Report to the Legislature

Opportunities for Action on Toxic Chemicals: Recommendations of the Advisory Committee on Mercury Pollution for the formation of an Advisory Council on Toxics

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

Act 149 (2008) charged the Advisory Committee on Mercury Pollution (ACMP) with developing a recommendation to the Legislature regarding whether the jurisdiction of the ACMP should be expanded to include review of additional toxic substances.

By way of background, insufficient toxicity information exists on a significant proportion of the estimated 80,000 chemicals in commerce. This data gap has created a safety gap in that government agencies do not have the information needed to protect the public. Furthermore, these data and safety gaps have hindered the research on and development of safer alternatives and "green chemistry" technologies. The Advisory Committee concludes that toxic chemicals in consumer products and commerce pose a significant risk of adverse health effects ranging from neurological and developmental impacts in fetuses and young children to chronic disease and premature death.

An Advisory Council on Toxics, based on the model of the Advisory Committee on Mercury Pollution, can keep the Vermont Legislature abreast of the priority chemicals of concern to public health and the environment. As more toxicity information becomes available on certain chemicals, this will allow Vermont to act in a timely and appropriate manner to protect the public from existing and emerging threats.

KEY RECOMMENDATIONS

Pursuant to Act No. 149 (2008), the Advisory Committee recommends the creation of a new Advisory Council on Toxics (ACT) in place of the existing ACMP, to advise the Legislature, on an ongoing basis, on the regulation, abatement, and monitoring of toxic substances, including mercury, in products that are manufactured, sold, or distributed in Vermont, or in the environment, with the goal of protecting public health and the environment. The ACT would consult with state, national, and international jurisdictions for guidance on chemicals of high concern and advise the Legislature on specific actions that should be taken.

The Advisory Council would report annually and advise the Legislature on an ongoing basis on the following:

- Establishment of a list of chemicals of high concern to public health and the environment (especially to pregnant women and children), including but not limited to chemicals that are carcinogens, mutagens, reproductive toxins, endocrine disruptors, or persistent or bioaccumulative toxins. This list would be revised annually or as necessary.

- Actions or strategies to reduce health risks from exposure to chemicals of high concern (especially risks to pregnant women and children), and to reduce risks of harm to the natural environment. Such actions or strategies would include, but not be limited to, restriction on or prohibition of the distribution, sale, or use of these chemicals into Vermont, public disclosure requirements, and promotion of safer alternative chemicals.

- Potential costs of minimizing further risk and recommendations on how to raise funds needed to minimize the risks of exposure to toxic substances.

In carrying out these responsibilities, the ACT would coordinate with other states or jurisdictions that have developed lists of chemicals of high concern or have evaluated feasible alternatives to chemicals of high concern and participate in an interstate chemicals clearinghouse.

It is recommended that the ACT membership consist of the following:

- One member of a relevant committee of the Vermont House of Representatives.
- One member of a relevant committee of the Vermont Senate.
- One representative of the Vermont Department of Environmental Conservation.
- One representative of the Vermont Department of Health.
- One representative of the Vermont Attorney General's Office.
- One representative of a Solid Waste Management District.
- One representative of a college or university located in Vermont.
- One representative of the Vermont medical community.
- One representative of the Vermont manufacturing community.
- One representative of the Vermont retail community.
- One representative of a statewide consumer interest group.
- One representative of a statewide environmental group.
- One Vermont toxicologist**.**
- One scientist knowledgeable on matters related to toxic substances.
- One representative of the Vermont Agency of Agriculture, Food & Markets knowledgeable about the Agency's pesticides program.

INTRODUCTION

Act 149 (2008) charged the Advisory Committee on Mercury Pollution with developing a recommendation to the Senate and House Committees on Natural Resources and Energy and the House Committee on Fish, Wildlife and Water Resources and the Senate Committee on Health and Welfare regarding whether the jurisdiction of the Advisory Committee on Mercury Pollution (ACMP) should be expanded to include review of additional toxic substances.(See Appendix 1). The report is to include:

- A summary of existing Vermont programs and entities that identify or address the use and risks posed by harmful toxic substances.
- A summary of how other states identify and minimize the risks posed by harmful toxic substances.
- A recommendation as to whether the jurisdiction of the ACMP or any other existing program or state agency should be expanded to include review of additional toxic substances.
- If a recommendation is made to expand the jurisdiction of the ACMP or any other Vermont program or state agency:
  - A recommendation as to the toxic substances or categories of toxic substances that should be added to the jurisdiction of the ACMP, or if relevant the jurisdiction of any other Vermont program or state agency, including an explanation of the criteria employed to review and identify such substances;
  - Recommended statutory changes to the ACMP's statutory charge under 10 V.S.A. § 7113 or changes to the statutory charges of any other Vermont program or state agency, including an analysis of the impact of such expansion relative to the ability of the committee, program, or state agency to meet its current responsibilities.
  - A recommendation how to improve the toxics use reduction and hazardous waste reduction programs established under 10 V.S.A. Chapter 159;
  - A recommended date to which repeal of the ACMP should be extended; and
  - The estimated cost of expanding the jurisdiction of the ACMP or other Vermont program or state agency, including identification of additional resources that would be required for implementing the expanded jurisdiction.

The Committee met seven times beginning in June 2008. As part of the Committee's work, the Committee interviewed representatives of toxic substances programs of several Vermont state agencies and departments; the Maine Department of Environmental Protection and Washington Department of Ecology, and one representative of a non-governmental organization knowledgeable about European Union toxic substance directives.

Given the relatively short amount of time that the Committee had to conduct its study and develop its report, the Committee relied heavily on reports from the following organizations: University of Massachusetts at Lowell Center for Sustainable Production[1], Maine Governor John Baldacci's Task Force to Promote Safer Chemicals in Consumer Products[2], The Centers for Occupational and Environmental Health, University of California, Berkeley[3], and the Department of Toxic Substances Control, California Environmental Protection Agency[4]. These reports involved extensive literature review and/or public comment. The Committee feels that is has availed itself of current and comprehensive information on toxic chemical science and policy from leading institutions and agencies.

DEFINING THE TOXIC CHEMICAL PROBLEM: A SURVEY OF TOXIC CHEMICAL KNOWLEDGE, POLICIES, AND PROGRAMS

The recent and seemingly endless stream of media coverage of chemically tainted toys and children's products, consumer product recalls, and tainted foods serves as a reminder of the pervasiveness of toxic substances in consumer products. Many consumers have a false sense of security that all consumer products are monitored and regulated by the government to ensure our safety – yet the reality is that there are significant voids in this safety net.

Although Vermont and the nation as a whole have made great strides in cleaning up the air, land, and water from toxic and hazardous chemicals over the last four decades, our existing laws and regulations continue to focus on an industrial system that primarily manages only the residuals and byproducts of product manufacturing and the disposal of products at the end of their life. This end-of-pipe approach has largely ignored the input side of the equation. Despite all of the regulation and effort to provide a clean and safe environment, we find ourselves facing new environmental heath and safety risks posed by the products society uses and discards each day that include:

- Uncertainty about the safety of chemicals contained in products manufactured around the world;
- Limited information about chemical ingredients and their potential human health risks
- Poorly conceived chemical bans that do not consider the overall safety of chemical substitutes that may have another set of potential health impacts;
- Vast resources spent at the federal, state, and municipal levels to manage hazardous chemicals that are released into the environment and the costs to society for environmental remediation, waste recycling, and disposal of these, not to mention the public health cost of worker and public exposure to toxic chemicals.

The new movement to "green chemistry" and the designing of toxic chemicals out of products in the first place show promise as a strategy of the future to address the concerns listed above. Programs like California's Green Chemistry Initiative offer a paradigm shift toward a healthier and more economically sound future.

"The primary law in the United States that regulates industrial manufacture and use of chemicals, called the Toxic Substances Control Act (TSCA), is now 30 years old and has proved largely ineffective in restricting problem chemicals in commerce or in minimizing and mitigating their harm to humans and the environment. It has also failed to effectively stimulate the development and marketing of safer chemicals and products. Basic toxicity information that is publicly available exists for only a small percentage of the thousands of chemicals in commerce."

Options for State Chemicals Policy Reform, Lowell Center for Sustainable Production[5]

As a result of weaknesses in federal policy, the human health and environmental impacts of the great majority of the 80,000 industrial chemicals in commerce in the U.S. today are largely unknown. Each day, 42 billion pounds of these chemicals are produced or imported into the U.S. An estimated 1,000 new chemicals are introduced into commerce each year. Global chemical production is doubling every 25 years.[6]

The lack of information on the health and environmental impacts of most chemicals and products means that neither consumers nor businesses can choose the safest products for their needs.

The passage of the federal Toxic Substances Control Act (TSCA) in 1976 was intended to provide a framework for federal regulation of chemicals found to present an "unreasonable risk" of injury to health and the environment and encourage industry to develop adequate data "with respect to the effect of chemical substances and mixtures on health and the environment." TSCA has, however, failed to achieve these goals for the 62,000 chemicals in use at the time of its passage (which were "grandfathered"), as well as for new chemicals developed since passage.

…EPA had managed to review the risks of about 1,200 or 2% of the 62,000 chemicals.

With the exception of one class of chemicals (PCBs or polychlorinated biphenyls) that were of particular concern at the time of enactment, TSCA does not require EPA, the administrating agency, to review the risks of existing chemicals in commerce. EPA has the discretionary authority to issue "testing orders" to chemical manufacturers, but only after it has met its burden of "substantial evidence" that the chemical may present "unreasonable risk."[7]

Since 1976, EPA has issued testing orders for fewer than 200 of the 62,000 chemicals that were in production in 1979[8].

The Government Accountability Office (GAO), which has been critical of TSCA's shortcomings, reported that EPA had managed to review the risks of only 1200 or 2% of the 62,000 chemicals then in use. EPA reported that about 16,000 (26%) of these chemicals were of potential concern on account of their production volume and chemical design. This body of chemicals in existence as of 1979 still constitutes the great majority of chemicals in production today (by volume).[9]

While EPA's record of review of new chemicals (since 1979) is somewhat better, there is similarly no requirement in TSCA that they be tested for safety. TSCA simply requires manufacturers to submit pre-market notifications (PMNs) and has acknowledged that 85% of PMNs lack data on chemical health effects, and 67% lack health or environmental data of any kind.

Even when data exist demonstrating the need for regulation of a toxic chemical, few regulatory actions are taken. Since 1976, EPA has only taken final regulatory action to restrict the use of five chemical classes (PCBs, CFCs, dioxins, asbestos and hexavalent chromium). EPA has banned no chemical from use in over 18 years. EPA's regulation of asbestos, promulgated after the agency spent ten years gathering evidence, was overturned in federal court because EPA failed to meet its burden of proof under TSCA.[10]

The Data Gap, Safety Gap and Technology Gap

The landmark report of the University of California Berkeley entitled, *Green Chemistry in California: A Framework for Leadership in Chemicals Policy and Innovation*[11], defined three frequently cited gaps in TSCA that have "created a broad set of problems for public and environmental health, industry, and business."

The Data Gap

EPA has made limited progress in closing the data gap under its High Production Volume (HPV) Chemical Challenge, in which chemical manufacturers voluntarily submit "screening level" toxicity data for about 3000 chemicals produced or imported at more than one million pounds per year. Screening level information is not comprehensive enough on which to adequately inform business or consumer choices.

The Data Gap has produced a skewed chemicals market in which products compete on all attributes except safety. As a result:

- Consumers are largely unable to choose products on the basis of their potential health and environmental impacts.
- Businesses and manufacturers have limited information with which to identify and eliminate hazardous chemicals and products in their supply chains.
- Public agencies have insufficient information to identify chemical hazards of highest priority for human health and the environment.
- The deterrent function of the product liability and workers' compensation systems is undermined.[12]

Finally, without information on chemical hazards or uses, neither the market nor public agencies can stimulate or reward the development and commercialization of safer alternatives.

