well-being" (MacKendrick, 2011: 42). This critique demonstrates that limiting the focus of health promotion to behavioural factors does not account for broader determinants of health including social, structural and environmental factors (Brown, 2007; Nash, 2006)

In restricting the scope of regulation to infants, the federal government is effectively dismissing exposures for other populations at risk. Thirteen of Canada's

⁸² The American College of Obstetricians and Gynecologists Committee on Health Care for Underserved Women and the American Society for Reproductive Medicine Practice Committee published a Committee Opinion on exposure to toxic environmental agents in October 2013. The statement acknowledges reducing exposure to toxic substances at the level of the individual. However, it goes further than the position of the Royal College of Obstetricians and Gynaecologists by calling for primary prevention. It notes that individuals can "do little about exposure to toxic environmental agents, such as from air and water pollution, and exposure perpetuated by poverty. The incorporation of the authoritative voice of health care professionals in policy arenas is critical to translating emerging scientific findings into prevention-oriented action on a large scale" (American College of Obstetricians and Gynecologists Committee on Health Care for Underserved Women and the American Society for Reproductive Medicine Practice Committee, 2013: 3). At this time, the Society of Obstetricians and Gynaecologists of Canada has not published a position regarding exposure to toxic substances (Society of Obstetricians and Gynaecologists of Canada, 2013).

health and environmental organizations⁸³ released a joint statement calling for the federal government to eliminate key sources of exposure after Canada's designation of BPA as toxic under CEPA 1999. Providing context for the statement and demonstrating the real life implications for the Canadian population, Kathleen Cooper, Senior Researcher with the Canadian Environmental Law Association said that “[r]obust scientific evidence links low-dose BPA exposure with increased risks for breast, prostate and testicular cancers, altered reproductive function, altered metabolism of sugars and fats linked to obesity and diabetes, and adverse effects on the developing brain” (Canadian Partnership for Children's Health and the Environment (CPCHE), 2010). The joint statement makes recommendations which call for: an elimination of all food- and beverage-related uses of BPA; legislative reforms to improve the testing and regulation of toxic substances which are known endocrine disrupting chemicals; and clear labelling of products which contain endocrine disrupting chemicals (CPCHE, 2010).

In light of the recent findings that ninety-five percent of Canadians have BPA in their urine, Environmental Defence⁸⁴ launched a letter writing campaign asking

⁸³ The thirteen signatories of *Focus on Bisphenol A - Statement of Health and Environmental Organizations on Endocrine Disrupting Chemicals* are the Canadian Association of Physicians for the Environment, Canadian Child Care Federation, Canadian Environmental Law Association, Canadian Partnership for Children's Health and Environment, Environmental Health Clinic – Women's College Hospital, Environmental Health Institute of Canada, Health Nexus, Learning Disabilities Association of Canada, Ontario College of Family Physicians, Ontario Public Health Association, Pollution Probe, South Riverdale Community Health Centre, The Lung Association – Ontario, and Toronto Public Health (CAPE et al., 2010).

⁸⁴ Environmental Defence first raised concerns about the potential health effects of BPA in 2007 as part of efforts to remove the substance from baby bottles (Environmental Defence, 2013b). Environmental Defence's most recent research and call to federal regulatory action surrounds a report released in June 2013 entitled *Pre-Polluted: A report on toxic substances in the umbilical cord blood of Canadian newborns*. The organization tested the umbilical cord blood of three newborn babies and the results determined that each of the children was born with between 55 and 121 toxic substances resulting in a toxic

Canadians to contact the Minister of the Environment and the Minister of Health. The text of the letter recognizes the success of the regulations around polycarbonate baby bottles, but calls on the federal government to take action around the continued exposure to children and adults to BPA.

International organizations, expert panels and more than 150 peer-reviewed studies have associated bisphenol A with a variety of health problems – obesity, attention deficit hyperactivity disorder, breast cancer and a wide range of developmental problems – often at low levels of exposure (Environmental Defence, 2013d).

This campaign calls on the federal government to demonstrate leadership and develop and implement regulatory action that will be protective of both children and adults and eliminate BPA from all food and beverage containers, as well as other sources of exposure such as cash register receipts (Environmental Defence, 2013e).

Issues of Occupational Health Exposures, Accountability and Compensation

There has also been no move to address the occupational health exposures for workers who are exposed to BPA in their workplaces, such as the food canning industry. The occupational risks for breast cancer have traditionally been a neglected area of research (DeMatteo et al., 2012). A Canadian case-control study recently published by Brophy et al. (2012) found an increased risk of breast cancer among women working in

body burden at birth. Of the 137 chemicals detected, 132 are reported to be carcinogenic, 110 are considered to be toxic to the brain and nervous system, and 133 result in developmental and reproductive problems. This study has a small sample size but is consistent with other umbilical cord studies conducted in the United States. Demonstrating the extreme persistence of some chemicals, 96 PCBs were found among the three samples. PCBs cross international boundaries, are bioaccumulative and carcinogenic and toxic to the immune, reproductive and neurological systems; they have also been banned in Canada since 1977. Organochlorine pesticides including DDT which are highly toxic and persistent were also found in the cord blood, despite being banned by the federal government in 1985 and banned from agricultural use by the Stockholm Convention in 2004. While the chemicals found in these children were in low doses, there is still significant cause for concern around windows of susceptibility, as well as additive, cumulative and synergistic effects of chemicals (Environmental Defense, 2013c). For more information, refer to CTV (2013), Environmental Defence, (2013b, 2013c), MacDonald, (2013), and Ubelacker, (2013).

occupations including farming, automotive, food canning, metal working, and bars, casinos and racetracks. Women who worked for ten years in occupations classified as “highly exposed” to cancer-causing substances and endocrine disrupting chemicals were found to have a higher risk for developing breast cancer. Specific findings included:

- *Farming:* A 36 percent increased breast cancer risk was found in the farming sector. Research has established that several pesticides act as mammary carcinogens and many are endocrine disrupting chemicals. Employment in farming and exposure to pesticides often begins earlier in women’s lives than other occupations and may play a role in the development of breast cancer during subsequent windows of susceptibility.
- *Automotive:* A statistically significant more than two-fold increased breast cancer risk was found in the automotive plastics industry sector. The increase rose to an almost 5-fold excess among women who were pre-menopausal. Many plastics have been found to release estrogenic and carcinogenic chemicals and cumulative exposures to mixtures of these chemicals are a particularly significant concern.
- *Food Canning:* A statistically significant 2-fold breast cancer risk was found in the food canning sector. The increase rose to more than 5-fold among women who were pre-menopausal. Exposures to chemicals in the food canning industry may include pesticide residues and emissions from the polymer linings of cans including BPA.
- *Metalworking:* A statistically significant 73 percent increased breast cancer risk was found in the metalworking sector. Women working in tooling, foundries and metal parts manufacturing are exposed to a variety of potentially hazardous metals and chemicals. The cumulative exposures to mixtures of toxic substances are of concern.
- *Bars, Casinos and Racetracks:* A 2-fold increased breast cancer risk approaching statistical significance was found in bars, casinos and racetracks. The elevated risk of developing breast cancer may be linked to second-hand smoke exposure and night work which has been found to disrupt the endocrine system (Sweeney, 2012b).

This research has a number of important implications which are detailed by Brophy et al. (2013). This work challenges the paradigm promoted by Doll and Peto by demonstrating

the importance of occupational and environmental factors in the development of cancer. The predominant focus on lifestyle and behavioural factors in cancer research and public health policy has resulted in gaps including the prevention of exposure to toxic substances and the resulting detrimental health outcomes such as the development of breast cancer in environmental and occupational settings.

Seriously considering the role of endocrine disrupting chemicals in the development of breast cancer undermines the established orthodoxy in traditional toxicology where the “dose makes the poison.” These chemicals can have effects at low doses. The majority of exposure standards for occupational, environmental and consumer health and safety are still based on the toxicology model which is insufficient in accounting for endocrine disrupting chemicals and low-dose cumulative exposures. Brophy et al. (2013) suggest that “[i]f there are no ‘thresholds’ for certain substances at which no effects are observed, no ‘safe’ limit can be established.”

