

**Protecting Public Health, Increasing Profits
And Promoting Innovation
By Benchmarking Corporate Governance of
Chemicals in Products**

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Executive Summary

In coming years, companies are likely to face increasing pressures to remove toxic chemicals from consumer products. These pressures will stem from new scientific knowledge and media and political attention. Corporate and product reputations may face sizeable risks, and corporate bottom lines and investor returns on investment may suffer.

On the other hand, innovative, entrepreneurial companies can gain competitive advantage, increase profits, and grow shareholder value by systematically reviewing chemicals in their products, working with their suppliers to reduce or eliminate product toxicity, and responding creatively to the growing demand for environmentally preferable goods. Corporate directors and executives exercising due diligence in managing the risks and rewards from this evolving environment can promote their companies' long-term well-being by recognizing that a focused concern on product toxicity is not so much a regulatory compliance cost as it is a potentially value-adding benefit.

This paper reviews these developments, identifies innovative corporate programs to reduce product toxicity, and offers a governance framework of benchmarked "best practices" that investors may use in screening investments, managing portfolio risk, and engaging in shareholder actions. This "best practices" framework can also be used by independent directors seeking to promote their companies' financial health. Annexes provide summaries of recent shareholder actions, websites of pertinent resources, and overviews of evolving regulatory requirements.

Remarkable changes have occurred in the last fifteen years in scientific understanding about the low dose effects of common chemicals, especially on fetuses and children. Scientists have also been refining their ability to detect such chemicals in human breast milk, blood, and urine, so the last several years have also witnessed startling and disturbing reports of elevated concentrations of hazardous chemicals in human populations. Researchers also have been suggesting that unexplained increases in cancers and other health disorders may have links to toxic chemical exposures.

These scientific advances have been accompanied by growing media attention—page 1 newspaper stories and lengthy television news features. Regulators and legislators have also responded, by restricting or banning suspect chemicals, establishing new test requirements, and issuing warnings to consumers about purchasing particular products and foods. More regulatory attention looms, particularly in Europe and at the state and local level in the United States. Government agencies and private sector purchasers have adopted environmentally preferable purchasing policies to exclude individual chemicals and classes of chemicals in products.

Many corporations have made good progress in recent decades in treating discharges of pollutants. They have also reduced waste and saved millions of dollars through pollution prevention and energy efficiency initiatives. Many companies also have sought to strengthen their environmental management systems and have issued dedicated reports on social responsibility.

But this past progress will not be enough to satisfy rising demands. New scientific developments and attendant media, political, and consumer concern, comprise a significantly new and more potent challenge. Plaintiffs' attorneys are likely to be close behind. The threat of toxic chemicals is likely to be substantially redefined, viewed less as some violation of abstract air and water quality standards and more as the most intimate form of bodily trespass.

Companies are likely to be asked, with increasing frequency, how they are rising to these new challenges. For example, what are they doing to identify and reduce the most toxic chemicals in their products, substances that may be associated with birth defects, learning disabilities, cancers, or other health disorders? Investors will want to know what liabilities might be looming, what product reputations may be at stake, and whether companies are undertaking foresighted actions to minimize risks and costs. Such measures can not only reduce consumer hazards, but as with the case of past pollution prevention measures, they can reduce occupational and environmental hazards and costs.

Investors may also want to know what innovative steps companies are taking to develop cost-saving product innovations that can be marketed to the growing segment of consumers who "buy green" or that will satisfy the specifications of bulk purchasers of "environmentally preferable" products. By incorporating toxicity considerations into the front end of product design—incorporating principles of "green chemistry", "industrial ecology" and related decision rubrics—companies can convert constraints into opportunities.

Investment groups already have signaled their concern over these issues during the last several years, through shareholder initiatives seeking changes in retailers' sales of products (e.g., mercury thermometers) and changes in cosmetics and medical products companies' formulation of products. Either under threat from these initiatives or on a voluntary basis, retailers have changed sales practices and manufacturers have removed suspect chemicals. Separate from these investor initiatives, other companies have undertaken systematic assessments of their product lines to reduce toxicity.