DATA GAP
Lack of comprehensive and standardized information on the toxicity and ecotoxicity of most chemicals

SAFETY GAP
Government agencies do not have the information they need to systematically prioritize chemical hazards nor the legal tools to efficiently mitigate known hazards

TECHNOLOGY GAP
Lack of both market and regulatory drivers to motivate U.S. chemical producers and entrepreneurs to develop green chemistry technologies[13]

The Safety Gap

Chemical producers are not currently required to assume full responsibility for the health effects and environmental consequences that can occur over the life cycle of their products. As a result, there is little incentive to minimize potential hazards associated with the manufacture, use or disposal of chemicals and products. Without sufficient data to inform the demand for safer products, or a system for product stewardship, public agencies are limited to regulating the use and disposal of existing chemicals and products, rather then taking preventive measures.[14]

The Technology Gap

The difficult transition from concept to commercial application of green chemistry requires that a company conduct extensive research and development, make large capital investments, and assume the risks of being a leader in an emerging field. The market and regulatory weaknesses caused by the data and safety gaps, together with organizational inertia within industry and a lack of public and private investment in green chemistry research and education, all make companies reluctant to take such risks. These factors are producing a green technology gap that could have long-term implications for U.S. competitiveness in the global market for chemicals and products.[15]

Toxic Chemicals and Public Health Concerns

The U.S. Centers for Disease Control and Prevention has an ongoing biomonitoring program to assess levels of industrial chemicals in the U.S. population. In 2005, in the most comprehensive biomonitoring study ever conducted on Americans, 148 chemicals were found in the blood and urine of the sample population. In a 2005 study by the Environmental Working Group, ten babies in the U.S. were tested for the presence of 413 industrial chemicals in cord blood. A total of 287 chemicals were detected. Of these, 212 were banned industrial chemicals and pesticides that still persist in the environment, and 47 were chemicals currently found as ingredients of consumer products.[16,17]

Table 1 contains examples of some of the chemicals that have been detected in umbilical cord blood, breast milk, and adult blood, urine and tissue samples, along with their known sources and exposure routes. Many of these substances are known or probable human carcinogens, reproductive or neurological toxicants, or all three. For a number of these chemicals, including lead, organophosphate and organochlorine pesticides, and phthalates, mean concentration levels in children were higher than in adults. The reasons for this are not fully understood. Other common chemicals detected were polybrominated diphenyl ethers or PBDEs, perfluorinated chemicals (PFCs) and bisphenol A.[18]

Phthalates are chemicals found in nail polish, beauty products and PVC plastic; they are hormone- or endocrine-disrupting chemicals that threaten reproductive health, particularly in males. PBDEs are a major class of brominated flame retardants added to casings for TVs, computers, and other electronics; they can affect thinking and learning abilities, reproductive development, and thyroid function and may cause liver tumors. Some states, such as Maine, have taken action to restrict or ban certain PBDEs. PFCs are synthetic chemicals such as Teflon used in non-stick cookware and fabrics. They have been associated with liver damage, immune and endocrine system disruption, and are likely human carcinogens. Bisphenol A, of recent media notoriety, is a component of plastics used in baby bottles and water bottles; it is a potent endocrine disrupting chemical at very low doses, is suspected of causing reproductive damage and birth defects and is implicated in prostate and breast cancers.[19]

TABLE 1. SELECTED EXAMPLES OF TOXIC SUBSTANCES FOUND IN UMBILICAL CORD BLOOD, BREAST MILK AND ADULT TISSUES

Contaminant	Examples of known sources	How people are exposed
Volatile Organic Compounds		
Naphthalene	Vehicle exhaust, deodorizers, paints, glues	Outdoor and indoor air, drinking water, workplaces
Perchloroethylene	Dry cleaning solvent, degreasing products	Treated clothing, proximity to dry cleaners, workplaces
Benzene	Gasoline, glues, detergents, vehicle exhaust	Outdoor air, workplaces
Agricultural Products		
Organophosphates	Pesticides, flea & tick pet products	Food, proximity to agriculture, field work, and indoor air
Atrazine	Herbicide	Good, water, proximity to agriculture, field work
Persistent Organic Pollutants		
Polybrominated diphenyl ethers (PBDEs)	Frame retardants in furniture and electronics	Food, indoor air and dust
Dioxins & Furans	Byproduct of waste incineration, paper mills, manufacturing	Food, outdoor air, drinking water
PFOA/PFOS	Non-stick and stain resistant coatings	Consumer products, food, water, workplaces
Plastics Components		
Phthalates	Cosmetics, detergents, household cleaners, vinyl materials, lacquers	Skin contact, indoor air, food, soft plastics
Bisphenol A	Hard plastic containers, canned food linings	Food, air, water, workplaces
Heavy Metals		
Cadmium	Batteries, fertilizer production, waste incineration, plastics, metal coatings	Food
Lead	Paint, electronics, batteries, fossil fuels	Toys, food soil, drinking water, workplaces

Over 100 synthetic chemicals have been detected in umbilical cord blood, human breast milk, and tissues of adults. Many of these chemicals are known or probable carcinogens, reproductive or neurological toxins or all three.[20]

Mean concentration levels in children were higher than in adults – the reasons for this are not fully understood.

Many of these same chemicals, as with lead and mercury, are persistent and bioaccumulative toxins (also known as PBTs). They resist breakdown and can remain in the environment for decades, even centuries, concentrating in the food chain. As an example, even though PCBs and DDT have been banned for decades, they continue to be found in children born today. PBTs are priority chemicals of concern consistently recognized by national and international health and environmental agencies. The ability to bioaccumulate (or biomagnify) and persist (not be broken down or excreted by the body) exacerbates the problem of even low environmental concentrations of chemicals and has serious implications for intergenerational transfer to offspring.[21]

CASE: FLAME RETARDANTS

The polybrominated diphenyl ethers (PBDEs), a class of persistent and bioaccumulative chemical flame retardants, are added to many consumer products, including furniture, computers and televisions. PBDEs are found in humans and wildlife around the world; over the last 30 years, their levels have increased about 100-fold in human blood, breast milk, and tissues. Women in California have some of the highest levels of PBDEs measured in breast milk, levels which are approaching those associated with adverse health effects in experimental animals.

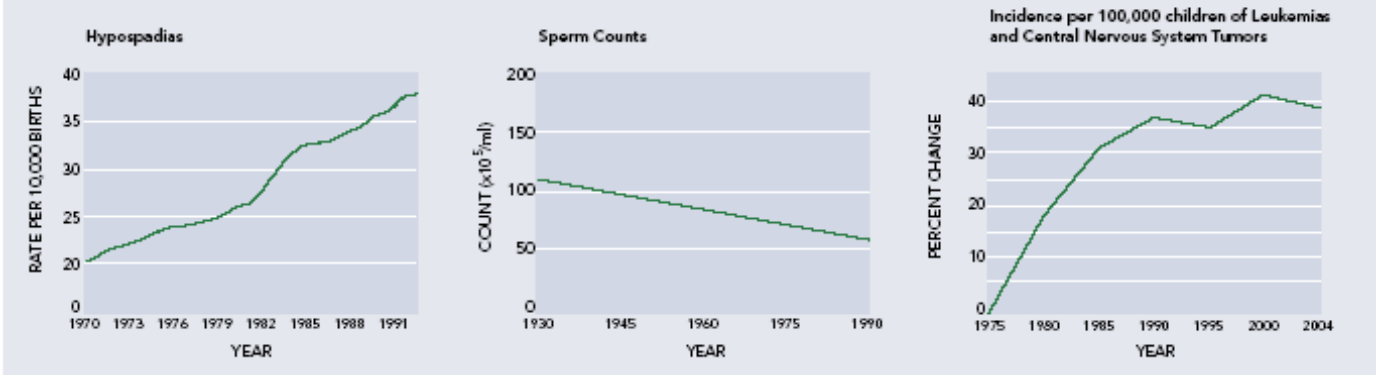
These effects include permanent learning and memory deficits in the offspring of exposed animals, changes to male and female reproductive structure and function, and low thyroid hormone levels, which impairs fetal brain development.

Using a persistent, bioaccumulative substance in products designed to come into close contact with people is inherently problematic. If asked to do so, chemical producers will prioritize the development of more appropriate flame retardant technologies.[22]

Chemical Exposure in Children

A growing body of evidence suggests that chemical exposures are of particular concern for fetuses and young children because they are in vulnerable stages of development. These stages include the cascade of hormone signals that guide reproductive development and the connections that occur among billions of neurons in the developing brain and nervous system. The blood- brain barrier remains relatively permeable well into the first year of life and allows passage of synthetic chemicals from the bloodstream directly to the infant's developing brain and nervous system. The vast majority of chemicals to which children are commonly exposed have never been examined for their long-term effects on the developing brain.[23]

FIGURE 1. TRENDS IN REPRODUCTIVE HEALTH AND CHILDHOOD CANCERS, UNITED STATES



The incidence of certain pediatric and reproductive health disorders in on the rise, including hypospadias, reduced sperm count (variable by region), and the childhood cancers that are mot commonly linked to chemical exposures.[24]

Research suggests that rates of childhood illness with potential links to environmental contamination are on the rise. In place of infectious disease as a leading cause of childhood illness and death, a group of chronic conditions of multifactorial origin – including asthma, cancer, and neurodevelopmental and behavioral disorders - may be linked in part to environmental pollutants. EPA has also acknowledged this link.[25]

Worker Exposure and Safety

Workers in some occupations are also particularly vulnerable to chemical exposure at higher concentrations than the general public. The document for conveying chemical hazard information to workers, the Material Safety Data Sheet (MSDS), requires limited information on the health effects of chemicals, and is widely recognized as inadequate for worker protection. Health effects of chemical mixtures are even less known. There are Permissible Exposure Limits (PELs) for just 7% of the nearly 3,000 HPV chemicals.[26]

Costs

Although this report makes no attempt to quantify the societal and economic costs of toxic chemical exposure, research and studies by other state agencies suggest the potential enormity of these costs. The direct and indirect medical costs to treat each cancer case, the educational costs for managing learning disabilities in our schools, and the loss of worker productivity are a few examples.

In addition to these costs, exposure to neurodevelopmental toxic substances can have a lifelong impact on IQ, worker productivity and income. One study estimates that the benefit of a relatively small reduction in blood lead levels of children would result in $7 billion (in 1994 dollars) decrease in medical costs and compensatory education. Similar reductions in lead levels in the adult population would result in a $10 billion savings in medical costs and lost wages. The economic cost of prenatal exposure to methyl mercury, a PBT chemical, was estimated to be $9 billion annually, associated with loss of IQ, and $298 million for the associated increase in mental retardation.[27]

A Note on Nanotechnology

The same novel physical, chemical and biological properties of engineered nanomolecules or nanoparticles (billionth of a meter in diameter) that make them effective may also produce new hazards for human health and the environment.

Nanoparticles are already present in many commercial chemical products, including toothpaste, sunscreen, tires, and washing machines. They may one day play a large role in drug delivery for diseases such as cancer. On the other hand, nanoparticles have been shown to exhibit toxic effects in rodent studies. The Committee did not fully review nanotechnology; but considers it a special category deserving of further attention.[29]

. . . the Material Safety Data Sheet requires limited information on the health effects of chemicals and is widely recognized as inadequate for worker protection.

ENDOCRINE DISRUPTORS: ALTERNING THE BODY'S SIGNALS

A growing body of evidence indicates that certain synthetic chemicals commonly found in consumer products can disrupt the endocrine system, a complex network of hormones that affect the development of all organs in the human body. Even small alterations in hormone levels by endocrine disrupting chemicals (EDCs) can affect development of the body's neurological, reproductive and metabolic systems. These alterations can produce permanent changes, affecting the body's responses to food, chemicals and hormones even later in life. Early research suggests that this "reprogramming" may contribute to obesity, prediabetic insulin resistance and breast and prostate cancers. Strikingly, evidence from animal studies suggests that the effects of EDCs are heritable; that is, passed on through as many as four generations after an animal is briefly exposed during fetal development.[28]

EPA has made limited progress in reducing the data gap on toxic substances since TSCA. As previously mentioned, the High Production Volume (HPV) Challenge to the chemical industry is starting to provide screening level toxicity information for about 3,000 chemicals. Under a new voluntary data gathering initiative, the Chemical Assessment and Management Program (ChAMP), EPA has committed to completing screening level hazard and risk characterizations of 6,750 chemicals produced above 25,000 pounds per year. The U.S. approach to the data gap has been voluntary, whereas with mandatory programs, Canada and the European Union are viewed as leaders in chemical policy reform.

Canada

The Canadian Environmental Protection Act of 1999 required categorization of 23,000 chemicals on the Domestic Substances List. Categorization occurred by the September 2006 deadline and domestic substances were prioritized based on exposure potential or persistence, bioaccumulation, and inherent toxicity. A total of 4,300 substances have been identified for further study/action, and 200 substances have been identified as priority chemicals (See Appendix 2). Information is being published on these chemicals on an ongoing basis with a three-year date for completion. The chemical industry will be required to provide information through manufacturing surveys.[30]

European Union: REACH

The European Union's Directive known as REACH (Registration, Evaluation, and Authorization of Chemicals) is the most far-reaching mandatory program aimed at closing the data, safety, and technology gaps for chemicals in commerce. REACH took effect on June 1, 2007, and will eventually address about 30,000 chemicals. Its development and implementation have been closely followed in the U.S. because it will affect chemical exports to the EU, and U.S. industry must comply. REACH has four major elements that are described below.