Finally, these research findings present clear challenges to the workers’ compensation system (Brophy et al., 2013). Definitively assessing and managing occupational diseases is a complex and highly problematic process which is influenced by social, cultural and political issues, as well as scientific and medical knowledge and theories (Watterson, 1999). The difficulties in establishing a direct and causal link between a particular substance and a specific health outcome are complicated by a variety of factors. For example, lengthy latency periods are often required in order to establish a statistically significant correlation between an exposure to a toxic substance and an increased incidence of disease in a particular population. The contested nature of

environmental health outcomes may mean that it is not possible to establish a connection conclusively and to the satisfaction of the entire scientific community (Markowitz and Rosner, 2002: 6).

Health outcomes as a result of environmental and occupational exposures have traditionally been framed as contested and are surrounded by questions of uncertainty and accountability. The risks that arise as a result of new and continually evolving technologies are unique to the risk society and there are difficulties with compensation and accountability where the risks are not limitable, either spatially or temporally; may not be accountable according to the prevailing rules of causality, guilt and liability; and may not be compensable nor insurable (Beck, 1995: 2; 1996: 31). Issues of accountability are wrought with difficulties, “far from being caused by individuals who...[can] be held accountable, these risks...[are] caused by the system of high technology itself” (Richter et al., 2006: 7).

In examining examples of accountability and compensation, Richter et al. (2006: 6) note that the traditional compensation system is most often unable to adequately account for those affected by environmental health issues such as those impacted by the Chernobyl nuclear disaster. This is especially evident in cases where the illness is contested, both in its existence and in cases where there are issues around determining causality. For instance, health care workers in Nova Scotia claimed to be suffering from heavy metal poisoning as a result of exposure to toxic dust during renovations at the New Waterford Consolidated Hospital in 2001-2002. These claims have not been universally accepted and their illnesses and the events in this community constitute an environmental

health controversy with opposing viewpoints carried out in both public and private realms.⁸⁵ The health care workers at the New Waterford Consolidated Hospital encountered resistance in three specific ways including belief in the existence of the illness; conflict in a diagnosis; and conflict regarding an appropriate treatment (Sweeney, 2006a). Affected employees filed a workers' compensation claim which was supported by local MLA Frank Corbett who stated that "there is no excuse left for the [Workers' Compensation Board] to further delay the compensation owed to eligible workers who became sick while they were employed [at the New Waterford Consolidated Hospital]" (Corbett, 2004; Sweeney, 2006a). The Workers' Compensation Board rejected the claim from thirty-six employees reasoning that they could not find a link between the employees' illnesses and the Hospital (CBC, 2005). The approval of the Workers Compensation Board claim not only would have assisted workers financially, but would have formally legitimized their claims. An oral surgeon who was affected by this case filed a statement of claim at the Supreme Court against the Cape Breton District Health Authority contending that occupational health and safety rules were violated and resulted in hospital workers being exposed to excessive levels of toxic dust (Richer, 2004; Sweeney, 2006a). The lawsuit concluded in 2009 when the Supreme Court judge found

⁸⁵ Those affected in this case engaged in Brown's (1992: 267-9) stages of popular epidemiology which are based on his research surrounding communities affected by toxic waste "where lay persons gather and direct and marshal the knowledge and resources of experts in order to understand the epidemiology of disease, treat existing and prevent future disease, and remove the responsible contaminants." A case study of the events surrounding the environmental health controversy at the New Waterford Consolidated Hospital amends the stages of popular epidemiology to include biographical disruption in an examination of the experiences of health care workers who become ill with environment-related illnesses, when they encounter resistance from their peers and the health care system to which they belong (Sweeney, 2006a).

in favour of the Cape Breton District Health Authority. In a 113-page decision, Justice MacLellan found that

[t]he plaintiff here has suffered a great deal. His life has been torn apart by his illness. He is a good man and a skilled dental surgeon. The court finds no joy in denying his claim. However, the legal system requires that a plaintiff prove his claim based on certain legal principles, including proof of causation (Camus, 2009).

The plaintiff has since filed an appeal which suggests that the Supreme Court failed to address the original claim that the Cape Breton District Health Authority breached its leasing contract by exposing employees to hazardous substances including heavy metals and toxic gases (CBC, 2010b). It also suggests that the Supreme Court erred by placing the burden of proof on the plaintiff to “prove hazardous materials were present in the hospital while the renovations were going on, when the Occupational Health and Safety Act requires the health authority to determine what hazardous materials were present before starting the renovations” (Hayes, 2010). The controversy around issues of accountability and compensation in this case involves the affected health care workers, the Hospital Administration, health care system, and the Workers’ Compensation Board, and has yet to be resolved. This case demonstrates the intrinsic link between risk, environmental health controversies and contested illnesses, where the affected health care workers have continued to suffer physically, financially and emotionally.

In cases concerning occupational exposures and breast cancer, the existence of the disease itself is not contested but its causation and issues of accountability are continually surrounded by scrutiny and debate. Many of the endocrine disrupting chemicals and mammary carcinogens of concern in the development of breast cancer have come into

widespread use over the past thirty years and women in Canada are exposed to these toxic substances on a regular basis.

Based on the mounting evidence, this widespread introduction of toxic chemicals into various work environments, and particularly new pesticides into agriculture and plastics into automotive manufacturing, will likely result in escalating numbers of claims for work place compensation for women who have developed breast cancer from these new technologies (Brophy et al., 2013).

To date there have been no workers' compensation claims upheld in Canada in cases of toxic exposures linked to breast cancer (Keith, 2013). Manitoba became the first jurisdiction in Canada to "enact a firefighter's disease presumption" when it added breast cancer to its list of compensable diseases for firefighters in 2011 (Government of Manitoba, 2010). Ten primary-site cancers were listed in the original legislation in 2002 including brain, bladder, kidney, lung, ureter, colorectal, esophageal, and testicular cancers, non-Hodgkin's lymphoma, and leukemia. The amendments proposed in 2010 apply to volunteer, part-time and full-time firefighters and included four additional cancers including multiple myeloma, primary site prostate, skin, and breast cancer (Government of Manitoba, 2010). The risk of a female firefighter developing breast cancer is three to five times higher than the general population as a result of exposure to more than 200 known carcinogens connected to breast cancer at every fire (CBC, 2010c; Kusch, 2010).⁸⁶ Thus far, other provinces and territories do not have this category for

⁸⁶ Janette Neves Rivera is a California firefighter who was diagnosed with breast cancer that is believed to be linked to her exposure to toxic substances as a result of her occupation (Fire Engineering, 2013). Rivera maximized her sick time and applied to San Francisco's catastrophic illness program which enables employees to donate their sick time to each other, but the city's Department of Public Health denied her claim, stating that her current condition was not considered to be "life threatening" (KTVU, 2012). Rivera recently filed a petition along with the Center for Environmental Health to the Chairman of the Consumer Product Safety Commission which is currently considering a federal flammability standard that would restrict the use of flame retardants in furniture and other products across the United States. The federal standard being considered will undermine a new California standard (TB 117-2013) which would require

firefighters or any other specific occupational group. A workers' compensation claim was initially granted to health care workers who experienced a breast cancer cluster in a hospital laboratory in British Columbia and claimed they were exposed to carcinogens. However, this claim was appealed by the employer who argued that there was insufficient evidence to demonstrate that the claimants' cases of breast cancer were caused by occupational factors. The claim was overturned by the provincial Supreme Court, though the case has been left open if new evidence becomes available in the future (BC Justice, 2013; Keith, 2013).

Meek and Armstrong (2007: 593) note that the definition of environment in CEPA 1999 is broad enough to encompass the occupational environment. However, the federal regulatory regime that is designed to protect human health including CEPA 1999 and the *Chemicals Management Plan* does not encompass occupational health which instead falls under provincial and territorial legislation in the form of Occupational Health and Safety Acts. The research conducted by Brophy et al. (2012) linking increased incidence rates of breast cancer to occupational exposures of toxic substances raises important questions about the adequacy of existing chemical testing protocols in workplaces under provincial occupational health and safety standards. The Association of Workers' Compensation Boards of Canada recently listed breast cancer as an emerging issue citing the Brophy et al. (2012) study and its findings that the risk of breast cancer is

companies to make products with improved fire safety and without hazardous flame retardants. The petition calls on the Consumer Product Safety Commission to join California and research other fire safety approaches that would provide greater fire safety without the use of toxic chemicals that are hazardous to human health and the environment (Fire Engineering, 2013; Rivera, Janette Neves and the Center for Environmental Health, 2013; State of California, 2013b, 2013c).

higher in workers in automotive plastic manufacturing and food canning industries (Association of Workers' Compensation Boards of Canada, 2013; Keith, 2013). The growing body of epidemiological and laboratory research has the potential to impact the workers' compensation system and frame breast cancer as a compensable occupational disease (Brophy et al., 2013).