Recent investor actions and voluntary corporate initiatives around the issue of global warming are a possible precursor of the future blossoming of product detoxification as an investment issue. Even though the science of global warming continues to be debated, and the United States government has been loath to impose mandatory reductions in carbon dioxide emissions, various major companies have set voluntary emission targets. Other companies are being challenged by investor groups to identify their potential liabilities from global warming and to develop plans to reduce emissions of green house gases. Swiss Re insurance is taking corporate green house gas policies into account when it issues officer and director liability insurance, and the Investor Responsibility Research Center (IRRC) and CERES have partnered to produce a "Climate Change Governance Checklist" to encourage best practice among portfolio companies.

Following on the IRRC/CERES model for climate change issues management, this brief proposes a "Product Toxicity and Safer Alternatives Governance Benchmarking Framework". The benchmark is an initial set of "best practices" that investors should demand of their portfolio companies. Examples from numerous companies illustrate real-world implementation of these best practices.

Drivers of Change

Drivers of Change(I)--Lessons From Brominated Flame Retardants

The recent history of brominated flame retardants epitomizes many of the drivers of concern over toxic chemicals in consumer products.¹ These chemicals, developed in the early 1970s, are used in a wide range of consumer goods, such as furniture, foam, and plastic casings of electronic devices. In 1998, Swedish scientists reviewing archived human breast milk samples discovered that certain flame retardant chemicals (polybrominated diphenyl ethers, or PBDEs) had doubled in concentration in Swedish breast milk about every five years over the preceding twenty. This was a source of concern, as studies of laboratory animals had shown that PBDEs disrupt thyroid hormones. Such disruption yields neurobehavioral effects similar to those of PCBs (polychlorinated biphenyls), whose manufacture the United States banned in 1976.

The Swedish research led to additional research in the United States that revealed similarly rising levels. These data ultimately prompted the European Union in 2003 to outlaw two forms (penta- and octa-) of PBDEs by 2004. In August 2003, the State of California took similar action, requiring a phase-out by 2008.

In September 2003, the U.S. daily newspaper *USA Today* published a top-of-page 1 story entitled “Flame Retardant Found in Breast Milk”.² The story cited a spokesperson for industry’s Bromine Science and Environmental Forum as saying that human effects cannot be extrapolated from rodents. A page 1 story in the *Wall Street Journal* in October 2003 traced PBDEs’ scientific and regulatory history and quoted a US EPA official as saying that more research was needed before national regulatory action could be taken. This comment is sorry testimony to the immense difficulty in the United States of taking regulatory action to remove existing dangerous chemicals from the marketplace. Nevertheless, a few weeks later, Great Lakes Chemical Corporation, the main U.S. manufacturer of PBDEs, announced an agreement with EPA to voluntarily phase out production of the two major PBDEs of concern. The company also announced it was making available a replacement flame retardant for penta- that had been favorably reviewed by EPA and had been determined in tests to be neither persistent, bioaccumulative or eco-toxic.³ New scientific research subsequently has emerged suggesting problems with a third PBDE (deca-) that had originally been thought to be less of a risk than penta- and octa-.⁴ A formal European Union risk assessment group concluded in mid-2004 that no extra legislative controls on deca- are needed, at least for now. But the State of Maine enacted legislation in April 2004 outlawing deca- by January 2008 unless certain exemption requirements are met.⁵

Drivers of Change(II)—Lessons From Perfluorinated Chemicals

Perfluorinated chemicals are just the latest in a series of halogenated chemicals—chlorinated chemicals such as PCBs and brominated chemicals such as brominated flame retardants—that have raised human health and environmental concerns. In 2000, findings of unexpectedly elevated levels of perfluorinated chemicals in non-occupationally exposed individuals and in the environment, and the potential for resulting regulatory action, prompted the 3M company to shut

down production of its well-known Scotchgard product.⁶ The shutdown resulted in a \$168 million dollar charge against pretax earnings.⁷

Although many questions about perfluorinated chemicals remain unanswered, scientific knowledge is rapidly building, in much the same way that the initial findings in Sweden about brominated flame retardants caused a subsequent flood of research about these chemicals. According to one report, journals publishing papers on perfluorinated chemicals grew tenfold, to nearly 50, in a three year period following 3M's actions.⁸