Pre-registration: Within 18 months, all chemical manufacturers and importers of chemicals in amounts greater than one ton per year (about 30,000 chemicals) must submit simple technical information to the new European Chemicals Agency (ECHA).

Registration: Chemical manufacturers and importers must formally register their chemicals and submit specific chemical safety data for chemicals manufactured at greater than 10 tons per year. The Regis

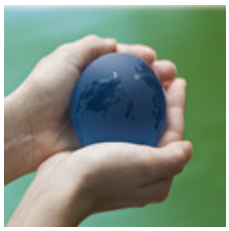
tration process will be phased in over 3 years, 6 years and 11 years. This will close the data gap for the larger production volume chemicals.

Evaluation: Chemical safety reports will be evaluated and additional information can be required. If risks are not adequately controlled, then a restriction process may be used.

Authorization: This is essentially a ban on chemicals of very high concern, with exemptions allowed for specific uses. Once a chemical is selected for authorization, a date will be set for when its use will be phased out. Those who wish to continue the chemical's use must apply for authorization. This presumptive ban will apply to the following categories of chemicals: known and probable carcinogens, mutagens and reproductive toxins, very persistent and very bioaccumulative chemicals, and substances of equivalent concern.[31]

In October 2008, ECHA officials proposed an initial candidate list of 16 substances of very high concern (SVHCs), which are the chemicals subject to the authorization process (See Appendix 2).

ChemSec, a Swedish non-governmental organization, has developed its own preliminary version of the candidate list in an effort to accelerate the process of adding SVHCs. ChemSec has termed the list "SIN List 1.0" (an abbreviation for "Substitute it Now"). The SIN List includes 267 carcinogens, mutagens, reproductive toxins, and PBTs already designated by EU authorities as meeting the criteria for listing.[32]



European Union: RoHS Directive

The EU RoHS directive (Regulation of Hazardous Substances) became effective July 1, 2006 and restricts six substances in electrical and electronic equipment: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenols, and polybrominated diphenyl ethers. RoHS restricts the content of these substances in products with some exemptions. RoHS is having a major impact on electronic product design and material content, including the supply chain for product manufacturers. The RoHS directive is currently undergoing revision, with 46 possible newly restricted substances. A companion EU directive known as WEEE (Waste Electronics and Electrical Equipment) is mandating manufacturer responsibility for products at end of life. Following in the footsteps of the EU, China has adopted a similar RoHS initiative. Both programs have product labeling requirements for RoHS-compliant products.

Significant State Chemical Policy Reform Initiatives

The states of Maine, Washington and California are the first states to adopt elements of chemical policy reform to begin closing the data, safety, and technology gaps.

Maine

In Maine, the report of the Governor's Task Force to Promote Safer Chemicals in Consumer Products in 2007 led to the passage of the "Act to Protect Children's Health and the Environment from Toxic Chemicals in Children's Products" in April 2008. The Act calls for the publication of a list of chemicals of high concern and authorizes the Maine Department of Environmental Protection (DEP) to designate chemicals of high concern as high priority for chemical use restrictions and bans provided that DEP can demonstrate that safer alternative chemicals are technically and economically feasible for substitution in products and public exposure to the chemical can be demonstrated. DEP can request chemical toxicity information from a manufacturer. At the present time, DEP is working on developing a list of chemicals of high concern. Although Maine's statute is restricted to children's products, the definition is broad and includes "any consumer product intended for use by children, such as baby products and clothing, and any consumer product containing a chemical of high concern that when used or disposed of will likely result in a child's or a fetus's being exposed to that chemical" By January 1, 2011, at least two chemicals must be designated as priority chemicals. Any manufacturer or distributor of a children's product must notify DEP of products containing these chemicals and the amounts. DEP is authorized to participate in an interstate chemical clearinghouse to assist the state in identifying priority chemicals as well as safer alternatives to these chemicals.

Other recent legislation in Maine relating to chemical safety includes restriction of lead in children's toys; promotion of safe chemicals in schools, in which allowed cleaning products must meet third- party certification as environmentally safe; and restrictions on the content of penta and octa mixtures of PBDEs in products, as well as restrictions on the sale of mattresses, furniture, and TV and computer housings containing deca PBDE mixtures.[33]

Washington State

The State of Washington passed the Safe Children's Product Act of 2008 which calls for the virtual elimination of phthalates, lead, and cadmium in children's products. Children's products include cosmetics, jewelry, toys, and other products intended for or marketed to children under the age of 12. The Act also calls for the state to identify, by 2009, high priority chemicals that are of high concern to children found through biomonitorng to be within the human body, present in household dust, drinking water, or otherwise in the home environment. The Act also requires manufacturers of products with high priority chemicals to provide notice to the state. Children's products or product categories that may contain these chemicals will be identified and a report issued with policy options for addressing the presence of these chemicals in children's products.

Other recent legislation in Washington related to chemical safety include restrictions on the sale of products containing PBDEs and mattresses containing deca PBDE, along with a requirement that the Department of Ecology study alternatives to PBDEs; another act requires the development of "chemical action plans" for PBTs and mercury.[34] . A list of PBTs subject to chemical action plans has been developed (See Appendix 2).

California's Green Chemistry Initiative

In April 2007, the California Department of Toxic Substances Control, part of the California Environmental Protection Agency, began a Green Chemistry Initiative, a partnership between government and industry whose mission is to work collaboratively to fill gaps in chemical safety information and promote the use of green chemistry to find alternatives to harmful chemicals currently in use. The California Green Chemistry Initiative Final Report (December 2008)[35] contained six policy recommendations intended to shift chemicals policy from end-of-pipe cleanup to up-front design and prevention, foster innovation, and drive market changes toward a more sustainable economy. They include:

- Expanding pollution prevention to assist California businesses to lead the world in greener design and production
- Develop green chemistry workforce education and training, research and development and technology transfer to meet global demand for greener materials and products
- Creating an Online Product Ingredient Network to disclose chemical ingredients in products sold in the state to allow consumers and businesses to make safer choices
- Creating an online toxics clearinghouse to increase knowledge about toxicity and hazards for chemicals
- Accelerating the quest for safer products to make the transition to more sustainable, safer products more quickly using science-based alternative analysis and lifecycle thinking
- Moving toward a "cradle-to-cradle" economy to leverage market forces to produce products that are "benign-by-design."

According to California's Secretary for Environmental Protection states that: "The six recommendations developed through the California Green Chemistry Initiative constitute a far-reaching, market-driven strategy with an ambitious aim – the launch of a new chemi-

ONE STATE'S APPROACH TO PBTs

Washington State Department of Ecology (Ecology) has established a rule (Chapter 173-333 WAC) that contains a list of identified persistent, bioacuumulative toxins (PBTs) and specified actions that can be taken to reduce releases of these chemicals and phase out their use if appropriate. Through the issuance of Chemical Action Plans (CAPs), Ecology can restrict or phase out the use of any listed PBT following established criteria and public involvement.

In 2006, a CAP was issued for a class of polybrominated diphenyl ether flame retardants (PBDEs), recommending a statutory prohibition of the sale and manufacture of PBDEs. The following year, the Washington State Legislature enacted a law banning the manufacture and sale of products containing PBDEs, with certain exceptions.

In signing a bill in 2007 banning phthalates in toys, Governor Schwarzenegger-stated that: "[a] comprehensive and unified approach [to chemicals] is needed to ensure good accountable policy."

cals framework and a quantum shift in environmental protection."

Bills have already been signed into law in California that will put into place two recommendations of the report. One law, AB 1879, requires the Department of Toxic Substances Control to adopt regulations by January 1, 2011, to identify and prioritize chemicals of concern, to evaluate alternatives, and to specify regulatory responses where chemicals of concern are found in products. The other, SB 509, requires an online, public Toxics Information Clearinghouse to be created that includes science-based information on the toxicity and hazards of chemicals in products.

The California report goes on further to conclude:

"The California Green Chemistry Initiative is an opportunity to accelerate technical innovation in materials science. It can catalyze research at California universities. It can help create the solutions needed to curb global warming and meet the goal of 30% reduction in greenhouse gas emissions by 2020."

In 2005, California passed the first law requiring disclosure of chemical ingredients, particularly carcinogens and reproductive toxins, in cosmetic products. In 2006, landmark legislation was passed that makes California the first state to measure and catalogue human exposure to chemicals. In signing a bill in 2007 banning phthalates in toys, Governor Schwarzenegger stated that "[a] comprehensive and unified approach [to chemicals] is needed to ensure good accountable policy." California has a bill restricting lead in jewelry and penta and octa PBDEs in various consumer products. A law requiring a phased transition away from the carcinogenic drycleaning chemical, perchloroethylene to safer alternatives has also been enacted.[36]

Vermont

In 2008, Vermont passed Act 171, An Act Relating to Phthalates in Products for Young Children. This law restricts the sale of children's toys and childcare articles containing more than 0.1% (by weight) of several plasticizing chemicals or phthalates, which are endocrine-disruptors. These include di-(2-ethylhexly phthalate (DEHP)), dibutyl phthalate (DBP), benzyl butyl phthalate (BBP), diisononoyl phthalate (DINP), diisodecyl phthalate (DIDP), and di-n-octyl phthalate (DnOP). It also requires manufacturers to use the least toxic alternatives when replacing phthalates and prohibits replacement with carcinogens or reproductive toxins.

In 2008, Vermont also passed an Act Relating to Prevention of Lead Poisoning by Exposure to Lead in Consumer Products. This law prohibits the sale of any children's product that contains lead and further restricts jewelry containing lead. The law requires the phase-out of tire wheel weights containing lead. It prohibits the sale of solder or flux containing lead (0.2% limit) and plumbing fixtures containing lead (0.25%)

Since 1991, Vermont has had a law restricting the sale of packaging or packaging components including inks, dyes, pigments or other additives containing lead, cadmium, mercury, or hexavalent chromium. Many other states have similar laws and a Toxics in Packaging Clearinghouse has formed to assist states with effectively implementing the restrictions on heavy metals in packaging.

Vermont's mercury product laws (10V.S.A. Chapter 164) restrict the sale of products containing mercury and require manufacturer notification and product labeling for mercury-added products. Numerous products containing mercury are banned from sale in the state, including mercury thermostats, fever thermometers, electrical switches, and numerous mercury-added measuring devices.

The Interstate Mercury Education and Reduction Clearinghouse (IMERC) assists numerous states in the implementation of similar mercury product laws.

Efforts to Establish an Interstate Chemicals Clearinghouse

Seeing the need to better catalogue chemical toxicity/safety data and technical research data on safer chemical alternatives, and to collaborate and pool scarce technical and financial resources, several states and institutions are organizing an interstate chemicals clearinghouse.

Under the leadership of the Lowell Center for Sustainable Production, nine states began meeting in October 2008 to develop a proposal for a clearinghouse to serve the needs of the states, particularly those states with laws requiring the development of priority chemicals lists and requirements to assess safer alternatives. California, Connecticut, Maine, and Washington (and possibly others) have statutory authority to participate in an interstate chemicals clearinghouse.

Since October, a mission statement, proposed clearinghouse functions, and a Memorandum of Agreement for state participation have been drafted. Some state funding has been secured through states for initial startup and a fiscal agent has been identified (Northeast Waste Management Officials' Association, of which Vermont is a member). The proposed functions of the Clearinghouse include:

- Sharing data and information on use, hazard, exposure, and safer chemical alternatives.
- Sharing strategies and outcomes on chemical prioritization initiatives.
- Supporting state program development and implementation.
- Building state capacity by sharing materials, strategies, and trainings.
- Assisting the states in meeting the information needs of businesses, consumers, and the public.

Review of Vermont State Programs Addressing Toxic Chemicals

The Advisory Committee conducted interviews with all of the major programs in Vermont state government dealing with toxic chemicals, including the Departments of Public Safety, Environmental Conservation, Labor, and Health, and the Agency of Agriculture, Food and Markets. Included below is a synopsis of these programs. Appendix 3 contains additional information about these programs.

Agency of Agriculture Pesticide Management Program

At the federal level, pesticides are governed by FIFRA (Federal Insecticide, Fungicide and Rodenticide Act) which is administered by EPA. In Vermont, the Agency of Agriculture, Food & Markets (AAFM) has authority for regulation and enforcement regarding pesticides, including pesticide wastes.