Neither the federal regulatory or provincial occupational health and safety regimes adequately protect women and prevent detrimental health outcomes including the development of breast cancer as a result of exposure to toxic substances. The Government of Canada contends that “[n]ational consistency secures the same level of environmental and human health protection for all Canadians” (Environment Canada and Health Canada, 2006: 18). However, the federal regulatory regime does not account for women as a susceptible population who are at risk as a result of everyday exposures to toxic substances. Health Canada’s focus on infants and children as the only vulnerable population at risk from exposure to environmental contaminants does not account for either a lifecourse approach to health or windows of susceptibility that occur through a woman’s life. The risk assessment and management frameworks do not adequately account for the effects of low-dose, cumulative and synergistic effects of exposure to complex mixtures of toxic substances. These frameworks do not currently account for the emerging understandings of the long-term health effects of endocrine disrupting chemicals, despite the “abundant scientific evidence of the harmful effects by EDCs [which] has accumulated to support a swift change in public health and environmental policies aimed at protecting the public in general, and, in particular, the developing fetus

and women of reproductive age” (Soto and Sonnenschein, 2010: 7).

Women’s Health and Cancer Organizations’ Response

The majority of health and environmental organizations operate within the framework and discourse established by the government and public health sector. The more mainstream cancer and women’s health organizations have traditionally and primarily promoted the lifestyle and behavioural risk factors in the development of cancer with the individualization of risk and responsabilization paradigm. It is also suggested that this approach has been promoted by mainstream organizations because of partnerships with and funding from pharmaceutical organizations. Batt (2010: 69) demonstrates that “[s]urveys based on annual reports, websites, and interviews confirm the prevalence of pharmaceutical company donors as well as concerns about disclosure, not only in Canada but in the U.S., Europe, Australia, and New Zealand.” Health-related organizations receive tens to hundreds of thousands of dollars annually from pharmaceutical companies for conferences, publications, websites, and advocacy training (Batt, 2010: 69).⁸⁷ However, there is emerging evidence that points to a shift in mainstream women’s health and cancer organizations which acknowledges the environment as a determinant of health and exposure to toxic substances as hazardous to women’s health.

⁸⁷ Indeed, the Canadian Breast Cancer Foundation lists GlaxoSmithKline and the Roche Group as “Pink Ribbon Partners” of its Ontario branch with donations greater than \$50,000 (CBCF, 2013). The Canadian Breast Cancer Network lists GlaxoSmithKline, the Roche Group, Novartis, and Amgen as sponsors (CBCN, 2013a).

The Canadian Cancer Society is perhaps the most well-known cancer organization in the country with a Nationwide Strategic Plan for 2010-2015 which aims to “deter, defeat and defy cancers” through the reduction of cancer incidence and cancer mortality rates for Canadians (Canadian Cancer Society, 2013d). The Canadian Cancer Society has traditionally focused its public education campaigns on lifestyle and behavioural risk factors. The Canadian Cancer Society published the “Seven Steps to Health” which were widely utilized in public educational campaigns of various cancer organizations including the Canadian Breast Cancer Foundation, Halifax Breast Cancer Screening Clinic, Cancer Care Nova Scotia, and the Canadian Cancer Society itself. For instance, the Seven Steps to Health appear prominently in public education pamphlets including “Breast Self-Examination: How to Check Your Breasts” (1997); “Facts on Breast Cancer” (2000); “Cancer Facts for Women” (2000); “Breast Health: What You Can Do” (2002); and “Breast Self-Examination: What You Can Do” (2002) (Sweeney, 2006b). The Seven Steps to Health are framed around the knowledge that “some cancers can be prevented,” and the suggestion that members of the general public should take responsibility for their health and use these steps to reduce their risk of developing breast cancer:

- 1) Be a non-smoker and avoid second hand-smoke;
- 2) Eat 5 to 10 servings of vegetables and fruit a day. Choose high fibre, lower fat foods. If you drink alcohol, limit your intake to 1 or 2 drinks a day;
- 3) Be physically active on a regular basis: this will also help you maintain a healthy body weight;
- 4) Protect yourself and your family from the sun. Reduce sun exposure between 11a.m. and 4 p.m. Check your skin regularly and report any changes to your doctor;

5) Follow cancer screening guidelines. For women, discuss mammography, Pap tests and breast exams with a health professional. Both men and women should also discuss screening for colon and rectal cancers.

6) Visit your doctor or dentist if you notice a change in your normal state of health; and

7) Follow health and safety instructions both at home and work when using, storing and disposing of hazardous materials (Sweeney, 2006b: 82).

The influence of the Doll and Peto paradigm, the individualization of risk, and promotion of responsabilization is evident in the emphasis on lifestyle and behavioural factors in the public education literature. Breast cancer is primarily framed as a problem of behavioural practices as women are encouraged to live a healthy lifestyle which includes not smoking, limiting alcohol consumption, eating healthy, exercising, and engaging in cancer screening practices (Steingraber, 2000).

Step seven of the Canadian Cancer Society's approach is the only one to acknowledge an environmental role in the development of cancer. The language used in step seven has evolved over time. A public education pamphlet published in 1997 suggests that "[a]t home and work, follow health and safety instructions when using hazardous materials." There was a minor revision in 2000 to read "[f]ollow health and safety instructions at home and at work when using, storing and disposing of hazardous materials" (Sweeney, 2006b: 84). An article published in *This Magazine* questioned the Chief Executive Officer of the Canadian Cancer Society about why this step offers advice on handling hazardous materials and does not urge citizens to avoid known carcinogens altogether. The question in itself reflects the lifestyle and behavioural component in framing the responsibility for avoiding exposure to carcinogens as a problem to be

addressed at the individual level. The Chief Executive Officer replied that “[i]t’s sort of wussy,” and that all public education materials using the Seven Steps to Health should be updated within the year (Murphy, 2002: 32). The interview was published in March 2002, and two of the pamphlets that were revised and printed in July 2002 contained a re-wording of step seven: “[f]ollow health and safety instructions both at home and at work when using, storing and disposing of hazardous materials.” This was nearly identical to the text from seven years prior and the Canadian Cancer Society’s website reflected the same information in 2003 (Sweeney, 2006b: 84-85). Chernomas and Donner (2004) note that in 2004 the Canadian Cancer Society endorsed the precautionary principle as an effective tool for preventing cancer. However, the authors critique the organization’s approach as “inconsistent in acknowledging the importance of primary prevention” in relation to the precautionary principle as the public education literature on breast cancer does not contain reference to possible environmental risk factors (Chernomas and Donner, 2004: 17).

More recently, the Canadian Cancer Society (2008, 2013b) suggests that the current scientific evidence has not been able to confirm or eliminate a causal link to environmental contaminants in the development of cancer and list environmental exposures under unknown risk factors, but does allow that “people who are continually exposed to cancer-causing substances at high levels or over long periods of time may have a higher risk of developing cancers” (Canadian Cancer Society, 2008: 3). *The Environment, Cancer and You* is an underwhelming publication as it still places a significant amount of responsibility on the individual and only fully confirms asbestos

and radon as cancer-causing, while other substances such as flame retardants, phthalates and electromagnetic fields are classified as a concern (Canadian Cancer Society, 2008). The organization maintains that more research is needed in order to clearly understand how toxic or environmental substances may be linked to cancer, but suggest that substances that are known to cause cancer should be replaced with safer alternatives and if that is not possible, then exposure to the substance should be reduced as much as possible (Canadian Cancer Society, 2013e). The Canadian Cancer Society relies on classification material from international sources including the International Agency for Research on Cancer, the United States National Toxicology Program; and the United States Environmental Protection Agency (Canadian Cancer Society, 2013e).⁸⁸

The Canadian Cancer Society announced in November 2012 that it will be funding three new prevention-focused projects. Director of Research, Dr. Mary Argent-Katwala stated that

[t]hese new prevention grants are a unique opportunity for the Society to use the findings to inform our advocacy and policy agenda. For example, the results...could be used for educational campaigns, advocacy activities to urge governments to enact prevention regulations, and to set priorities for our prevention activities (Canadian Cancer Society, 2012b).