Perfluorinated chemicals are also an issue for DuPont. DuPont has had to respond to a class action lawsuit in the state of Ohio over a perfluorinated chemical known as C-8, one of the chemicals that 3M stopped manufacturing. C-8 is used in the manufacture of Teflon and was discharged to the environment by a DuPont plant in the neighboring state of West Virginia. Teflon-related products contribute at least \$100 million in annual profits to DuPont, almost 10 percent of DuPont's 2003 earnings.⁹ DuPont launched a \$20 million ad campaign in 2003 promoting Teflon cookware and stain-resistant fabrics, and has spent another \$50 million expanding its Teflon production capacity.¹⁰

In announcing its quarterly financial results in July 2004, DuPont indicated it was setting aside \$45 million in reserves in connection with the class-action lawsuit.¹¹ Two months later DuPont settled the case for at least \$108 million. DuPont's liability under the settlement could rise to above \$300 million, depending on whether additional scientific research strengthens links to human health disorders.¹²

As a result of documents discovered in the Ohio litigation, DuPont faces a potentially multi-million dollar administrative penalty by the U.S. Environmental Protection Agency for failing to disclose adverse effects from C-8 discovered as far back as the early 1980s. In theory, the penalty could exceed \$300 million but in practice the penalty surely will be lower. DuPont denies the allegations, just as it contests health hazards posed by C-8.¹³

Perfluorinated chemical controversies represent not only a material financial risk to DuPont, but they represent a major challenge to DuPont's reputation as a champion of sustainability principles. DuPont has substantially reduced emissions of greenhouse gases, has made progress in other measures of sound environmental, health, and safety management, and even has substantially decreased C-8 discharges at the West Virginia plant where it faced litigation. The journal Chief Executive noted that CEO Chad Holliday "has burnished a reputation for himself and his company as a champion of 'sustainable business'."¹⁴ But the journal, in concluding its detailed report on C-8, commented: "[A]s more details become known about C-8 and DuPont's handling of the substance, it will become clearer whether Holliday's actions have indeed lived up to his words."¹⁵

Evolving Science--Lessons From DDT/DDE

The history of DDT provides useful insight into how scientific understanding of hazards from toxic chemicals has shifted at the close of the 20th century and the dawn of the 21st. It's a longer history than that of PBDEs and perfluorinated chemicals, but the length of the history itself is

valuable because it reveals how long it can take to fully appreciate the hazards of toxic chemicals and why product withdrawal may be merited even before firm scientific conclusions are reached about cause-effect relationships.

DDT has a prominent public profile. It represents the double-edged character of chemical technology: it was welcomed enthusiastically on account of its perceived benefits, but it ultimately was viewed more negatively as its adverse side effects surfaced. While mostly used to protect crops from agricultural pests, DDT once was considered a miracle chemical for preventing illness and death from malaria. After its pesticidal properties were recognized in the late 1930s, it was deployed to protect military personnel during World War II. It was then the basis for an ambitious malaria eradication campaign in the 1950s and 1960s. The campaign fell short of its eradication goal in many places, but it nevertheless is credited with saving millions of lives.

Rachel Carson highlighted DDT's adverse environmental effects in her 1962 book, Silent Spring. Ten years later in 1972, EPA banned DDT for agricultural use in the United States. EPA's decision was based on DDT's suspected carcinogenicity and evidence that it was thinning eggshells and contributing to population declines in bald eagles and other birds. As of 2004, DDT is used legally and routinely in about a dozen countries, where it is sprayed inside homes to control malaria. For such use, DDT historically has been regarded as relatively safe, in the sense that it is not acutely toxic to humans except in very large doses.

In 2002, the U.S. Department of Health and Human Services published an updated toxicological profile of DDT and its breakdown products.¹⁶ The profile underscores how much has been learned about DDT in the years since EPA's ban, particularly with respect to DDT's ability to interfere with hormones.[‡] For example, in two studies published in 1987 and 1995, the length of a mother's ability to breast feed her children was found to be inversely related to the concentration of *p,p*-DDE ("para-para-DDE") in her breast milk.¹⁷ Research published in 2001 based on studies of American women in the 1960s found increased odds of having pre-term and low birth weight ("small-for-gestational-age") infants among those women having elevated blood concentrations of DDE.¹⁸ Since it is generally accepted that pre-term birth and low birth weight can contribute to infant mortality, EPA's decision to ban the use of DDT in 1972 might have increased the survival odds of American infants, even if the agency didn't realize it at the time. Conversely, since blood concentrations of DDE have been found to be high in countries that use DDT for malaria control, the toxicological profile reports that "adverse reproductive outcomes may be a concern for women in countries where these chemicals are still used."¹⁹