Pesticides are registered at the federal level by EPA for distribution, sale and use, after an evaluation of human and environmental health effects. Potential registrants must provide data to EPA according to EPA test guidelines. Vermont can further restrict availability and is much more restrictive than EPA in permitting pesticide use. AAFM prepares an annual report of restricted pesticide use statewide. Vermont pesticide use reporting is progressive in this respect compared to many states. Farms are not required to report but must maintain records. Some of the largest uses of pesticides by volume are cooling towers (biocides), corn crops, golf courses, and Christmas tree farms.

The Pesticide Advisory Council was established to review pest control programs in the state (including insect, plant and noxious wildlife) and assess the effect of these programs on human health and the environment, including recommendations for greater safety and efficiency, with a goal of reducing pesticide use in the state. Among its functions, the Council reviews and approves right-of-way herbicide treatment applications as well as pesticide management plans for golf courses.

Pesticides are one of the few categories of toxic chemicals for which toxicity information is required prior to approval for use. This should not be surprising,

since the intended purpose of pesticides is as a toxin or poison. EPA has curtailed the use of some higher risk pesticides, phasing out the residential use of two moderately toxic pesticides, diazinon and chlorpyrifos, and cancelled the registration of 17 other organophosphate pesticides.

Critics have pointed out shortcomings in EPA toxicity testing criteria for pesticides. There are concerns that the health hazards of pesticides, particularly for children, are not tested for. Food-use pesticides are also not tested for neurotoxicity. Although EPA has validated Developmental Neurotoxicity testing (DNT) protocol, very few pesticide active ingredients have been tested. A 2006 EPA Inspector General Report recommended that EPA take steps to improve its pesticide risk assessment protocol for children.

There are also concerns about consumer products that are pesticide treated, such as repellant-treated clothing and anti-microbial toys that are not regulated under FIFRA. Many common household cleaning products are also not FIFRA-regulated.

Department of Labor – VOSHA

Vermont administers the federal Occupational Safety and Health Act for worker safety. The program does not regulate worker safety per se, but rather employee exposure to chemicals. This report has already described the potential shortcomings in the federal program to adequately assess toxic chemicals – only 600 workplace chemicals have Permissible Exposure Limits (PELs) and only 30 chemicals have expanded health standards. Although Material Safety Data Sheets (MSDS) are required for every product with hazardous ingredients, this requirement is not always met by product manufacturers. In addition, MSDSs are often inadequate in health and safety information.

Department of Public Safety – Tier II Chemical Reporting

Tier II chemical reporting is a federal requirement that stems from the federal Emergency Planning and Community Right-To-Know Act. This is an annual reporting requirement that supports chemical emergency response at the state and local levels through the State Emergency Response Commission (SERC) and Local Emergency Planning Commissions (LEPCs), of which there are nine.

Any facility storing 100 pounds or more of any hazardous or toxic chemical on EPA's SARA 313 list (derived from EPA's Superfund Program) must report. There are about 350 chemicals on this list. The Tier II reporting program helps to assure that emergency responders (such as local fire departments) are aware of potential on-site exposure and hazard risks. There is no assessment of chemicals for toxicity on an ongoing basis. Although the list of chemicals changes over time, it is fairly static.

Vermont Department of Health Programs

The lead poisoning and lead regulatory program, asbestos program, radon program, school indoor air program, and private drinking water, and toxicology assessment programs are housed within the Vermont Department of Health (VDH). The radon program is non-regulatory and educational in nature.

VDH's toxicology and risk assessment program deals with public complaints, general questions, and research on potential exposures or illnesses caused by toxic substances. VDH works in conjunction with some of the Vermont Department of Environmental Conservation (DEC) regulatory programs to establish health-based standards for ground water contaminants as well as ambient air quality standards for air contaminants. Fish consumption advisories for mercury and PCBs are another example of VDH's responsibilities.

VDH does not have a system or program in place to assess and prioritize chemicals of concern based on exposure – the approach is more a reactive one. Funding and staffing is limited for these above-described programs. Indoor air quality as it relates to chemical exposure is a high concern for VDH.

DEC - Air Toxics Program

DEC's Air Toxics regulations create a program for the control of hazardous air contaminants. Nearly 300 chemicals, defined as known or suspect carcinogens, chronic toxicity chemicals (long exposure), and short-term irritants,

have numerical action levels (pounds emitted per 8 hours) and ambient air concentration standards. Any source that emits a hazardous air contaminant in excess of the action level for the particular chemical must apply pollution control or process changes to achieve the Hazardous Most Stringent Emission Rate (HSMER). In coordination with VDH, DEC reviews all the available health data for each listed hazardous air contaminant. Based on this review, a hazardous ambient air standard is established for the protection of human health. If a facility proposes to emit a contaminant not currently listed as a hazardous air contaminant in the regulations, DEC may establish an interim hazardous ambient air standard and interim action level for the contaminant, provided that sufficient health data are available.

DEC - Toxics Use and Hazardous Waste Reduction Planning Program

DEC's Toxics Use and Hazardous Waste Reduction (Pollution Prevention) Planning law requires any facility that routinely generates more than 100 kilograms of hazardous waste per month and any manufacturer that uses more than 1000 pounds per year of a listed chemical to develop a reduction plan. The applicable list of chemicals is the SARA 313 list which is also used to report toxics release under the federal Toxics Release Inventory (TRI) reporting requirement administered by EPA (and also Tier II reporting, see Department of Public Safety Tier II above). In the late 1980s, Vermont was one of a group of states (including Massachusetts, Wash

ington, Oregon, and Maine) to acknowledge that there were no federal programs that limited toxic chemical use and hazardous waste generation – to promote pollution prevention rather than end-of-pipe-controls. As in Vermont, these toxics use or pollution prevention planning programs generally coupled a regulatory planning requirement with a technical assistance program to assist companies in modifying processes and substituting less toxic chemicals in order to achieve reductions.

Plans are required to be developed every three years with performance goals and identification of technically and economically feasible pollution prevention measures that will be pursued for implementation. At the beginning of the program in1992 there were 220 companies subject to planning. In 2008, there were 86 planners. The decrease in planners is due in part to companies having implemented cost-effective operation and maintenance improvements that reduced toxic chemical use and hazardous waste generation below regulatory thresholds.

This list of toxic chemicals has remained fairly static over the years. In addition, chemical input substitutions cannot always be effectively evaluated to determine if they are indeed safer alternatives.

The Committee did not have adequate time to evaluate the Pollution Prevention Program in order to make recommendations for program improvements. Such evaluation would be appropriate for the proposed Advisory Council on Toxics if that body is established by the Legislature.

DEC - Drinking Water Program

Drinking water standards for public water supplies are set by EPA or VDH. VDH can set more stringent standards than EPA. DEC is delegated by EPA to implement the federal Safe Drinking Water Act. There are several categories of contaminants for which maximum contaminant levels are set. Some contaminants, such as arsenic and uranium are naturally occurring. There are 18 primary inorganic chemicals with maximum contaminant levels, including mercury, arsenic, asbestos, lead, and nitrate. Regulated organic chemicals include about 20 volatile organic compounds, about 30 synthetic organic compounds (including many pesticides), and several disinfection chemical byproducts, including chlorinated compounds with known health concerns.

EPA has a Proposed Unregulated Contaminant Monitoring Program

addressing contaminants being considered for regulation. These are tested for in public water supplies prior to making a regulatory decision.

Vermont's Ground Water Protection Rule and Strategy sets a not-to-exceed standard for ground water contamination for many contaminants, as well as an action level, which is generally one-half of the maximum level. Over 225 chemicals are regulated with standards; many of these are pesticides. The rule also sets up a classification system in the state for ground water.

DEC Hazardous Materials and Waste Management Programs

DEC's Hazardous Waste Mangement Program regulates waste materials defined as hazardous waste by the federal Resource Conservation and Recovery Act (RCRA). Facilities that generate, transport, store, treat and dispose of hazardous wastes are regulated
to minimize the potential for environmental release. There are several thousand generators of hazardous waste in the state with storage, transportation and disposal requirements. There are numerous hazardous and toxic chemicals listed under RCRA, including toxic, acutely toxic, reactive, and caustic chemicals, as well as wastes from specified industrial manufacturing processes. When a waste meets the definition of hazardous waste, it becomes subject to the management regulations and standards which vary depending on the rate of generation of waste. There are no requirements under RCRA that regulate the use of toxic chemicals, or require reduction in the amounts generated. The federal list of hazardous wastes is fairly static and rulemaking to add new substances can be a slow and arduous process.

The Underground Storage Tank Program regulates the below-ground storage of hazardous and toxic materials. The vast majority of underground tank regulation applies to gasoline, diesel, and other petroleum product storage. This program is preventive; its standards are established to avoid releases to the ground.

The Hazardous Sites Program deals with the cleanup of hazardous substance release to the land.

There are over 2000 sites in the state where releases have occurred achieve standards has taken place. and monitoring and/or remediation of soils and groundwater to Clean up standards may be established by the Program or may be established though the Ground Water Protection Rule.

DEC - Water Programs

Although there are limited monitoring programs to asses the presence of new and emerging chemicals of concern, EPA and USGS have supported testing and sampling of an array of toxic chemicals in Vermont waters. Municipal treatment plants have whole effluent toxicity testing requirements and may be required to reduce the toxicity of the wastewater through further analysis of identification of the source of toxicity. Industrial dischargers are generally regulated for a limited list of EPA priority pollutants as part of Vermont's delegation of the federal National Pollutant Discharge Elimination System (NPDES).

OPPORTUNITIES FOR ACTION – COMMITTEE RECOMMENDATIONS

Pursuant to Act No. 149 (2008), the Advisory Committee recommends the creation of a new Advisory Council on Toxics (ACT) in place of the existing ACMP, to advise the Legislature, on an ongoing basis, on the regulation, abatement, and monitoring of toxic substances including mercury, in either products that are manufactured, sold or distributed in Vermont, or in the environment, with the goal of protecting public health and the environment. The ACT would consult with state, national and international jurisdictions for guidance on chemicals of high concern to public health and the environment and advise the Legislature on specific actions that should be taken.

THE ADVISORY COUNCIL WOULD REPORT ANNUALLY AND ADVISE THE LEGISLATURE ON AN ONGOING BASIS ON THE FOLLOWING:

- Establishment of a list of chemicals of high concern to public health and the environment (especially to pregnant women and children), including but not limited to chemicals that are carcinogens, mutagens, reproductive toxins, endocrine disruptors, or persistent or bioaccumulative toxins. This list would be revised annually or as necessary.

- Actions or strategies to reduce health risks from exposure to chemicals of high concern (especially risk to pregnant women and children), and to reduce risks of harm to the natural environment. Such actions or strategies would include, but not be limited to, restriction on or prohibition of the distribution, sale or use of these chemicals into Vermont; public disclosure requirements on manufacturers of these chemicals or products containing these chemicals; and promotion of safer alternative chemicals.

- Potential costs of minimizing further risk and recommendations on how to raise funds needed to minimize the risks of exposure to toxic substances.

In carrying out these responsibilities, the ACT would coordinate with other states or jurisdictions that have developed lists of chemicals of high concern or have evaluated feasible alternatives to chemicals of high concern and participate in an interstate chemicals clearinghouse. At the present time, a planning process is underway to create such an interstate clearinghouse, whose functions include supporting the development of chemical alternatives assessment methods; sharing strategies and outcomes on chemical prioritization initiatives; sharing data on chemical use, hazard, exposure, and alternatives; and assisting with relevant information needs of businesses, consumers and the public.

Staff support to the ACT should be provided by an assigned person from Legislative Council and one person within the Department of Environmental Conservation or Department of Health with the requisite skills and background necessary to afford administrative and technical support to the Committee.

The Advisory Committee notes that there are chemicals of high concern that have been already identified in Vermont and in other jurisdictions that may warrant specific legislative action even before the ACT is up and running (for example, legislation contemporaneous with the creation of the ACT).

IT IS RECOMMENDED THAT THE ACT MEMBERSHIP CONSIST OF THE FOLLOWING:	
• One member of a relevant committee of the Vermont House of Representatives.	• One representative of the Vermont manufacturing community.
• One member of a relevant committee of the Vermont Senate.	• One representative of the Vermont retail community.
• One representative of the Vermont Department of Environmental Conservation.	• One representative of a statewide consumer interest group.
• One representative of the Vermont Department of Health.	• One representative of a statewide environmental group.
• One representative of the Vermont Attorney General's Office.	• One Vermont toxicologist.
• One representative of a Solid Waste Management District.	• One scientist knowledgeable on matters related to toxic substances.
• One representative of a college or university located in Vermont.	• One representative of the Vermont Agency of Agriculture, Food & Markets knowledgeable about the Agency's pesticides program.
• One representative of the Vermont medical community.	