⁸⁸ The International Agency for Research on Cancer (IARC) is an intergovernmental agency and part of the World Health Organization. It uses four classes in its conclusions around carcinogenicity including Group 1 (carcinogenic to humans); Group 2A (probably carcinogenic to humans); Group 2B (possibly carcinogenic to humans); Group 3 (not classifiable as to its carcinogenicity to humans); and Group 4 (probably not carcinogenic to humans) (Canadian Cancer Society, 2013f; IARC, 2013). The National Toxicology Program (NTP) is part of the United States Department of Health and Human Services. The defining criteria it uses for determining carcinogenicity includes known to be a human carcinogen; and reasonably anticipated to be a human carcinogen (Canadian Cancer Society, 2013f; NTP, 2011). The United States Environmental Protection Agency (USEPA) classifies toxic substances in five categories including carcinogenic to humans; likely to be carcinogenic to humans; suggestive of carcinogenicity but not sufficient to assess human carcinogenic potential; data are inadequate for an assessment of human carcinogenic potential; and not likely to be carcinogenic to humans (Canadian Cancer Society, 2013f; USEPA, 1999; 2012).

The first study will quantify the number of new cancer cases and deaths in Canada that can be attributed to workplace factors and determine its economic impact. This multi-disciplinary research will receive \$1 million over four years to examine the human and economic impact of workplace exposure to forty-four known or suspected carcinogens based on the guidelines from the International Agency for Research on Cancer, and toxic substances links to twenty-seven types of cancer. The substances that will be considered include industrial chemicals benzene, formaldehyde and 1.3-butadiene; metals such as chromium, nickel and arsenic; and other factors including exposure to sunlight, asbestos, paint, diesel fumes, and shift work. The research will also estimate direct costs such as medical care, indirect costs such as lost work time, and quality of life costs related to occupationally-related cancers; estimate the human and economic burden of occupational cancer by province, industry, sector, and gender (sex); and utilize the estimates in order to determine potential benefits of cancer prevention such as toxics use reduction (Canadian Cancer Society, 2012b).

The second prevention-focused research project funded by the Canadian Cancer Society involves \$928,000 over four years to study how public health agencies can collaborate to reduce cancer rates in Northern British Columbia which has higher rates of smoking, obesity and cancer-related deaths than the rest of the province. The third project involves \$970,000 over four years to create a smoking cessation intervention program for youth in Quebec involving general practitioners and nurses, follow-up counselling, and peer support in order to target youth who smoke and prevent cancer incidence related to smoking-related illnesses such as lung cancer (Canadian Cancer Society, 2012b). While

the first study has a broader focus on occupational exposure to toxic substances, the two remaining studies continue to focus primarily on lifestyle and behavioural factors in their focus on smoking cessation.

The Canadian Breast Cancer Foundation (2012d) acknowledges the potential of toxic substances in increasing the risk of developing breast cancer and points to key areas of concern such as the health effects of endocrine disrupting chemicals, low-level cumulative exposures and mixtures of toxic substances, and critical periods of development and susceptibility including infancy, puberty and pregnancy. Research on indoor air and household exposures to toxic substances suggests that low-level exposures may result in triggers for the development of breast cancer including disruptions in the hormonal system, early puberty and altered mammary gland development. The Canadian Breast Cancer Foundation endorses the use of the precautionary principle as a way to “apply evolving breast cancer prevention evidence in our daily lives. By following the precautionary principle in your life, when scientific evidence is inconclusive you put your health first and err on the side of caution” (CBCF, 2012d).

The Canadian Breast Cancer Foundation encourages people to limit their daily exposure to toxic substances at home and in the workplace (CBCF, 2012d, 2012e). Specifically, the organization suggests that people can reduce their exposure to toxic substances in food, plastics, personal care and cleaning products, and products for children in order to reduce chemical exposures in the home. In order to reduce exposures through food, people are encouraged to wash fruits and vegetables to remove traces of pesticides; buy local, pesticide-free or organic food; and minimize exposure to BPA by

avoiding canned foods and using glass containers instead of plastic to prevent leaching. Avoiding plastics that contain polyvinyl chloride, polystyrene and polycarbonate is also suggested. In order to reduce or limit exposure, the organization recommends using fewer cosmetics and personal care products or ones with less ingredients. They also encourage consumers to read the label for ingredients and avoid products that contain fragrance or parfum or toxic substances such as phthalates, parabens, alkylphenols, and placental extracts. To reduce exposures through the use of household products, consumers are encouraged to use non-toxic household products, avoid products containing bleach, and use pesticide-free and non-toxic products on yards and gardens and in particular avoid products which contain 2,4-D or malathion. Finally, the organization suggests limiting children's exposure to toxic substances by using glass food containers instead of plastic and buying toys that do not contain phthalates (CBCF, 2012f). These recommendations all fall under practices of precautionary consumption and seem to target a highly educated and affluent demographic with recommendations to purchase organic food and read labels for cosmetics, personal care products, and cleaning products.

The Canadian Breast Cancer Foundation also acknowledges concerns around workplace exposures to toxic substances and the risk of developing breast cancer. Occupations with increased breast cancer risks include agriculture and manufacturing of textiles, paper, microelectronics, metals, food canning, and automotive plastics as a result of exposure to toxic chemicals; health care where workers are exposed to ionizing radiation; work with heavy traffic such as border service agents where there are high levels of exposure to diesel exhaust; and long-term night-shift workers whose exposure to

artificial light can reduce melatonin levels which can play a role in suppressing the growth of breast tumours (CBCF, 2012f). The Canadian Breast Cancer Foundation cites the Brophy et al. (2012) work as a “landmark study” in occupational breast cancer research which found that women who were exposed to carcinogens and endocrine disrupting chemicals over a ten year period had a forty-two percent increased average risk and women working in the food canning and automotive plastics had a five times higher risk of developing breast cancer before menopause. The precautionary steps recommended for workers exposed to toxic substances include knowing workplace health and safety rights; learning about how to best protect yourself from risks such as how to properly use protective equipment or clothing; as well as raising concerns with supervisors, Occupational Health and Safety Committees, the local ministry of labour office, or the Canadian Centre for Occupational Health and Safety. In addition to the precautionary measures recommended for individual workers, the Canadian Breast Cancer Foundation argues that there is a need for regulators and employers to take precautionary action in order to protect workers and reduce the risk of negative health outcomes (CBCF, 2012g).

The Breast Cancer Society of Canada (2013c) has also moved towards acknowledging the environment as playing a role in “healthy living” and in the development of breast cancer. The Breast Cancer Society of Canada acknowledges both environmental and occupational exposures as issues of concern, although their recommendations for “living green” fall into precautionary consumption behaviours and are vague at best. The organization suggests that the cost of making extreme

modifications to our homes or changing careers in order to live a completely green lifestyle without exposures to toxic substances is not feasible, while still placing responsibility on the individual by recommending that “there are many things that can be done in your daily life and if you integrate these changes gradually in the areas where you are most vulnerable, you’ll be living green before you know it” (BCSC, 2013c). The Breast Cancer Society of Canada acknowledges that Canadian citizens come into contact with chemicals that have been linked to breast cancer including polychlorinated biphenyls, dioxin, pesticides, phthalates, BPA, polyvinyl chloride, fire retardants, and ingredients in cosmetics. However, there is no background or context provided as part of this discussion, rather they provide a link to the Environmental Working Group’s Cosmetics Database where people can “verify how safe your brands are,” and a link to an alphabetized list of carcinogens compiled by Health Canada. Farm workers are the only occupation included as increasing the risk of developing breast cancer and the recommendations are to follow warnings and handling procedures in material safety data sheets for chemicals and to work with employers to ensure the workplace has good air quality and that chemicals are properly handled (BCSC, 2013c). This information lacks any level of detail and specificity while placing the onus of responsibility for behavioral change on the individual rather than any acknowledgement or call for regulatory reform around environmental and occupational exposures.