The remarkable recovery of bald eagle, peregrine falcon, and brown pelican populations in the last thirty years provides strong evidence that EPA did the right thing in outlawing DDT for agricultural use in 1972. Declines in measured concentrations of DDE in public health surveys of Americans provide further evidence of the impact of EPA's ban. However the measured presence of DDT/DDE in the bodies of American children born long after DDT was banned serves as a reminder of how persistent this chemical can be and how it can be passed from mother to child.

[‡] Hormone disruptors are chemicals that mimic or block the action of the body's own hormones, or interfere with normal hormone production or breakdown in some way.

The DDT tale highlights the important public policy challenge of deciding how much should be known or suspected about a chemical before regulatory steps are taken to remove it from the market place. In this regard, it is worth noting that scientists frequently find only associations between exposures and effects. They do not always know exactly how a chemical works, i.e., its “mechanism of action”. For example, a panel of experts commissioned by the World Health Organization recently concluded that “there is strong evidence that eggshell thinning results from exposure to DDE”, but added “there is continued uncertainty with respect to the precise mechanism of action of DDE.”²⁰ This begs the question of what might have been the fate of America’s bald eagle population if regulation had been contingent upon more precise scientific knowledge about how DDE works.

The DDT story is instructive in other ways as well. For example, scientists historically have stressed that “the dose makes the poison”. A corollary of this belief is that while high doses of a chemical may be toxic, lower doses are less likely to be. But scientific evidence gathered in the last 10-20 years indicates that this dogma requires modification—that it is not only the dose that makes the poison, but the timing. For example, the U.S. government’s “toxicological profile” of DDT and its breakdown products indicated that adverse developmental effects depended not only on the dose administered, but the timing of exposure during or after gestation (the period in the womb).²¹ Some of the DDT-related chemicals were associated with female hormonal effects in the reproductive system. One was associated with anti-androgenic (compromising of male hormone) effects.

A landmark National Academy of Sciences report published in 1993, *Pesticides in the Diets of Infants and Children*, underscores the importance of timing of exposure in making judgments about potential hazards from chemicals.²² The NAS report found both quantitative and qualitative differences in the toxicity of pesticides between children and adults. The report noted “special windows of vulnerability—brief periods early in development when exposure to a toxicant can permanently alter the structure or function of an organ system.”²³ Since publication of this NAS report, evidence has been accumulating that low doses of chemicals, striking through windows of vulnerability, can be harmful.²⁴

Body Burden and Biomonitoring

The chemical industry has long expressed concern that governments’ methods for risk estimation, based on modeling and conservative assumptions, overstate risks from chemicals, and that it would be desirable to have real measurements of human exposures. Recent events serve as a reminder to be careful what you wish for. For example, a 2001 report from the Centers for Disease Control and Prevention highlighted unexpectedly high levels of phthalates, ingredients in many personal care products, in American women of child-bearing age. Some phthalates have been shown in laboratory animal studies to cause testicular harm. The CDC report contributed to a campaign by public health organizations to encourage companies to remove these chemicals from their products.²⁵ A later, expanded CDC study indicated that 8 percent of American women of child-bearing age were exposed to levels of mercury that exceed safe levels, and a subsequent EPA analysis raised that number to more than 15% of women, indicating that as many as 630,000 American newborns are at risk of serious neurological and

developmental impairment from these exposures.²⁶ (Biomonitoring does not always produce bad news—CDC studies also show levels of lead and chemicals from second-hand tobacco smoke dropping in Americans, a reflection of past bans.)