Rationale for Committee Recommendations

The Committee recognizes both the complexity and the urgency of the problem we face with toxic chemicals. Chemical policy reform is happening internationally and in the states to close the data, safety, and technology gaps on toxic chemicals. Progress in this area will be shaped by federal and state policy actions, business leadership, consumer demand and international markets.

The Committee shares a belief with the Maine Governor's Task Force in the following principles that should guide chemical policy development:

- Shift the burden of proof away from government to prove harm and onto manufacturers to prove the relative safety of chemicals that they produce.

- Shift the standard of proof away from having to demonstrate unreasonable risk to acting with foresight to protect from harm.
- Ensure that chemical policies protect the most vulnerable populations among us.
- Require safer alternatives to hazardous chemicals when available, while phasing out high hazard chemicals such as persistent, bioaccumulative and toxic chemicals (PBTs).
- Honor the public's right to know about chemical hazards, while ensuring that data gaps on chemical safety are closed.
- Consider the best of the work of other governments, both state and international, that are developing chemical policies and implementing programs; especially those programs to identify priority chemicals and to assess safer alternatives.[37]

An Advisory Council on Toxics, based on the model of the Advisory Committee on Mercury Pollution, can keep the Vermont Legislature abreast of the priority chemicals of concern to public health and the environment. As more toxicity information becomes available on certain chemicals, this will allow Vermont to act in a timely and appropriate manner to protect the public from existing and emerging threats.

The proposed charge and reporting requirements of ACT to begin identifying chemicals of high concern are consistent with efforts underway in several states, Canada, and the European Union. The opportunity to participate in the new Interstate Chemicals Clearinghouse can support this task. Collaborating with others is necessary given the complexity of the problem and resource constraints.

The Committee believes that the Council would need to meet quarterly, and at times more frequently to review and finalize reports. If the Legislature acts to establish the Advisory Council on Toxic Substances, the Committee recommends that the Advisory Committee on Mercury Pollution (ACMP) dissolve upon creation of the new Council.

COSTS

In the short term, an effective and efficient approach to toxics policy in commerce is through an advisory council that can build on and tap into the work of other governmental agencies and the interstate chemicals clearinghouse, and that can advise the Legislature on appropriate strategies.

The Committee has identified the following categories of expenses but did not attempt specific cost estimates in all cases:

- Administrative staff support to the Council. This is necessary for meeting logistics, minutes, research, report writing for the Council, and communication with and participation in the interstate chemicals clearinghouse.
- In-kind services (in the form of time) for Council members.
- Per diem expenses for Legislators involved with the Council.
- Dues to the interstate chemicals clearinghouse (For comparison, DEC pays dues of $5000 per year to support the Interstate Mercury Education and Reduction Clearinghouse).

CATEGORIES OF TOXIC CHEMICALS

We believe that the ACT should address a broad list of categories of toxic substances, including PBTs, carcinogens, mutagens, and reproductive toxins, endocrine-disrupting chemicals, and those chemicals that exhibit aquatic toxicity. Nanoparticles from the growing field of nanotechnology should also be addressed by the Council. Pesticides, which can display toxic characteristics, should be included in the purview of ACT, although pesticides may not be a priority at the onset, due to better characterization of toxicity concerns as a whole for this category under federal regulation. Nevertheless, the Committee believes that there are data gaps for pesticides as discussed in this report.

Finally, as also noted in the Maine and California reports,[38,39] there is an opportunity for Vermont to engage in a green chemistry initiative that can create jobs, catalyze green chemistry research at colleges and universities, and contribute to solutions to curb greenhouse gas emissions through greener and more sustainable production processes.

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APPENDIX 1

Legislative Charge Relating to Expansion of the Advisory Committee on Mercury Pollution

MERCURY ADVISORY COMMITTEE REPORT ON TOXIC SUBSTANCES

(a) On or before January 15, 2009, the mercury advisory committee shall report to the senate and house committees on natural resources and energy and the house committee on fish, wildlife and water resources and the senate committee on health and welfare regarding whether the jurisdiction of the mercury advisory committee should be expanded to include review of additional toxic substances. In preparing the report, the committee may consult with interested parties. The report shall include:

(1) A summary of existing Vermont programs and entities that identify or address the use of and risks posed by harmful toxic substances.

(2) A summary of how other states identify and minimize the risk posed by harmful toxic substances.

(3) A recommendation as to whether the jurisdiction of the mercury advisory committee or any other existing Vermont program or state agency should be expanded to include review of additional toxic substances.

(4) If a recommendation under subdivision (3) of this subsection is made to expand the jurisdiction of the mercury advisory committee or the jurisdiction of any other Vermont program or state agency, the report shall include each of the following:

(A) A recommendation of the toxic substances or categories of toxic substances that should be added to the jurisdiction of the mercury advisory committee or, if relevant, the jurisdiction of any other Vermont program or state agency, including an explanation of the criteria employed to review and identify such substances;

(B) Recommended statutory changes to the mercury advisory committee's statutory charge under 10 V.S.A. § 7113 or recommended statutory changes to the statutory charge of any other Vermont program or state agency, including an analysis of the impact of such expansion relative to the ability of the committee, program, or state agency to meet its current responsibilities;

(C) A recommendation for how to improve the toxic use reduction and hazardous waste reduction programs established under 10 V.S.A. chapter 159;

(D) A recommended date to which the repeal of the mercury advisory committee should be extended; and

(E) The estimated cost, if any, of expanding the jurisdiction of the mercury advisory committee or expanding the jurisdiction of another Vermont program or state agency, including identification of additional resources that would be required for implementing the expanded jurisdiction.

(b) For the purposes of this section, the mercury advisory committee shall consist of the members set forth in 10 V.S.A. § 7113(a), the attorney general of Vermont or his or her designee, the department of health state toxicologist, an employee of the department of environmental conservation designated by the secretary of the agency of natural resources, and a member of a consumer interest group to be appointed by the governor.

APPENDIX 2

Published Lists of Priority Chemicals:
European Union, Washington State, and Canada

The following published lists of priority chemicals by governmental agencies are included with the Chemical Abstract Service (CAS) number (unique identifier for every chemical):

European Union:
Candidate List of Substances of Very High Concern for Authorization[40]

Washington State:
PBT List – Toxic Chemicals that require further action because they remain (persist) in the environment for long periods of time where they bioaccumulate to levels that pose threats to human health and the environment.[41]

Canada:
Challenge List of Chemical Substances. Approximately 200 chemicals of highest priority have been identified by the Government of Canada for further action.[42]

European Union

Substance name	EC (CAS No.)
Triethyl arsenate	427-700-2
Anthracene	204-371-1
4,4'- Diaminodiphenylmethane (MDA)	202-974-4
Dibutyl phthalate (DBP)	201-557-4
Cobalt dichloride	231-589-4
Diarsenic pentaoxide	215-116-9
Diarsenic trioxide	215-481-4
Sodium dichromate	234-190-3 (7789-12-0 and 10588-01-9)
5-tert-butyl-2,4,6-trinitro-m-xylene (musk xylene)	201-329-4
Bis (2-ethylhexyl)phthalate (DEHP)	204-211-0
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified:	247-148-4 and 221-695-9
Alpha-hexabromocyclododecane	(134237-50-6)
Beta-hexabromocyclododecane	(134237-51-7)
Gamma-hexabromocyclododecane	(134237-52-8)
Alkanes, C10-13, chloro (Short Chain Chlorinated Parafins)	287-476-5
Bis(tributyltin)oxide (TBTO)	200-268-0
Lead hydrogen arsenate	232-064-2
Benzyl butyl phthalate (BBP)	201-622-7

APPENDIX 2 (Continued)

Washington State

Chemical Groups Listed in Alphabetical Order	CAS Number
Perfluorooctane sulfonates (PFOS)	
Acid	1763-23-1
Ammonium salt	29081-56-9
Diethanolamine salt	70225-14-8
Lithium salt	29457-72-5
Potassium salt	2795-39-3
Polycyclic aromatic hydrocarbons (PAHs)	
3-Methyl chlolanthrene	56-49-5
7H-Dibenzo(c,g)carazole	194-59-2
Benzo(a)phenanthrene (Chrysene)	218-01-9
Benzo(b)fluoranthene	205-99-2
Benzo(g,h,i)perylene	191-24-2
Benzo(j)fluoranthene	205-82-3
Benzo(k)fluoranthene	207-08-9
Benzo(r,s,t)pentaphene	189-55-9
Dibenzo(a,e)pyrene	192-65-4
Dibenzo(a,h)pyrene	189-64-4
Dibenzo(a,h)acridine	226-36-8
Dibenzo(a,h)anthracene	53-70-3
Dibenzo(a,j)acridine	224-42-0
Fluoranthene	206-44-0
Indeno(1,2,3-cd)pyrene	193-39-5
Perylene	198-55-0
Polybrominated dibenzodioxins and furans	
2,3,7,8-tetrabromodibenzo-pdioxin	50585-41-6
2,3,7,8-tetrabromodibenzofuran	67733-57-7
Polybrominated diphenyl ethers	
Pentabromodiphenyl ether	32534-81-9
Octabromodiphenyl ether	32536-52-0
Decabromodiphenyl ether	1163-19-5
Polychlorinated biphenyls (PCBs)	
2,3',4,4',5 Pentachlorobipheny	l 31508-00-6
2,3,4,4',5 Pentachlorobiphenyl	74472-37-0
2,3,3',4,4' Pentachlorobipheny	l 32598-14-4
3,3',4,4',5,5' Hexachlorobiphenyl	32774-16-6
2,3',4,4',5,5' Hexachlorobiphenyl	52663-72-6
2,3,3',4,4',5' Hexachlorobiphenyl	69782-90-7
2,3,3',4,4',5 Hexachlorobiphenyl	38380-08-4
2,3,3',4,4',5,5' Heptachlorobiphenyl	39365-31-9

Metals of Concern	CAS Number
Cadmium	7440-43-9
Lead	7439-92-1

Chemical Groups Listed in Alphabetical Order	CAS Number
Polychlorinated dibenzo-pdioxins	
2,3,7,8 Tetrachlorodibenzo-pdioxin	1746-01-6
1,2,3,7,8 Pentachlorodibenzo-pdioxin	40321-76-4
1,2,3,4,7,8 Hexachlorodibenzop-dioxin	39227-28-6
1,2,3,6,7,8 Hexachlorodibenzop-dioxin	576-53-8
1,2,3,7,8,9 Hexachlorodibenzop-dioxin	19408-74-3
1,2,3,4,6,7,8 Heptachlorodibenzo-p-dioxin	35822-46-9
1,2,3,4,6,7,8,9 Octachlorodibenzo-p-dioxin	3268-87-9
Polychlorinated dibenzofurans	
2,3,7,8 Tetrachlorodibenzofuran	51207-31-9
1,2,3,7,8 Pentachlorodibenzofuran	57117-41-6
2,3,4,7,8 Pentachlorodibenzofuran	57117-31-4
1,2,3,4,7,8 Hexachlorodibenzofuran	70648-26-9
1,2,3,6,7,8 Hexachlorodibenzofuran	57117-44-9
1,2,3,7,8,9 Hexachlorodibenzofuran	72918-21-9
2,3,4,6,7,8 Hexachlorodibenzofuran	60851-34-5
1,2,3,4,6,7,8 Heptachlorodibenzofuran	67562-39-4
1,2,3,4,7,8,9 Heptachlorodibenzofuran	55673-89-7
1,2,3,4,6,7,8,9 Octachlorodibenzofuran	39001-02-0
Polychlorinated naphthalenes	
Trichloronaphthalene	1321-65-9
Tetrachloronaphthalene	1335-88-2
Pentachloronaphthalene	1321-64-8
Hexachloronaphthalene	1335-87-1
Heptachloronaphthalene	32241-08-0

Chemicals Listed in Alphabetical Order	CAS Number
Aldrin	309-00-2
Chlordane	57-74-9
Chlordecone (Kepone)	143-50-0
Dichlorodiphenyltrichloroethane (DDT)	50-29-3
Dieldrin	60-57-1
Endrin	72-20-8
Heptachlor/Heptachlor epoxide	76-44-8/1024-57-3
Hexabromobiphenyl	59536-65-1
Hexabromocyclododecane	25637-99-4
Hexachlorobenzene	118-74-1
Hexachlorobutadiene	87-68-3
Methyl mercury	22967-92-6
Mirex	2385-85-5
Pentachlorobenzene	608-93-5
Short-chain chlorinated paraffins	85535-84-8
Tetrabromobisphenol	A 79-94-7
Tetrachlorobenzene	1,2,4,5- 95-94-3
Toxaphene	8001-35-2