The Canadian Breast Cancer Network finds that some organizations categorize environmental risk factors with a very broad understanding of environment to encompass all determinants that are not genetic or hereditary including lifestyle and behavioral

factors such as smoking. This framework is grounded in the responsabilization paradigm and the individualization of risk which are promoted in public health policy. At the other end of the spectrum are organizations who attempt to shift the discourse and approach to health outcomes by defining environmental risk factors as limited primarily to industrial chemical pollutants. The Canadian Breast Cancer Network itself recognizes the wide variation between the definitions as well as the political implications involved in categorical decisions. As such, the organization chooses to work with a middle ground by recognizing the impact of the environment on health outcomes and by providing a general selection of resources in its educational materials “relating to environmental concerns with the hope that a cleaner, healthier, conscientious environment is conducive to all facets of health, not least of all breast health” (CBCN, 2013b). The Canadian Breast Cancer Network acknowledges that toxic chemicals and radiation play a role in the risk a woman has of developing breast cancer and suggests that our exposure to chemicals and radiation is something that can be controlled through personal, corporate and political action. They do not provide any detailed information or suggestions as to what the corporate or political action may involve, but suggest precautionary consumption practices in “get[ting] to know the chemicals that have been linked to breast cancer and tak[ing] action to reduce your risk” (CBCN, 2013b).

While the Canadian Breast Cancer Network does acknowledge environmental risks, they categorize occupational hazards as a “lifestyle risk.” The occupational information provided includes automotive combustion with an article published in 2000 specific to male breast cancer incidence as a result of exposure to gasoline and vehicular

combustion product; and chemical exposure in female firefighters providing links to an American study from Cornell University and the International Agency for Research on Cancer Monographs with “recent evaluations of occupational carcinogens” which provides a broken link to the Canadian Cancer Society website (CBCN, 2010). There is no substantive discussion for concerns around automotive combustion or chemical exposure, though there is slightly more information provided about hazards associated with working night shifts and the role of melatonin in tumour development and a higher incidence of breast cancer among women who work night shifts (CBCN, 2010).

Recognizing the risks associated with occupational exposures and developing breast cancer is of great importance. However, categorizing occupational exposures as a lifestyle risk is problematic in a number of ways. First, framing occupational exposures and health outcomes in this manner clearly implies that individuals can control these exposures and subsequent health outcomes through behavioural practices when in the majority of cases this is beyond the capacity of the individual. It is also important to consider the social determinants of health such as socioeconomic status when discussing occupational exposures. There is often apprehension about being labelled a “troublemaker” for raising concerns around occupational health issues. In addition to this stigma, workers face the very real threat and fear of workplace closure and subsequent job loss in cases with environmental, contested or occupational exposures and health outcomes. This is similar to threats around mine closures when respiratory illnesses were linked to miners who were exposed to contaminated air (Rosner and Markowitz, 1987). The threat of job loss is particularly relevant in rural communities where there are few

major employers (Sweeney, 2006a). Brophy et al. (2012) also point to a class and gender bias around the issue of occupational exposures and that breast cancer is a neglected issue. Finally, framing occupational exposures as a lifestyle risk effectively dismisses the role of the employer and the government in regulating exposures and protecting workers' health.

Despite the Canadian Cancer Society, Canadian Breast Cancer Foundation, Canadian Breast Cancer Society, and the Canadian Breast Cancer Network making some move towards acknowledging the environment and toxic substances as influencing women's health and cancer outcomes, their primary focus remains on lifestyle and behavioural factors which places the onus of responsibility for preventing breast cancer on the individual and which is consistent with the mainstream organizations in the United States. Separate from these mainstream organizations, there are those which are more progressive in taking action through educational campaigns and lobbying government, and which can be classified as part of the culture of cancer prevention and environmental risk. The Breast Cancer Fund and Breast Cancer Action are two organizations that emerged as part of this culture of action in the San Francisco Bay Area, and Breast Cancer Action Montreal represents a similar organization in Canada as part of the broader environmental breast cancer movement. All of these organizations have similar mandates in their commitment to advancing and protecting women's health through public education and advocacy campaigns and a refusal to accept funding from organizations and corporations that conflict with their mandate such as pharmaceutical

companies, chemical manufacturers, oil companies, tobacco companies, and health treatment facilities.

The Breast Cancer Fund works towards translating scientific evidence which links environmental exposures to the development of breast cancer into public education and advocacy campaigns around reducing breast cancer risk and protecting women's health (Breast Cancer Fund, 2013b). The organization points to the emerging body of scientific evidence which indicates that exposures to toxic substances such as chemicals and radiation are contributing to the increased breast cancer incidence rates in industrialized countries. The Breast Cancer Fund's *State of the Evidence: The Connection Between Breast Cancer and the Environment* is now in its sixth edition. This widely cited report examines the links between exposure to environmental chemicals and radiation and the development of breast cancer within a broad context that recognizes the social determinants of health and susceptible populations who may be at higher risk of developing the disease. The organization argues for the importance of the timing and duration of exposures to toxic substances, low-dose exposures at environmentally significant levels, patterns and mixtures of exposures, and the complexity of interactions between environmental and other risk factors for breast cancer (Gray et al., 2009; Gray, 2010). The organization points to the role of windows of susceptibility when "mammary cells are more susceptible to the carcinogenic effects of hormones, chemicals and radiation including early stages of development, from the prenatal period through puberty, adolescence and on until the first full-term pregnancy" (Nudelman et al., 2009: 80).

The broad categories of concerns addressed by the Breast Cancer Fund include hormones in personal care products; endocrine disrupting chemicals; hormones in food; non-endocrine disrupting industrial chemicals; light-at-night and melatonin; and radiation. Specifically, there is a focus on air and water contaminants; chemicals used in cosmetic and personal care products; chemical ingredients in household cleaning products; chemicals in plastics; exposures in health care settings; and pesticides. The chemicals are considered in terms of the source of exposure and whether they are carcinogenic, a mammary carcinogen, or an endocrine disrupting compound (Gray et al., 2009; Gray, 2010; Nudelman et al., 2009; Nudelman and Engel, 2010). The everyday exposures associated with these toxic substances are widespread and cannot be controlled through measures of precautionary consumption. The Breast Cancer Fund advocates for increased research and regulatory change in order to “decrease human exposures to toxic substances implicated in the high rates of breast cancer, thereby decreasing the incidence of this disease” (Nudelman et al., 2009: 97).

Advocacy organization Breast Cancer Action operates with three priority areas including i) advocating for more effective and less toxic breast cancer treatments; ii) decreasing involuntary environmental exposures that increase the risk of developing breast cancer; and iii) creating awareness that social injustices, including political, economic and racial inequities lead to disparities in breast cancer outcomes (BCA, 2013a). Breast Cancer Action promotes the use of the precautionary principle in its commitment to advancing women’s health. “While many breast cancer organizations offer advice on how individuals can reduce their voluntary exposures to carcinogens, the

policy changes needed to eliminate these exposures for everyone require a broader social justice approach” (BCA, 2013b).

Breast Cancer Action launched the “Think Before You Pink” campaign in 2002 which calls for increased levels of transparency and accountability by companies who participate in breast cancer fundraising, and encourages people to ask critical questions about pink ribbon products and promotions (BCA, 2013c). The “What the Cluck?” campaign in 2010 noted the health hypocrisy of “Buckets for the Cure” which was a partnership between KFC and Susan G. Komen for the Cure, one of the largest and most well-funded breast cancer organizations. “Raise a Stink” also targeted Susan G. Komen for the Cure in 2011 to demand the recall of Promise Me perfume and that the highest precautionary standards be adopted to protect women’s health. The specific concerns with Promise Me Perfume centre around the chemicals it contains that i) are categorized as toxic and hazardous; ii) have not been adequately evaluated for human safety; and iii) have demonstrated negative health effects. Ingredients in the perfume include galaxolide which is a synthetic musk that acts as a hormone disruptor detected in blood and breast milk, and toluene which is a neurotoxin with a variety of negative health effects and is banned by the International Fragrance Association. This campaign resulted in a victory for Breast Cancer Action with Susan G. Komen for the Cure ending their partnership to produce Promise Me perfume as of May 2012 (BCA, 2011b, 2011c). The 2012 Think Before You Pink campaign was entitled “It’s An Epidemic, Stupid” and argued that “after three decades of ‘awareness’ campaigns and billions of dollars raised, breast cancer remains a public health crisis of epidemic proportions.” This campaign called for a

mandate for government action and for meaningful prevention efforts (BCA, 2012). The most recent Think Before You Pink campaign is entitled “Toxic Time is Up!” and was launched in October 2013. It calls for an end to pinkwashing and asks that chemical substances be proven to be safe before they are placed on the market and subsequently, into women’s bodies (BCA, 2013d). Breast Cancer Action is calling for a systemic change in advocating for the legislation, regulation, research, and education which would reduce and ultimately eliminate involuntary everyday exposures to toxic substances (BCA, 2013c).