Indoor studies of homes suggest that common consumer goods can be a source of hazardous chemicals. For example, a study by the Silent Spring Institute identified 67 suspected hormone disrupting chemicals in air and dust samples taken from 120 homes on Cape Cod, Massachusetts.²⁷ Growing interest in monitoring breast milk and sampling other bodily fluids can only heighten public recognition of the intrusiveness and ubiquity of chemical contaminants. With respect to breast milk, even though it is generally recognized that “breast is best” and contamination of breast milk by chemicals does not justify a switch to baby formula, parents of nursing babies may increasingly ask what steps can be taken to reduce flame retardants and other chemicals in breast milk.

Media Attention

During the past several decades, media attention to chemical exposure issues and environmental health has ebbed and flowed. Media interest in chemical issues appears to be growing again, as suggested by the front page newspaper coverage in September and October 2003 addressing flame retardant breast milk in the United States. This drumbeat of media attention continued later in 2003. DuPont’s production and use of a fluorinated chemical in Teflon production was featured on the U.S. ABC television network’s *20:20* news magazine program in mid-November 2003, and the CBS network’s news magazine program *60 Minutes* focused in mid-December on allegations of links between chemicals used in production of IBM’s computer chips and the incidence of cancer among IBM workers. In January 2004, scientists’ findings of elevated levels of PCBs in farm-grown salmon, attributable to the use of contaminated feed, drew world-wide attention.²⁸ A bio-monitoring campaign undertaken by WWF-UK drew extensive media attention both in the United Kingdom and elsewhere.²⁹

Increases in Human Health Disorders

For the last three decades, there appear to be disconcerting increases in the incidence of various human health disorders, for example breast cancer, testicular cancer, and learning disabilities. For some disorders registering increases, such as prostate cancer and autism, at least part of the rise is a consequence of clearly identifiable changes in diagnostic methods and definitions. Nevertheless, based on studies of wildlife, laboratory animals, and humans, scientists suspect that some of these adverse trends in public health may be associated with exposures to chemicals in daily life. For example, some Danish scientists have coined the term “testicular dysgenesis syndrome”, hypothesizing that a suite of male reproductive problems, such as genital abnormalities, testicular cancer, and reduced semen quality, may be associated with exposure of genetically susceptible individuals to hormone disrupting chemicals early in life.³⁰ Much more is known about effects in wildlife and laboratory animals than about effects on human health, but knowledge about human health effects is growing. The accumulating evidence prompted the International Programme on Chemical Safety, a consortium of the World Health Organization and other United Nations agencies, to convene an expert panel to produce a “state-of-the-science” review of hormone disruptors. In 2002, the panel urged that research on human health

effects be given a high priority, because there is strong “biological plausibility”, based on evidence from laboratory animals and wildlife, that hormone disrupting chemicals are damaging human development and reproduction.³¹

Public Activism

In this first decade of the 21st Century, environmental and public health groups are joining together to address shared concerns and redefine public perceptions of hazards from toxic chemicals. For example, the website of the Breast Cancer Fund in California offers a review of scientific evidence linking chemical exposures to disease incidence.³² So too does the website of Physicians for Social Responsibility.³³ In New York State, breast cancer activists focusing on avoidable chemical exposures have adopted the slogan “Prevention is the Cure”.³⁴ The Collaborative on Health and the Environment is bringing together health-affected groups with health professionals, researchers, and environmental organizations.³⁵ Websites of environmental health advocacy groups are summarized in Annex 2 of this brief.

In 2002, the Center for Children’s Health and the Environment at Mount Sinai Medical Center in New York City paid the New York Times to publish several display advertisements on chemical exposure and disease linkages.³⁶ For example, one was captioned “Johnny can’t read, sit still, or stop hitting the neighbor’s kid. Why?” The sub-head stated “Toxic chemicals can cause learning disabilities”. A second advertisement was headed “More kids are getting brain cancer. Why?” The sub-head stated, “Toxic chemicals appear linked to rising rates of some cancers.” A third ad was titled “Our most precious natural resource is being threatened. Why?” and the sub-head stated, “Toxic chemicals are being passed on to infants in breast milk.”

In the United Kingdom in 2003, WWF-UK produced a color advertisement of a young girl pressing her ear against her mother’s pregnant belly, under the heading of “Who Cares Where Toxic Chemicals End Up?” The text of the ad noted “Everyday we are exposed to dozens of man-made hazardous chemicals...babies in the womb and young children are the most vulnerable, and wildlife all around the world is being contaminated.”