APPENDIX 2 (Continued) Canada

Substance Name	CAS RN
Peroxide, (1,1,4,4-tetramethyl-1,4-butanediyl)bis[(1,1-dimethylethyl)	78-63-7
Peroxide, (1,1,4,4-tetramethyl-2-butyne-1,4-diyl)bis[(1,1-dimethylethyl)	1068-27-5
Peroxide, (3,3,5-trimethylcyclohexylidene)bis[(1,1-dimethylethyl)	6731-36-8
2-Naphthalenecarboxamide, N-[4-(acetylamino)phenyl]-4-[[5-(aminocarbonyl)-2-chlorophenyl]azo]-3-hydroxy-	12236-64-5
Benzenesulfonic acid, 4-[[3-[[2-hydroxy-3-[[(4-methoxyphenyl)amino]carbonyl]-1-naphthalenyl]azo]-4-methylbenzoyl]amino]-, calcium salt (2:1)	43035-18-3
Propanedinitrile, [[4-[[2-(4-cyclohexylphenoxy)ethyl]ethylamino]-2-methylphenyl]methylene]-	54079-53-7
2-Naphthalenecarboxamide, 4-[[5-[[[4-(aminocarbonyl)phenyl]amino]carbonyl]-2-methoxyphenyl]azo]-N-(5-chloro-2,4-dimethoxyphenyl)-3-hydroxy-	59487-23-9
Oxirane, methyl-	75-56-9
Benzene, 1,3-diisocyanato-2-methyl	91-08-7
Naphthalene	91-20-3
Oxirane, ethyl-	106-88-7
1,2-benzenediol	120-80-9
1,4-benzenediol	123-31-9
Benzene, 2,4-diisocyanato-1-methyl	584-84-9
Benzene, 1,3-diisocyanatomethyl-	26471-62-5
Cyclohexasiloxane, dodecamethyl-	540-97-6
Cyclopentasiloxane, decamethyl-	541-02-6
Cyclotetrasiloxane, octamethyl-	556-67-2
Phenol, 2,4,6-tris(1,1-dimethylethyl)-	732-26-3
Benzene, 1,3-bis(1-isocyanato-1-methylethyl)-	2778-42-9
Benzenesulfonic acid, 3,3'-[(9,10-dihydro-9,10-dioxo-1,4-anthracenediyl)diimino]bis[2,4,6-trimethyl-, disodium salt	4474-24-2
Spiro[isobenzofuran-1(3H),9'-[9H]xanthen]-3-one, 2',4',5',7'-tetrabromo-3',6'-dihydroxy-	15086-94-9
Benzenesulfonic acid, [(9,10-dihydro-9,10-dioxo-1,4-anthracenediyl)bis(imino-4,1-phenyleneoxy)]bis-, disodium salt	70161-19-2
Benzenesulfonic acid, 2,2 -[(9,10-dihydro-5,8-dihydroxy-9,10-dioxo-1,4-anthracenediyl)diimino]bis[5-(1,1-dimethylethyl)-, disodium salt	83006-67-1
9,10-Anthracenedione, 1,4-bis[(4-methylphenyl)amino]-, sulfonated, potassium salts	125351-99-7
Thiourea	62-56-6
1,3-Butadiene, 2-methyl-	78-79-5
Phenol, 4,4 -(1-methylethylidene)bis-	80-05-7
Oxirane, (chloromethyl)-	106-89-8
Acetic acid ethenyl ester	108-05-4
C.I. Pigment Yellow 34	1344-37-2
C.I. Pigment Red 104	12656-85-8
Benzenesulfonamide, N-(4-amino-9,10-dihydro-3-methoxy-9,10-dioxo-1-anthracenyl)-4-methyl-	81-68-5
9,10-Anthracenedione, 1-hydroxy-4-[[4-[(methylsulfonyl)oxy]phenyl]amino]-	1594-08-7
2-Naphthalenol, 1-[(4-methyl-2-nitrophenyl)azo]-	2425-85-6
2-Naphthalenol, 1-[(2-chloro-4-nitrophenyl)azo]-	2814-77-9
2-Naphthalenol, 1-[(2,4-dinitrophenyl)azo]-	3468-63-1
9,10-Anthracenedione, 1-amino-4-(phenylamino)-	4395-65-7
2-Naphthalenol, 1-[(2-nitrophenyl)azo]-	6410-09-9
2-Naphthalenol, 1-[(4-chloro-2-nitrophenyl)azo]-	6410-13-5
2-Naphthalenecarboxamide, N-(5-chloro-2,4-dimethoxyphenyl)-4-[[5-[(diethylamino)sulfonyl]-2-methoxyphenyl]azo]-3-hydroxy-	6410-41-9
2-Anthracenesulfonic acid, 4,4'-[(1-methylethylidene)bis(4,1-phenyleneimino)]bis[1-amino-9,10-dihydro-9,10-dioxo-, disodium salt	6471-01-8
9,10-Anthracenedione, 1,8-dihydroxy-4-nitro-5-(phenylamino)-	20241-76-3
Peroxide, [1,3(or 1,4)-phenylenebis(1-methylethylidene)]bis[(1,1-dimethylethyl)	25155-25-3
1-Propanaminium, 3-[[4-[(2,4-dimethylphenyl)amino]-9,10-dihydro-9,10-dioxo-1-anthracenyl]amino]-*N,N,N*-trimethyl-, methylsulfate	60352-98-9
Benzenesulfonic acid, 3-[[4-amino-9,10-dihydro-9,10-dioxo-3-[sulfo-4-(1,1,3,3-tetramethylbutyl)phenoxy]-1-anthracenyl]amino]-2,4,6-trimethyl-, disodium salt	72243-90-4
9,10-Anthracenedione, 1-[(5,7-dichloro-1,9-dihydro-2-methyl-9-oxopyrazolo[5,1-b]quinazolin-3-yl)azo]-	74336-60-0
Ethanol, 2-methoxy-, acetate	110-49-6
Ethanol, 2-ethoxy-, acetate	111-15-9
Ethanol, 2-(2-methoxyethoxy)-	111-77-3
1-Propanol, 2-methoxy-	1589-47-5
Phenol, 4,4 -(3H-2,1-benzoxathiol-3-ylidene)bis[2,6-dibromo-, S,S-dioxide	115-39-9
Phenol, 4,4 -(3H-2,1-benzoxathiol-3-ylidene)bis[2-bromo-6-methyl-, S,S-dioxide	115-40-2
Phenol, 4,4 -(3H -2,1-benzoxathiol-3-ylidene)bis[2,5-dimethyl-, S,S-dioxide	125-31-5
Benzamide, 3,5-dichloro-N-(3,4-dichlorophenyl)-2-hydroxy-	1154-59-2

Substance Name	CAS RN
Benzoic acid, 2-[(3,5-dibromo-4-hydroxyphenyl)(3,5-dibromo-4-oxo-2,5-cyclohexadien-1-ylidene)methyl]-, ethyl ester	1176-74-5
5H-Dibenz[b,f]azepine-5-propanamine, 3-chloro-10,11-dihydro-N,N-dimethyl-, monohydrochloride	17321-77-6
Phenol, 4,4 -(3H-1,2-benzoxathiol-3-ylidene)bis[2,6-dibromo-3-methyl-, S,S-dioxide, monosodium salt	62625-32-5
Adenosine, N-benzoyl-5 -O-[bis(4-methoxyphenyl)phenylmethyl]-2 -deoxy-	64325-78-6
Amines, tallow alkyl, ethoxylated, phosphates	68308-48-5
Amines, C_{18-22}-tert-alkyl, ethoxylated	68443-10-7
Benzenamine, N-phenyl-, reaction products with styrene and 2,4,4-trimethylpentene	68921-45-9
2-Butanone, 4-[[[1,2,3,4,4a,9,10,10a-octahydro-1,4a-dimethyl-7-(1-methylethyl)-1-phenanthrenyl]methyl](3-oxo-3-phenylpropyl)amino]-, [1R-(1a,4aß,10aa)]-	70776-86-2
Amines, C_{18-22}-tert-alkyl, (chloromethyl)phosphonates (2:1)	79357-73-6
Sulfuric acid, diethyl ester	64-67-5
Propane, 2-methyl-	75-28-5
Sulfuric acid, dimethyl ester	77-78-1
Butane	106-97-8
Hexane	110-54-3
Propanenitrile, 3-[[2-(acetyloxy)ethyl][4-[(2,6-dichloro-4-nitrophenyl)azo]phenyl]amino]-	5261-31-4
Ethanol, 2-[[4-[(2,6-dichloro-4-nitrophenyl)azo]phenyl]methylamino]-	6232-56-0
Acetamide, N-[5-[bis[2-(acetyloxy)ethyl]amino]-2-[(2-bromo-4,6-dinitrophenyl)azo]-4-ethoxyphenyl]-	12239-34-8
Acetamide, N-[5-[[2-(acetyloxy)ethyl](phenylmethyl)amino]-2-[(2-chloro-4,6-dinitrophenyl)azo]-4-methoxyphenyl]-	16421-40-2
Acetamide, N-[5-[[2-(acetyloxy)ethyl](phenylmethyl)amino]-2-[(2,4-dinitrophenyl)azo]-4-methoxyphenyl]-	16421-41-3
Ethanol, 2,2'-[[4-[(2-bromo-6-chloro-4-nitrophenyl)azo]-3-chlorophenyl]imino]bis-	17464-91-4
Ethanol, 2,2'-[[3-chloro-4-[(2,6-dichloro-4-nitrophenyl)azo]phenyl]imino]bis-	23355-64-8
Propanamide, N-[5-[bis[2-(acetyloxy)ethyl]amino]-2-[(2-chloro-4-nitrophenyl)azo]phenyl]-	26850-12-4
Benzamide, N-[5-[bis[2-(acetyloxy)ethyl]amino]-2-[(4-nitrophenyl)azo]phenyl]-	29765-00-2
Acetamide, N-[2-[(2-bromo-4,6-dinitrophenyl)azo]-5-(diethylamino)phenyl]-	52697-38-8
Propanenitrile, 3-[[4-[(2,6-dibromo-4-nitrophenyl)azo]phenyl]ethylamino]-	55281-26-0
Ethanol, 2,2'-[[4-[(2,6-dibromo-4-nitrophenyl)azo]phenyl]imino]bis-, diacetate (ester)	55619-18-6
Formamide	75-12-7
2-Propenamide	79-06-1
Benzenamine, 4-[(2,6-dichloro-4-nitrophenyl)azo]-N-(4-nitrophenyl)-	72927-94-7
Acetamide, 2-chloro-	79-07-2
Ethanol, 2-chloro-, phosphate (3:1)	115-96-8
Phosphoric acid tributyl ester	126-73-8
Acetamide, N,N-dimethyl-	127-19-5
2-Naphthalenol, 1-[[4-(phenylazo)phenyl]azo]-	85-86-9
2-Naphthalenol, 1-[(2-methoxyphenyl)azo]-	1229-55-6
2,7-Naphthalenedisulfonic acid, 4-amino-3-[[4'-[(2,4-diaminophenyl)azo][1,1'-biphenyl]-4-yl]azo]-5-hydroxy-6-(phenylazo)-, disodium salt	1937-37-7
2-Naphthalenol, 1-[(2,4-dimethylphenyl)azo]-	3118-97-6
Phenol, 4-[[4-(phenylazo)phenyl]azo]-	6250-23-3
Phenol, 4-[[4-(phenylazo)-1-naphthalenyl]azo]-	6253-10-7
Phenol, 2-methyl-4-[[4-(phenylazo)phenyl]azo]-	6300-37-4
2,7-Naphthalenedisulfonic acid, 3-[[2,2'-dimethyl-4'-[[4-[[(4-methylphenyl)sulfonyl]oxy]phenyl]azo][1,1'-biphenyl]-4-yl]azo]-4-hydroxy-, disodium salt	6358-57-2
1-Naphthalenol, 4-[(4-ethoxyphenyl)azo]-	6535-42-8
Butanamide, 2,2'-[(3,3'-dimethoxy[1,1'-biphenyl]-4,4'-diyl)bis(azo)]bis[N-(2-methylphenyl)-3-oxo-	7147-42-4
Phenol, 4-[[2-methoxy-4-[(4-nitrophenyl)azo]phenyl]azo]-	19800-42-1
Phenol, 4,4'-[1,4-phenylenebis(azo)]bis-	21811-64-3
Phenol, 4-[[2-methoxy-4-[(2-methoxyphenyl)azo]-5-methylphenyl]azo]-	93805-00-6
Methane, chloro-	74-87-3
Benzene, (chloromethyl)-	100-44-7
1-Propene, 3-chloro-	107-05-1
1,2-Benzenedicarboxylic acid, bis(2-methoxyethyl) ester	117-82-8
1,2-Benzenedicarboxylic acid, di-C_{7-11}-branched and linear alkyl esters	68515-42-4
1-Naphthalenemethanol,-bis[4-(diethylamino)phenyl]-4-(ethylamino)-	1325-86-6
3H-Pyrazol-3-one, 4-[(2-chlorophenyl)azo]-2,4-dihydro-5-methyl-2-phenyl-	6407-74-5
3H-Pyrazol-3-one, 4-[(2,4-dimethylphenyl)azo]-2,4-dihydro-5-methyl-2-phenyl-	6407-78-9
1-Naphthalenemethanol, -bis[4-(dimethylamino)phenyl]-4-(phenylamino)-	6786-83-0
Propanenitrile, 3-[ethyl[3-methyl-4-[(6-nitro-2-benzothiazolyl)azo]phenyl]amino]-	16586-42-8
Propanenitrile, 3-[[4-[(5,6-dichloro-2-benzothiazolyl)azo]phenyl]ethylamino]-	25176-89-0