Breast Cancer Action Montreal is a non-profit activist and advocacy organization which works to i) educate the public about environmental toxicants and widespread exposures linked to breast cancer, the precautionary principle, the benefits and risks associated with various treatments for breast cancer, and current cancer research, treatment and services; ii) advocate for policies that would decrease the amount of toxic substances in the environment and allocate increased funding for research on environmental causes of breast cancer; iii) provide support for efforts to improve services, health care and health policies, as well as for individuals to have a strong voice in decisions about their diagnosis and treatment; and iv) network to create a resource-sharing community of women around the issue of breast cancer, and encourage other breast cancer organizations to join the fight for prevention of the disease, as well as for improvements in diagnosis and treatment (BCAM, 2013a).

Breast Cancer Action Montreal has a similar critique about the use of the pink ribbon and launched a campaign called “Little Pink Lies” which counters the mythology

around Breast Cancer Awareness Month (Cohen, 2012⁸⁹). The little pink lies included in this educational campaign include:

- *“We’re close to finding a cure.”* This message is repeated at fundraising events and printed in media coverage around Breast Cancer Awareness Month. However, the treatment options including surgery, radiation and chemotherapy have not changed in the past forty years, and a cure or cures have not been found despite the significant amount of funding for research in this area. With the mainstream organizational, corporate and media attention focused on the “cure,” there has been far less focus on prevention and less than five percent of research funding goes to prevention;
- *“Rates of breast cancer are decreasing.”* While mortality rates among women diagnosed in Canada and the United States are decreasing, this is attributed to detection measures and the reduced use of hormone replacement therapy. The incidence of breast cancer is increasing in developing countries which may be linked with the proliferation of toxic substances in the environment and is not reflected in pink ribbon campaigns;
- *“Pink ribbons mean companies care.”* There is a general perception that purchasing pink ribbons products contributes to the “cause” and that the company’s practice is grounded in philanthropy. However, there is very little transparency about what amount of money will be contributed, if there is a cap on donations, or what organization the money will be donated to and what work will be done with the donation. Breast Cancer Action Montreal points to the pinkwashing associated with companies who “support breast cancer” with pink ribbon products while simultaneously manufacturing products which contain ingredients that may be linked to the disease such as automobile manufacturers whose vehicles emit PAHs, cosmetic companies whose products contain carcinogens or endocrine disrupting chemicals, food producers whose cans are lined with BPA, and multinational pharmaceutical companies who produce and sell carcinogenic pesticides as well as medications that are used in cancer treatment;
- *“Government regulations prohibit the use of known or suspected carcinogens in consumer products.”* The *Consumer Product Safety Act* which was introduced in 2011 was designed to protect the public by “addressing or preventing dangers to human health or safety posed by consumer products in Canada.” However,

⁸⁹ This research project received ethics approval from York University’s Office of Research Ethics. Participation was completely voluntary and participants received information describing the goals of the study and signed an informed consent form.

despite meeting the Act's definition of a "danger to human health," it does not include carcinogens. Breast Cancer Action Montreal created a petition calling for regulatory changes asking Health Canada to prohibit the use of any chemicals that are inherently carcinogenic or mutagenic, as well as those that have been identified as reproductive toxicants in products sold in Canada; mandate that manufacturers of consumer products supply full and complete safety data tests for all chemical ingredients used in their products; and require that producers submit complete environmental and health data to Health Canada on each chemical used as most chemicals lack comprehensive testing information; and

- "*We lack evidence that environmental factors affect breast cancer.*" Breast Cancer Action Montreal points to the substantial and growing body of evidence on how chemicals, radiation and other environmental factors contribute to the development of the disease. Over the past sixty years there have been at least 100,000 new chemicals introduced into the environment and breast cancer incidence in Canada rose from one in forty women to one in nine. Recognizing that only five to ten percent of breast cancers are as a result of genetic and family history, the organization points to important findings in considering the everyday environmental exposures women experience including: synthetic chemicals mimicking the action of estrogen; a woman's risk of breast cancer increasing with her lifetime exposure to estrogen; and that estrogen-like chemicals including BPA, PVCs and phthalates are found in consumer goods and personal care products. Women are consistently exposed to a "chemical soup" which can have cumulative and synergistic effects, as well as effects as a result of low-dose, long-term and chronic exposures (BCAM, 2013b).

Breast Cancer Action Montreal is particularly interested in the involuntary risk factors which are inherent in everyday exposures to environmental toxicants and grounds its work in the precautionary principle (Cohen, 2012). In addition to the Little Pink Lies campaign, Breast Cancer Action Montreal has a campaign for safe cosmetics which calls on Health Canada to prohibit the use of chemicals in cosmetics sold in Canada that are inherently carcinogenic, mutagenic or act as a reproductive toxin. The campaign also seeks to mandate that cosmetic companies supply complete safety data tests for all chemical ingredients in their products, and demands that producers supply full environmental and health data on all chemicals used in their products to Health Canada

(BCAM, 2013c, 2013d). FemmeToxic is a related initiative and educational campaign which focuses on young women and toxic substances found in cosmetic and personal care products that are detrimental to human health and may increase the risk of breast cancer.

The average woman uses 12 cosmetic and personal care products every day, exposing her to 126 unique chemicals. Canada's weak cosmetic regulations, and the influence of the powerful \$5.4 billion Canadian cosmetic industry, allow compounds such as carcinogens, mutagens and reproductive toxins, for example, to be used in our cosmetic products. It has reached a point where the financial costs of reformulating outweigh and undermine the impacts and concerns these chemicals have on our health. Marketing schemes have been successful in skewing a woman's perspective on true beauty. The small dose, long-term exposure from these cosmetics toxins accumulate and add to the body burden of women who have already been overloaded with other environmental contaminants that pollute our bodies (FemmeToxic, 2013).

The FemmeToxic campaign engages with youth aged twelve to twenty-five and advocates for stronger regulations from Health Canada including labelling and the substitution and removal of toxic substances in cosmetics and personal care products (BCAM, 2013e; FemmeToxic, 2013).

The final campaign from Breast Cancer Action Montreal is framed around the loopholes in the federal regulatory system for consumer products. "Becoming a Chemical Detective" provides education and resources with practical solutions and safer alternatives in order to help reduce exposure to toxic substances and provides low-cost and affordable solutions, recognizing potential socioeconomic barriers. The campaign is focused on new and potential parents in its emphasis on the risks associated with exposure to toxic substances and susceptibility during pregnancy, infancy, early childhood and adolescence (BCAM, 2013f). Breast Cancer Action Montreal

demonstrates that the focus of breast cancer research must “move beyond its current emphasis on treatment to also embrace a serious search for the causes of the disease and its prevention” (BCAM, 2013g).

As a response to the critiques around Breast Cancer Awareness Month and the pink ribbon campaigns, the Canadian Women’s Health Network launched a postcard campaign in 2012 focused on breast cancer prevention. The Canadian Women’s Health Network utilized messaging in this educational campaign which included:

- *Think Before You Pink*: Drawing on Breast Cancer Action’s campaign, the Canadian Women’s Health Network notes the history behind Charlotte Haley’s peach ribbon and the lack of funding for primary prevention;
- *Prevent the Root Causes*: This postcard calls for the prevention of the root causes of breast cancer, lung cancer and cardiovascular disease and their impacts on women’s health and mortality;
- *An Ounce of Prevention*: Questioning the predominant focus on research for a cure for breast cancer, this postcard notes organizations who are working on prevention including Breast Cancer Action Montreal, the Women’s Healthy Environments Network, the Breast Cancer Fund, Breast Cancer Action, and the Alliance for Cancer Prevention;
- *Breast Cancer is Preventable*: This postcard notes that breast cancer is preventable and points to the toxic substances and environmental exposures to the disease, calling for both personal and political action; and
- *Link Our Environments with Prevention*: This postcard speaks to occupational exposures and calls for the need to link both home and work environments with breast cancer prevention efforts (Canadian Women’s Health Network, 2012d).