Environmental and consumer groups in Europe reached agreement in 1999 on a set of principles (The “Copenhagen Charter”) for policy making that provide the underpinnings of subsequent detoxification efforts in Europe. The principles include a call for companies to use the safest chemical for any application, and the phase out of chemicals that are persistent[§] or bioaccumulate^{**} or which are not safe beyond reasonable doubt.³⁷ In 2002, Friends of the Earth UK launched a Safer Chemicals Campaign that included a retailers’ pledge.³⁸ FOE secured pledges from major retailers throughout the U.K. to work from official lists to identify bioaccumulative chemicals and those that interfere with the hormone, immune or nervous system; produce a strategy to identify which house brands and national brands contain these chemicals; produce a timeline to phase out these chemicals from house brands and pressure national brands to remove them, and report publicly on progress.

[§] Persistent chemicals last a long time in the environment, breaking down very slowly.

^{**} Chemicals that bioaccumulate increase in concentration as they rise through the food web, thereby posing increased risks for humans, predatory birds, and other species at the top of the food web.

Tightening Regulations

The U.S. federal government during the administration of President George W. Bush is widely recognized as unsympathetic to environmental regulations. Governments elsewhere have stepped into the void with their own regulatory initiatives. California, Maine, and the European Union's outlawing brominated flame retardants are prominent examples. In January 2003, the European Union amended its Cosmetics Directive to outlaw carcinogens, mutagens, and reproductive toxicants in cosmetics. Member states of the European Union were required to comply by September 2004.³⁹ Not only will companies marketing cosmetics in Europe need to change formulations, but companies marketing cosmetics in the United States will either need to follow suit or argue to American women that they need not worry about the risks from such chemicals. These and other such choices will flow down the supply chain to chemical producers.

The European Union has begun an ambitious effort (the so-called REACH initiative) to systematically overhaul chemical management in member states. REACH is based on the idea of "no data-no market"—companies must make public much more data than are available now on the hazards of their products, or face the risk that they will not be able to continue selling them. Chemicals that are persistent, bioaccumulative and toxic (PBT) and those that are very persistent and very bioaccumulative (vPvB) are the "low hanging fruit" that likely will be the initial regulatory targets. Hormone disrupting chemicals may also be controlled, as will those that are carcinogens, mutagens and reproductive toxicants. Companies understandably and justifiably will make the case that certain chemicals have yielded sizeable social benefits (e.g., flame retardants' contributions to reductions in fire deaths), and REACH will allow them to make this case before controls are considered. But companies such as those discussed below that have attempted to purge the most toxic chemicals from their product lines may be better positioned to be winners under the REACH process than those companies that have not.

REACH's final form remains to be determined by the European Parliament and the European Commission. European and American chemical industries have been lobbying hard against it, citing its potential costs, while WWF-UK and other environmental organizations have been lobbying in support, citing potential health benefits and opportunities for innovation. In the U.K., Insight Investment, which manages more than \$100 billion in assets, has noted that some industry associations are suggesting that up to 20% of chemicals currently on the market would have to be discontinued. Insight observes, "It is already clear that REACH, in one form or another, will enter into law and that it is likely to have substantial financial implications."⁴⁰ In early 2004, Insight contacted 17 chemical companies requesting information as to how REACH may impact them financially. Insight asked the companies to address market loss, material loss, potential for innovation, and litigation risk.

Insight found that, with a few outstanding exceptions, many companies seemed unprepared for REACH. Most were unable to estimate REACH's financial impact but many "expressed confidence" that the impact would not be material. In those few cases where cost estimates were provided, there was significant variation in the assessments of likely impact. Insight also noted that few companies appear to have recognized the opportunities to grow market share by providing substitute chemicals. Insight concluded its analysis with the observation that

“experience with previous regulations has shown that first movers generally have the advantage.”

There is little doubt that if companies do not carefully specify the chemicals that may be included in their products and monitor their suppliers’ actions, they can pay a substantial price for running afoul of environmental regulations. For example, just prior to the Christmas holiday season in 2001, Netherlands authorities banned the sale of Sony PlayStation consoles because the cadmium in accessory cables exceeded regulatory limits. Sony’s lost sales and costs to rework their product totaled about \$150 million.⁴¹ As described later in this brief, this episode prompted Sony to carry out a systematic supply chain and internal management review to prevent similar problems from occurring and to prepare for stricter regulations in the future.