Substance Name	CAS RN
[1,1'-Biphenyl]-4,4'-diamine, N,N'-bis(2,4-dinitrophenyl)-3,3'-dimethoxy-	29398-96-7
Methanesulfonamide, N-[2-[(2,6-dicyano-4-methylphenyl)azo]-5-(dipropylamino)phenyl]-	72968-82-2
Benzoic acid, 2,3,4,5-tetrachloro-6-cyano-, methyl ester, reaction products with 4-[(4-aminophenyl)azo]-3-methylbenzenamine and sodium methoxide	106276-78-2
2-Cyclohexen-1-one, 3,5,5-trimethyl-	78-59-1
Methanone, bis[4-(dimethylamino)phenyl]-	90-94-8
2-Butanone, oxime	96-29-7
1,4-Dioxane	123-91-1
Oxirane, (butoxymethyl)-	2426-08-6
Benzene, 1,3,5-tribromo-	626-39-1
Benzene, 1,2,3,4-tetrachloro-5,6-dimethoxy-	944-61-6
Zinc, bis[O,O-bis(1,3-dimethylbutyl) phosphorodithioato-S,S']-, (T-4)-	2215-35-2
Phenol, 2,6-bis(1,1-dimethylethyl)-4-(1-methylpropyl)-	17540-75-9
Phosphonic acid, [[3,5-bis(1,1-dimethylethyl)-4-hydroxyphenyl]methyl]-, monoethyl ester, calcium salt (2:1)	65140-91-2
Fatty acids, C_{6-19}-branched, zinc salts	68551-44-0
Benzenepropanoic acid, 3,5-bis(1,1-dimethylethyl)-4-hydroxy-, (1,2-dioxo-1,2-ethanediyl)bis(imino-2,1-ethanediyl) ester	70331-94-1
Methylium, [4-(dimethylamino)phenyl]bis[4-(ethylamino)-3-methylphenyl]-, acetate	72102-55-7
Phosphonium, triphenyl(phenylmethyl)-, salt with 4,4 -[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (1:1)	75768-65-9
Methane, nitro-	75-52-5
Propane, 2-nitro-	79-46-9
Benzene, 1-methyl-2-nitro-	88-72-2
Glycine, N,N-bis(carboxymethyl)-	139-13-9
Phenol, (1,1-dimethylethyl)-4-methoxy-	25013-16-5
Benzo[h]benz[5,6]acridino[2,1,9,8-klmna]acridine-8,16-dione	475-71-8
Spiro[isobenzofuran-1(3H),9'-[9H]xanthen]-3-one, 3',6'-bis(diethylamino)-	509-34-2
Spiro[isobenzofuran-1(3H),9'-[9H]xanthen]-3-one, 2',4',5',7'-tetrabromo-3',6'-dihydroxy-, lead salt	1326-05-2
Benzoic acid, 2,3,4,5-tetrachloro-6-(2,4,5,7-tetrabromo-6-hydroxy-3-oxo-3H-xanthen-9-yl)-	2134-15-8
Benzo[b]thiophen-3(2H)-one, 6-chloro-2-(6-chloro-4-methyl-3-oxobenzo[b]thien-2(3H)-ylidene)-4-methyl-	2379-74-0
Oxirane, 2,2' ,2" ,2"' -[1,2-ethanediylidenetetrakis(4,1-phenyleneoxymethylene)]tetrakis-	7328-97-4
Benzo[b]thiophen-3(2H)-one, 4,7-dichloro-2-(4,7-dichloro-3-oxobenzo[b]thien-2(3H)-ylidene)-	14295-43-3
Nickel, bis[1-[4-(dimethylamino)phenyl]-2-phenyl-1,2-ethenedithiolato(2-)-S,S']-	38465-55-3
Decanedioic acid, bis(1,2,2,6,6-pentamethyl-4-piperidinyl) ester	41556-26-7
Benzoic acid, 4-[1-[[(2,4-dichlorophenyl)amino]carbonyl]-3,3-dimethyl-2-oxobutoxy]-	58161-93-6
7-Oxa-3,20-diazadispiro[5.1.11.2]heneicosan-21-one, 2,2,4,4-tetramethyl-	64338-16-5
2-Naphthalenesulfonic acid, 7-[[4,6-bis[[3-(diethylamino)propyl]amino]-1,3,5-triazin-2-yl]amino]-4-hydroxy-3-[[4-(phenylazo)phenyl]azo]-, monoacetate (salt)	71032-95-6
2-Pyrrolidinone, 1-ethenyl-	88-12-0
Benzene, 1,2-dimethoxy-4-(2-propenyl)-	93-15-2
Antimony oxide (Sb_2O_3)	1309-64-4
Vanadium oxide (V_2O_5)	1314-62-1
Bromic acid, potassium salt	7758-01-2
Nickel, bis[2,3-bis(hydroxyimino)-N-(2-methoxyphenyl)butanamidato]-	42739-61-7
Resin acids and Rosin acids, hydrogenated, esters with pentaerythritol	64365-17-9
Rosin, hydrogenated	65997-06-0
Resin acids and Rosin acids, hydrogenated, esters with glycerol	65997-13-9
Resin acids and Rosin acids, hydrogenated, esters with triethylene glycol	68648-53-3
2,9,11,13-Tetraazanonadecanethioic acid, 19-isocyanato-11-(6-isocyanatohexyl)-10,12-dioxo-, S-[3-(trimethoxysilyl)propyl] ester	185702-90-5
Resin acids and Rosin acids, fumarated, barium salts	124751-15-1
Hydrazine	302-01-2
Urea, N'-(3,4-dichlorophenyl)-N,N-dimethyl-	330-54-1
Cobalt	7440-48-4
Cobalt chloride	7646-79-9
Sulfuric acid, cobalt(2+) salt (1:1)	10124-43-3
Bismuthine, triphenyl-	603-33-8
Cyclotetrasiloxane, heptamethylphenyl-	10448-09-6
Benzene, 1,1'-(chlorophenylmethylene)bis[4-methoxy-	40615-36-9
Phenol, 2-phenoxy-, trichloro deriv.	64111-81-5
2-Propanone, reaction products with diphenylamine	68412-48-6
1,4-Benzenediamine, N,N'-mixed tolyl and xylyl derivs.	68478-45-5
Siloxanes and Silicones, Me 3,3,3-trifluoropropyl, Me vinyl,hydroxy-terminated	68952-02-3
1,4-Benzenediamine, N,N'-mixed Ph and tolyl derivs.	68953-84-4

Substance Name	CAS RN
Siloxanes and Silicones, di-Me, reaction products with Me hydrogen siloxanes and 1,1,3,3-tetramethyldisiloxane	69430-47-3
Siloxanes and Silicones, di-Me, hydrogen-terminated	70900-21-9
Phenol, 4,4 -(1-methylethylidene)bis-, reaction products with hexakis(methoxymethyl)melamine	125328-28-1
2-Furancarboxaldehyde	98-01-1
Hexanedioic acid, bis(2-ethylhexyl) ester	103-23-1
Ethanedial	107-22-2
2-Propenoic acid, ethyl ester	140-88-5
Hexanoic acid, 2-ethyl-	149- 57-5
Benzene, 1-chloro-2-[2,2-dichloro-1-(4-chlorophenyl)ethyl]-	53-19-0
2,4,11,13-Tetraazatetradecanediimidamide, N,N' -bis(4-chlorophenyl)-3,12-diimino-, diacetate	56-95-1
Trisiloxane, octamethyl-	107-51-7
1H-Indene, 2,3-dihydro-1,1,3,3,5-pentamethyl-4,6-dinitro-	116-66-5
1- Naphthalenepropanol, -ethenyldecahydro-2-hydroxy- ,2,5,5,8a-pentamethyl-, [1R-[1a(R),2ß,4aß,8a]]-	515-03-7
Trisiloxane, 1,1,1,5,5,5-hexamethyl-3,3-bis[(trimethylsilyl)oxy]-	3555-47-3
Benzenamine, 4,4' -[(1-methylethylidene)bis(4,1-phenyleneoxy)]bis-	13080-86-9
ß-Alanine, N-[4-[(2-bromo-6-chloro-4-nitrophenyl)azo]phenyl]-N-(3-methoxy-3-oxopropyl)-, methyl ester	59709-38-5
Ethanamine, N-ethyl-N-hydroxy-, reaction products with hexamethylcyclotrisiloxane, silica and 1,1,1-trimethyl-N-(trimethylsilyl)silanamine	68583-58-4
Silanamine, 1,1,1-trimethyl-N-(trimethylsilyl)-, reaction products with ammonia, octamethylcyclotetrasiloxane and silica	68937-51-9
Pyridine, 2-[3-(3-chlorophenyl)propyl]-	101200-53-7
Guanidine, N,N -diphenyl-	102-06-7
Carbon black	1333-86-4
Cristobalite	14464-46-1
Quartz	14808-60-7
Pyridine, alkyl derivs.	68391-11-7

APPENDIX 3

Vermont State Programs Addressing Toxic Chemicals

Program: Emergency Planning Community Right to Know Act (EPCRA),VT Emergency Mgmt.	
Statutory Authority for Program	20 VSA Chapter 1 establishes the State Emergency Response Commission (SERC) to carry out all the requirements of EPCRA 42 USC Chapter 116. Statute assigns administrative duties to Vermont Emergency Management.
What toxic substances are regulated?	The inventory of any Extremely Hazardous Substance (EHS) or chemical that exceeds a minimum Threshold Planning Quantity (TPQ) needs to be reported annually to the SERC/Vermont Emergency Management.
Who is regulated?	Any facility using/possessing/storing hazardous materials or chemicals.
What are the program regulatory requirements?	All facilities are required to report their inventory levels by March 1st of each year for the previous calendar years levels. Reporting facilities include businesses, government, municipalities, agriculture, non-profits, and federal.
How are standards or thresholds for toxic/hazardous substances developed?	The reporting requirements are established within EPA's Federal EPCRA 42 USC Chapter 116. 20 VSA Chapter 1 allows the State Emergency Response Commission to establish reporting thresholds at least as stringent as EPA but may be more stringent.
How are new or emerging chemicals of concern evaluated for program inclusion or regulation?	If a facility is required to maintain a material safety data sheet (MSDS) on site for any chemical they use/possess/store and the chemical exceeds the minimum threshold, a requirement to report the chemical is established.
Describe program coordination with other state programs related to toxic and hazardous substances?	The EPCRA Tier II reporting program works closely with Agency of Agriculture (Farm Chemicals), the Agency of Natural Resources (UST Program), and the Department of Labor (VOSHA).
Is program coordination adequate? If no, explain where improvements could be made.	Yes. The State Emergency Response Commission receives quarterly EPCRA program updates. The SERC membership includes Agency of Agriculture, Agency of Transportation, Department of Labor, Department of Public Safety, Agency of Natural Resources, and Vermont Department of Health.
Program: VT Agency of Agriculture, Pesticide program	
Statutory Authority for Program	6 VSA Chapter 87and outlined in Regulations promulgated under that authority
What toxic substances are regulated?	Pesticides
Who is regulated?	Any business or governmental entity or person who uses, manufactures, distributes, or recommends the use of a pesticide.
What are the program regulatory requirements?	Numerous, and include both State and Federal restrictions on handling, use and disposal, as well as Certification and Licensing for applicators and dealers.
How are standards or thresholds for toxic/hazardous substances developed?	Before manufacturers can sell pesticides in the United States, EPA must evaluate the pesticides thoroughly to ensure that they meet federal safety standards to protect human health and the environment. EPA grants a "registration" or license that permits a pesticide's distribution, sale, and use only after the company meets the scientific and regulatory requirements. These data requirements apply to anyone or any company that registers pesticides under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) or seeks a tolerance or tolerance exemption for a pesticide under the Federal Food, Drug, and Cosmetic Act (FFDCA). In evaluating each application, EPA assesses a wide variety of potential human health and environmental effects associated with use of the product. Potential registrants must generate scientific data necessary to address concerns pertaining to the identity, composition, potential adverse