The Canadian Women’s Health Network is attempting to shift the dominant discourse on breast cancer and acknowledge the role of the environment, risk and prevention in women’s health outcomes (CWHN, 2012d). While the burden of responsibility most often falls onto the individual through precautionary consumption practices, it is

ultimately legislation and public health policy that can play a role in truly protecting women's health and exposure to toxic substances (Cohen, 2012).

The longstanding organizations that operated with funding from Health Canada as part of the Women's Health Contribution Program produced research with a commitment to sex- and gender-based analysis and advancing women's health and well-being. This program was "critical to funding innovative social policy research, building community partnerships and providing important mentorship opportunities in women's health" (CWHN, 2012e). The Women's Health Contribution Program lost its funding as part of the 2012 federal budget. It was anticipated that Health Canada needed to cut more than \$200 million from its budget and would save \$2.85 million per year in eliminating the Women's Health Contribution Program (Rabson, 2012; Smith, 2012). The budget cuts resulted in four research centres and two communications networks losing their federal funding as of March 31, 2013, including the Atlantic Centre of Excellence for Women's Health, the British Columbia Centre of Excellence for Women's Health, the Canadian Women's Health Network, the Prairie Women's Health Centre of Excellence, the National Network on Environments and Women's Health, and the Réseau Québécois d'Action pour la Santé des Femmes. Steven Outhouse, communications director for the Minister of Health said that Health Canada was prioritizing front-line services (Rabson, 2012). However, Anne Rochon Ford, Executive Director of the Canadian Women's Health Network stated that the biggest loss associated with these cuts will be "how the

groups went beyond clinical research to focus on how particular government policies and regulations affect the health of women” (Smith, 2012).⁹⁰

The Atlantic and Prairie Centres of Excellence for Women’s Health have already closed as a result of the budget cuts, while the remaining centres and organizations such as the Canadian Women’s Health Network and the National Network on Environments and Women’s Health are searching for other sources of funding in the hope of remaining open and continuing to conduct research (CWHN, 2013). Chi Nguyen, Chair of the Board of the Canadian Women’s Health Network criticized the funding cuts and remarked that

[t]he effect of this decision by Health Canada is yet another sign that the federal government is pulling away from its responsibility to gender equality. The work funded through the WHCP [(Women’s Health Contribution Program)] has been critical to ensuring that Canadian women have had access to the best evidence and policy advice on women’s health issues, through research that recognized social

⁹⁰ The Canadian Federation of University Women compiled a list of women’s organizations and programs whose funding has been cut or eliminated by the federal government since the Conservative government was elected in 2006. These organizations and programs include Aboriginal Healing Foundation (cuts affected several healing centres that focused on providing support to abused women, such as the Native Women’s Shelter of Montreal), Action travail des femmes, Alberta Network of Immigrant Women, Association féminine d’éducation et d’action sociale, Atlantic Centre of Excellence for Women’s Health, British Columbia Centre of Excellence for Women’s Health, Canadian Child Care Federation, Canadian Research Institute for the Advancement of Women, Canadian Women’s Health Network, Centre de documentation sur l’éducation des adultes et la condition féminine, Child Care Advocacy Association of Canada, Childcare Resource and Research Unit, SpecialLink the National Centre for Child Care Inclusion, Conseil d’intervention pour l’accès des femmes au travail, Elspeth Heyworth Centre for Women Toronto, Feminists for Just and Equitable Public Policy, First Nations Child and Family Caring Society, International Planned Parenthood Federation, Kelowna Women’s Resource Centre, Marie Stopes International (a maternal health agency that has received only a promise of “conditional” funding if it avoids any and all connection with abortion), MATCH International, National Association of Women and the Law, National Network on Environments and Women’s Health, Native Women’s Association of Canada, New Brunswick Coalition for Pay Equity (lost funding for advocacy and research), Older Women’s Network, Ontario Association of Interval and Transition Houses, Ontario Coalition for Better Child Care, Pauktuutit, Intuit Women of Canada, Prairie Women’s Health Centre of Excellence, Réseau action femmes, Réseau des tables régionales de groupes de femmes du Québec, Le Réseau québécois d’action pour la santé des femmes, Riverdale Immigrant Women’s Centre, Toronto, Sisters in Spirit, South Asian Women’s Centre, Tri-Country Women’s Centre Society, Womanspace Resource Centre, Women and Health Protection, Women for Community Economic Development in Southwest Nova Scotia, Women’s Innovative Justice Initiative – Nova Scotia, and Workplace Equity/Employment Equity Program (Canadian Federation of University Women, 2012).

and environmental determinants of health are key (Institute for Feminist Legal Studies, 2012).

These funding cuts have resulted in losing organizations that conduct important research, policy and advocacy work on women's health with a critical feminist lens (Armstrong et al., 2012). Dayna Scott, Director of the National Network on Environments and Women's Health reflected upon the funding cuts and that organizations will no longer be able to apply their expertise and offer important critiques to policy issues. "It is difficult to reconcile it with a genuine need or desire to protect health in the long-term and to take preventive strategies that move towards health promotion for Canadians" (Scott, 2012c).

Federal funding cuts also seriously impacted the Canadian Environmental Network which is one of the country's oldest and largest environmental groups. It was established in 1977 and represents over 640 diverse environmental organizations with support for networking, communication and coordination services (Canadian Environmental Network, 2013). The Canadian Environmental Network provided opportunities for representatives from environmental non-governmental organizations to "participate in federal government meetings, conferences, workshops and consultations on environmental policy issues through a transparent, bilingual and democratic delegate selection process" (Canadian Environmental Network, 2013). The federal government eliminated the \$547,000 in core funding to the Canadian Environmental Network in 2011 (Canadian Environmental Network, 2011; CTV, 2011).

The level of engagement as part of the Canadian Environmental Network falls under the public participation requirements of CEPA 1999 and with the funding cuts, there is no longer an organizational process to coordinate feedback from non-

governmental organizations (Lewis, 2011). The federal government cited responsible spending and sound management of tax dollars as the basis for their decision and suggested that Environment Canada will be moving towards web-based public consultation (Environmental Hansard, 2011). However, there was no explanation provided about the possible limitations of this process including barriers around socioeconomic status and geographic location, access to computers, and levels of computer literacy. Megan Leslie, MP for Halifax criticized this decision stating that

The cancellation of this funding is forcing the closure of one of the most critical environment networks Canada has. Environment Canada has senselessly ended a 34 year partnership with a respected organisation. The government has told [the network]...that this decision is part of a cost-efficiency plan, but given the important role this organization plays, cancelling their funding will likely have expensive, long-term consequences. This decision just doesn't make sense financially, and it will endanger the health and sustainability of our environment (Leslie, 2011).

Conclusions

This chapter continued to examine the relationship between theory and practice in its examination of Canada's regulatory regime for toxic substances. In doing so, the gaps which exist in Canadian law, policy and practice are revealed. It demonstrates the ways in which women are not adequately protected from detrimental health outcomes as a result of exposure to toxic substances, in part because the regime places the onus of responsibility on individual citizens, and in part because it does not recognize women as a susceptible population who are at risk as a result of exposure to toxic substances. The final chapter will synthesize the findings of the dissertation and provide recommendations based on the research findings including policy implications related to environmental health, breast cancer and disease prevention.