	effects, and environmental fate of each pesticide. The data allow EPA to evaluate whether a pesticide has the potential to cause harmful effects on certain nontarget organisms and endangered species that include humans, wildlife, plants, and surface water or ground water
How are new or emerging chemicals of concern evaluated for program inclusion or regulation?	New Pesticide products must first undergo Federal Registration under FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) Section 3, once a product is federally registered, it may then be registered in Vermont
Describe program coordination with other state programs related to toxic and hazardous substances?	Numerous memorandums of understanding with regard to other sister agencies as well as inter-agency/departmental coordination through the Vermont Pesticide Advisory Council (VPAC)
Is program coordination adequate? If no, explain where improvements could be made.	Yes
Program: VOSHA – Department of Labor	
Statutory Authority for Program	21 VSA Chapter 3 subchapter 4
What toxic substances are regulated?	Over 600 chemicals found in 29 CFR 1910.1000 and expanded health standards for specific chemicals found at 29 CFR 1910.1001 through .1096
Who is regulated?	All employers in the public and private sector that have employees. Excluded are employees of the Federal Government and agricultural establishments that have 10 or fewer employees
What are the program regulatory requirements?	Employers are required to provide a safe and healthful workplace for their workers. They are required to not expose employees over the Permissible Exposure Limit (PEL) through the use of engineering controls, administrative controls or personal protective equipment in that order.
How are standards or thresholds for toxic/hazardous substances developed?	The PEL's are developed federally by NIOSH and ACGIH
How are new or emerging chemicals of concern evaluated for program inclusion or regulation?	This is done at the Federal OSHA level through rulemaking
Describe program coordination with other state programs related to toxic and hazardous substances?	VOSHA does not coordinate with other state entities. If we become aware of environmental impacts we make a referral to ANR
Is program coordination adequate? If no, explain where improvements could be made.	No, however any coordination has to recognize the statutory limits for chemical exposures (PEL's). VOSHA standards are based on an 8 hour time weighted exposure. For this reason, our PEL's are higher than the ANR standards
Program: VT Dept. of Health – Environmental Health Program	
Statutory Authority for Program	18 VSA chapters 26,38
What toxic substances are regulated	Lead, Asbestos.
Who is regulated?	Lead and asbestos abatement contractors, landlords
What are the program regulatory requirements?	Regulations governing evaluation and abatement of lead-based paint; require certification of asbestos inspectors and workers
How are standards or thresholds for toxic/hazardous substances developed?	If no federal standard exists for a chemical detected in air or water in state, EPA methodology is used to develop guideline
How are new or emerging chemicals of concern evaluated for program inclusion or regulation?	By reviewing latest data from Federal and International Agencies and by request of other state programs.
Describe program coordination with other state programs related to toxic and hazardous substances?	Health Dept develops air standards for DEC and develops drinking water guidelines when necessary for the public drinking water program

Is program coordination adequate? If no, explain where improvements could be made.	We used to have quarterly meeting between health and directors of the DEC environmental programs, these have decreased and need to be reinstituted.
Program: Control of Hazardous Air Contaminants- DEC Air Pollution Control Division	
Statutory Authority for Program	10 VSA §554(2) and §558; §5-261 of the Vermont Air Pollution Control Regulations (Regulations)
What toxic substances are regulated	Listed in Appendices B and C of the Regulations
Who is regulated?	Any "person" who has actual emissions of any hazardous air contaminant in excess of its respective *action level* as specified in Appendix C is subject to §5-261 of the Regulations. Combustion of virgin liquid and gaseous fuels are exempt as is application of agricultural chemicals under a program approved by the Vermont Department of Agriculture. §5-401 of the Regulations lists the types of facilities that are required to obtain permits and which are typically subject to the air toxic regulation.
What are the program regulatory requirements?	If a source has actual emissions of a hazardous air contaminant in excess of its respective *action level* as specified in Appendix C, they are subject to this rule. For each hazardous air contaminant that exceeds its respective *action level*, the source shall apply control technology, production processes or other technologies adequate to achieve the *hazardous most stringent emission rate* (HMSER). Such determinations remain in effect for at least five years and may be reevaluated and revised thereafter.
How are standards or thresholds for toxic/hazardous substances developed?	The Secretary, in coordination with the VT Department of Health, reviews all the available health data for each listed hazardous air contaminant. Based on this review, a hazardous ambient air standard is then established to ensure protection of public health.
How are new or emerging chemicals of concern evaluated for program inclusion or regulation?	If a facility proposes to emit a contaminant not currently listed in Appendix B of the Regulations, the Secretary may establish an interim *hazardous ambient air standard* or interim *stationary source hazardous air impact standard*, if appropriate, and an interim *action level* for said contaminant, provided that sufficient health data are available.
Describe program coordination with other state programs related to toxic and hazardous substances?	The Air Program coordinates with the Waste Management Division for facilities subject to corrective action plans under 10 VSA §6615b that may emit hazardous air contaminants in excess of an *action level*. In these cases the facilities are not required to obtain an air permit and instead are required to achieve HMSER equivalent emissions as determined through coordinated policies or reviews.
Is program coordination adequate	Yes
Program: Groundwater Protection – DEC Water Supply Division	
Statutory Authority for Program	10 VSA Chapter 48
What toxic substances are regulated?	Chemicals listed in the Groundwater Protection Rule and Strategy and chemicals that the Department of Health have issued an interim health advisor for.
Who is regulated?	Environmental releases of a listed chemical
What are the program regulatory requirements?	Groundwater Protection Rule and Strategy values as referenced by other Agency regulations
How are standards or thresholds for toxic/hazardous substances developed?	By the EPA and the Vermont Department of Health toxicologist
How are new or emerging chemicals of concern evaluated for program inclusion or regulation?	By the EPA and the Vermont Department of Health toxicologist and other state programs may request that a chemical be evaluated by VTDOH for addition to the Groundwater Protection Rule
Describe program coordination with other state programs related to toxic and hazardous substances?	Work with other programs regarding remediation and groundwater reclassification.
Is program coordination adequate?	Yes

Program: Public Water Supply – DEC Water Supply Division	
Statutory Authority for Program	10 VSA Chapter 56
What toxic substances are regulated?	Chemicals that are listed by the EPA for Public water supplies and chemicals that the Department of Health have issued an interim health advisor for
Who is regulated?	Public Water Supplies
What are the program regulatory requirements?	Water Supply Rule requirements
How are standards or thresholds for toxic/hazardous substances developed?	By the EPA and the Vermont Department of Health toxicologist
How are new or emerging chemicals of concern evaluated for program inclusion or regulation?	By the EPA and the Vermont Department of Health toxicologist
Describe program coordination with other state programs related to toxic and hazardous substances?	Work with other programs regarding remediation and groundwater reclassification
Is program coordination adequate?	Yes
Program: Hazardous Sites Management Program - VTDEC	
Statutory Authority for Program	10 VSA Ch. 159 §6615, §6615b and §6616
What toxic substances are regulated?	Hazardous Materials as defined in 10 VSA §6602(16)(A) which includes EPA CERCLA hazardous substances, petroleum products, and hazardous wastes defined under the VT hazardous waste management regulations
Who is regulated?	Person determined to be liable for a release of a hazardous material
What are the program regulatory requirements?	Person determined to be liable for a release is responsible for investigating contamination and performing corrective action as required under Vermont statutes
How are standards or thresholds for toxic/hazardous substances developed?	EPA standards, VT Groundwater Protection Rule and Strategy, VT Dept. of Health Advisory Levels
How are new or emerging chemicals of concern evaluated for program inclusion or regulation?	Coordination with EPA and other state programs to increase awareness of new chemicals of concern
Describe program coordination with other state programs related to toxic and hazardous substances?	Work with Groundwater Coordinating Committee to add new contaminants to Groundwater Protection Rule, meet regularly with New England states to discuss site cleanup issues including identifying new chemicals of concern, and attend annual conferences to learn latest cleanup information.
Is program coordination adequate? If no, explain where improvements …	Yes
Program: Hazardous Waste Management Program VTDEC	
Statutory Authority for Program	10 VSA Chapter 159 authorizes Vermont to develop a hazardous waste regulatory program. Vermont is delegated by EPA to run the state program. The Vermont Hazardous Waste Management Regulations are more stringent and broader in scope than the federal hazardous waste regulations.
What toxic substances are regulated?	Waste only – solid wastes that meet the definition of hazardous waste set forth in regulation. Wastes included on lists of hazardous waste from generic industrial processes, wastes from certain sectors of industry, and unused pure chemical products and formulations. In addition, wastes that exhibit characteristics of ignitability, corrosivity, reactivity, or exceed toxicity levels for one or more of 39 contaminants are also hazardous wastes.
Who is regulated?	Any business or governmental entity that handles hazardous waste including those that generate the waste, transport it, and treat, store or dispose of it
What are the program regulatory re-	The regulations stipulate cradle to grave management of hazardous waste

quirements?	and include requirements for handling and storage of waste at a generator's site, transport of hazardous waste and treatment and disposal of hazardous waste. Hazardous waste transporters and facilities that store hazardous waste for more that ninety days, or treat or dispose of hazardous waste are must have a permit issued by the Vermont Hazardous Waste Program.
How are standards or thresholds for toxic/hazardous substances developed?	Standards are developed by EPA and authorized states must be at least as stringent as EPA. States may regulate additional types of waste that are not regulated by EPA. Process for a listing a waste is listed in the regulations and includes consideration of the nature of the hazard posed by the waste, hazardous constituents in the waste, persistence and potential for bioaccumulation of the hazardous constituents, plausible types of mismanagement of the waste, and other factors. Vermont has only six Vermont-listed wastes.
How are new or emerging chemicals of concern evaluated for program inclusion or regulation?	Generally done at the federal EPA level, but it is a very slow process. VT has authority to list new wastes but lacks the resources to identify and research emerging chemicals that may become waste.
Describe program coordination with other state programs related to toxic and hazardous substances?	Memoranda of agreement with the VT Dept of Health for hazardous waste that is also radioactive waste; and with the VT Agency of Agriculture, Food and Markets for pesticides. The hazardous waste program coordinates with other Dept. of Environmental Conservation and Agency of Natural Resources programs.
Is program coordination adequate? If no, explain where improvements could be made.	Generally good within the DEC; could be better with other state agencies
Program: DEC Pollution Prevention Planning	
Statutory Authority for Program	10 VSA Chapter 159 Subchapter 2 establishes a program for certain businesses to develop a hazardous waste and toxics use reduction plan to establish voluntary goals for reduction.
What toxic substances are regulated?	Chemicals and chemical compounds on the federal SARA 313 list (Superfund Amendments and Reauthorization Act) are subject to planning if more than 1000 pounds per year of any such chemical(s) is used.
Who is regulated?	For hazardous waste – any business that routinely generates more than 2,640 pounds/year For toxic substances – manufacturers in SIC Codes 20-39
What are the program regulatory requirements?	Affected businesses must prepare a 3 year plan which assesses reduction opportunities and establishes performance goals for implementation if an opportunity(ies) is determined to be technically and economically feasible. Facilities must also submit an annual progress report (and fee) which tracks any change in the amount of toxics used and/or hazardous waste generated for that year.
How are standards or thresholds for toxic/hazardous substances developed?	If EPA adds chemicals to the 313 list (having gone through the required federal process for such action to occur), those chemicals also become subject to planning.
How are new or emerging chemicals of concern evaluated for program inclusion or regulation?	See above. The Vermont statute does provide that the "secretary may, by rule, add or remove any toxic substance... from the provisions of this subchapter" (sec 6625(d)). This has not happened since the statute was passed in 1991.
Describe program coordination with other state programs related to toxic and hazardous substances?	May periodically check with DEC's Air Pollution Control Program, Hazardous Waste Program and/or Dept of Public Safety, Emergency Management Div Tier II Program to identify new facilities subject to planning.
Is program coordination adequate? If no, explain where improvements …	While co-ordination with other programs is limited on the toxics use side because of significant differences in program applicability, there is ongoing and significant co-ordination with staff in the hazardous waste program on several mutual program interests, including the identification of new planning facilities.

ENDNOTES

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[6]UCal Green Chemistry 2008
[7] Maine Task Force Report 2008
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[11] Wilson MP, Chia D, Ehlers B. Green Chemistry in California: A Framework for Leadership in Chemicals Policy and Innovation. California Policy Research Center, University of California 2006
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