Chapter 6

Conclusions –

A Paradigm Shift: From A Reactionary to a Preventative Approach to Health Policy

Through my examination of the history of Canada's regulatory regime, it becomes clear that this research is steeped in politicized debates as it engages with issues central to women's health, risk and the environment. Davies and Sadler (1997: 19) found that "[p]ublic policy to achieve 'health for all' has yet to be translated into institutionalized processes that systematically address health issues at the policy, program and plan levels for decision-making." Despite substantive regulatory changes since 1997, including a revised *Canadian Environmental Protection Act* and the *Chemicals Management Plan*, these findings remain consistent sixteen years later with Canadian efforts for pollution prevention and precaution surrounding environmental health falling short. The significance of my research findings lies between the promise of precaution grounded in the regulatory regime and promoted by the federal government, and in exposing the gaps which exist in practice. These gaps result in an uneven protection which places women at risk for developing breast cancer. Women are not considered to be a susceptible population at risk as a result of exposure to toxic substances, and the influence of sex- and gender-related determinants of health are not adequately considered. At the same time, there is a gendered burden which places the onus of responsibility for preventing disease on individual women. My findings clearly demonstrate that despite being framed by the precautionary principle, Canadian law, policy and practice is not truly precautionary and does not enact a primary prevention approach.

Only a truly precautionary approach can be effective in protecting women's health. This approach would require shifting debates around causation upstream to focus on everyday exposures to toxic substances, while concurrently shifting the focus away from individual-level factors (Brown et al., 2006: 529). This concluding chapter will explore how primary prevention might be best reflected in Canadian health policy and its potential for positive health outcomes. By engaging with issues of risk, environmental justice, and viewing breast cancer as a multi-faceted social movement, the overarching theoretical framework and interdisciplinary approach allowed for an analysis which involved issues of gender, risk and precaution. The overarching goal of my research was not only to determine what legislation and policies exist within Canada's regulatory regime for toxic substances, but to examine how the issues are communicated and understood, where the burden of risk is presumed to lie, who the policies are designed to protect, and if the policies capture the need for prevention and action related to protecting women's health.

A paradigm shift is required in how the issues around breast cancer are communicated and understood, and where the burden of responsibility and risk is presumed to lie. The responsabilization paradigm and the trend towards individualization of risk clearly place the onus of responsibility in determining health outcomes on the individual. The dominant epidemiological paradigm is utilized by the biomedical community and the mainstream breast cancer movement to promote individual-level approaches to prevention, detection and treatment. This approach is promoted by government departments and mainstream cancer organizations and focuses solely on

modifiable risk factors such as tobacco and alcohol use, a lack of physical activity, and a healthy diet. The clear messaging in health promotion and public education campaigns is that breast cancer is preventable if individuals engage and participate in a “healthy lifestyle.” However, it is not made clear that the modifiable risk factors account for only a fraction of breast cancer incidence. The focus on lifestyle and behavioural risk factors excludes the possibility of other approaches and dismisses the importance of other social, structural, political, economic, and environmental factors that influence the disease.

The promotion of precautionary consumption practices acknowledges the potential role of toxic substances in health outcomes. However, risk is still framed as something that can be controlled by individual citizens through acts of green consumption in order to avoid everyday exposures to toxic substances. This practice is also highly problematic in placing the onus of responsibility at the level of the individual and in dismissing other social determinants of health including socioeconomic status and education, as well as creating a gendered and disproportionate burden on women. In both the dominant epidemiological paradigm and practices of precautionary consumption, individual citizens are encouraged to act and are framed as the “risk managers” that the federal government promotes (Government of Canada, 2011f).

Women would benefit from a repoliticization of breast cancer in order to shift away from the fundamental emphasis on lifestyle and behavioural risk factors, as well as from the widespread and consumption-based pink ribbon campaigns which are designed to raise a very specific type of “awareness.” Pink ribbon campaigns have resulted in the commercialization of breast cancer which presents the disease through a very restricted

and narrow lens. The efforts to raise awareness about breast cancer present a particular framing of the disease and do not encourage a more critical examination around the messaging of the campaigns, a lack of transparency in donated funds, and instances of pinkwashing. These pink ribbon campaigns divert attention from the realities of the disease, environmental links to breast cancer, and calls for primary prevention.

Environmental law, policy and practice are designed to protect and be representative of the entire Canadian population, but they are inadequate in protecting populations at risk including those who are highly exposed through occupational settings and in geographic areas that are highly polluted. Children's health emerged as a particular area of concern in the late 1990s, but this has not been reflected in the legislation as CEPA 1999 does not specifically address any populations of concern. Health Canada (2010c) does consider children as a vulnerable population in the *National Strategic Framework on Children's Environmental Health*. However, this method is contradictory as it does not include a lifecourse approach which allows for understanding the causal links between determinants of health throughout a person's life and health outcomes. It also does not account for windows of susceptibility that occur across the lifespan where the timing of exposure to toxic substances and stage of biological development can impact the development of diseases such as breast cancer.

Lalonde (1974: 18) noted with great foresight that "all the foregoing environmental conditions create risks which are a far greater threat to health than any present inadequacy of the health care system." *A New Perspective on the Health of Canadians* would benefit from a revised second edition with updated information on

environmental contaminants as determinants of health, the impact of sex and gender on health outcomes, and the role of primary prevention. Despite a provision in section 44(1)(f) of CEPA 1999 that requires the publication of reports on the state of the Canadian environment, this practice appears to have ceased since publications in 1991 and 1996. Both Standing Committees raised concerns about this during the CEPA 1999 legislative review and it would be advantageous to reinstate the practice of monitoring, reporting and disseminating the results about the state of the Canadian environment (House of Commons Standing Committee on Environment and Sustainable Development, 2007; House of Commons Standing Senate Committee on Energy, the Environment and Natural Resources, 2008). This process is a requirement for the Minister of the Environment, but it would be beneficial for Environment Canada to collaborate with Health Canada in order to address the current state of the Canadian environment, as well as the impacts of toxic substances on the environment and on human health.

Despite CEPA 1999 and the *Chemicals Management Plan* emphasizing the precautionary principle and the prevention of pollution, it is clear that the risk assessment and risk management processes are reactionary rather than precautionary. Firstly, the mandatory exposure requirement in determining the toxicity of a substance does not recognize inherent toxicity, and a toxic substance cannot be regulated for having the potential to cause harm. This process allows for harm to occur before a risk can be appropriately managed whereas a hazard assessment instead of or along with a risk assessment would offer room to evaluate the inherent toxicity and hazard of the substance, and its potential to cause harm in and of itself. Secondly, the risk assessment

and risk management process continues to be based on threshold values and the traditional dose-response relationship which suggest that threshold effects occur only at a specific level of exposure and that there is a toxicological threshold below which adverse effects do not occur. The basis of this aspect of risk assessment is problematic because it does not adequately account for the timing of exposure, windows of susceptibility, or the effects of low dose, cumulative and synergistic exposures to toxic substances including endocrine disrupting chemicals which have impacts below the traditional dose-response curve and threshold values. It also does not consider how sex and gender may impact the margins of exposure and how women may be a susceptible population.

Despite a formal commitment by the federal government, the Auditor General's report clearly demonstrates that sex- and gender-based analysis is not adequately integrated into policy development (Minister of Public Works and Government Services Canada, 2009). The role of sex and gender in influencing health outcomes is not reflected in Canadian law, policy and practice, and women are not considered to be a susceptible population of concern under CEPA 1999 or the *Chemicals Management Plan*. Public health policy and the regulatory regime for toxic chemicals lack the application of sex- and gender-based analysis which implies a gendered preference in their implementation and in the ability to protect women from health outcomes, such as breast cancer which is influenced by exposure to mammary carcinogens and endocrine disrupting chemicals. The budget cuts which formally eliminated federal funding for the Canadian Environmental Network and the Women's Health Contribution Program demonstrate a

continued devaluing of public engagement around environmental issues and of a commitment to women's health research and policy.

My dissertation concludes that Canadian law, policy and practice are not truly precautionary and do not capture the need for prevention and action related to women's health. Unless these gaps are adequately addressed in the federal regulatory regime, women will continue to be placed at risk. The importance of primary prevention in breast cancer cannot be overstated, and the current regulatory regime does not enact primary prevention. There is a need to bring the environment into public health discourse in a meaningful way which recognizes and fully understands the risks associated with exposure to toxic substances. An approach to health which embodies primary prevention must include sex- and gender-based analysis, as well as shifting the burden of risk and responsibility away from individual women. As Seager (2003: 957) suggests

[i]t has taken (and still takes) relentless pressure from environmental justice and women's health advocates to shift paradigms—to put human health issues on the mainstream environmental movement agenda and to put environmental issues on the health map. Even now, virtually all assertions of causality between health disruptions and environmental assaults are fiercely contested, all the more so when women are the primary proponents of linkage.

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