Regulatory efforts also are advancing at the state and local level in the United States.⁴² For example, the State of Washington Department of Ecology has developed a plan for phasing out the use of persistent, bioaccumulative toxic (PBT) chemicals in the state.⁴³ The City of Seattle, Washington, approved a resolution to reduce its use of PBTs.⁴⁴ The San Francisco, California Board of Supervisors adopted a citywide environmental ordinance on the precautionary principle in 2003, the first city in the nation to do so.⁴⁵ The precautionary principle incorporates a series of decision making guidelines for addressing hazards even when scientific information is incomplete.⁴⁶

Environmentally Preferable Purchasing Practices

Both public and private sector organizations are adopting environmentally preferable purchasing policies specifically incorporating environmental considerations into their purchasing decisions.⁴⁷ Such programs can provide significant new business opportunities in targeted sectors. For example, the cover story in the March 2004 issue of *Sanitary Maintenance*, “the business magazine for distributors of cleaning supplies, equipment, and paper products”, focuses on “green’s growing reach”.⁴⁸ The story notes the establishment of environmental purchasing programs in a number of states and cities and the incorporation of environmentally preferable cleaning products into a Green Building certification program for existing buildings. A standard for cleaning products developed by the non-profit organization Green Seal is often used in environmentally preferable purchasing programs. Experts cited in the story “say green will steadily gain acceptance, and that distributors who stay current on the trend will win green business; those that ignore the trend may risk losing customers”.

A similar shift is underway in the health care industry, spurred by organizations such as Hospitals for a Healthy Environment (H2E).⁴⁹ H2E is a joint project of the American Hospital Association, The American Nurses Association, Health Care Without Harm, and the U.S. Environmental Protection Agency. Its goals include virtually eliminating mercury-containing waste from health care facility waste streams by 2005 and identifying hazardous substances for pollution prevention and waste reduction opportunities, including hazardous chemicals and persistent, bioaccumulative, and toxic pollutants. Widespread adoption of environmentally preferable purchasing policies to advance these goals is facilitated by the on-line posting of product specifications in purchasers’ requests for proposals.⁵⁰

Environmentally preferable purchasing within the health care industry has been facilitated by greater disclosure of toxic chemicals in products distributed by the four top group purchasing organizations that buy supplies for more than 70 percent of the health care facilities in the United States. In 2002, Premier, Inc., Novation, Broadlane and Consorta, Inc.—which together represent about \$30 billion in medical purchasing power—announced initiatives designed to reduce the purchasing of mercury, polyvinyl chloride plastic, and the chemical plasticizer DEHP. Their measures include eliminating mercury-containing devices from contracts and clearly labeling products containing these toxic chemicals.⁵¹

Within the health care industry, Kaiser Permanente has been a major proponent of reducing environmental hazards. Kaiser Permanente is the largest nonprofit health plan in the United States, serving 8.2 million members. It operates 30 hospitals, 431 medical buildings, and had operating revenues of \$22.5 billion in 2002.⁵² Kaiser Permanente has set out to eliminate or reduce hazards to human health from chemicals that have been relied on to provide health care. Kaiser Permanente has been working to “green” its buildings, working with manufacturers to produce cleaner, less toxic materials. The company has focused on phasing out polyvinyl chloride and eliminating mercury, and removing DEHP from its neonatal units. In 2004 it launched a new chemical policy that calls for avoiding the use of carcinogens, mutagens and reproductive toxins, and persistent bioaccumulative toxic chemicals.⁵³

Environmentally preferable purchasing requirements provide competitive advantage to innovative, entrepreneurial suppliers. For example, in June 2004, the Collins & Aikman company responded to Kaiser Permanente’s market signal, announcing a new PVC-free line of carpets that uses an alternative plastic material for backing. The move was heralded in a Healthy Building Network press release, “Latest PVC-Free Carpet Lines Signal Environmental Health Considerations are Driving Markets Away from PVC”.⁵⁴ Shaw Industries, a unit of Berkshire Hathaway and the world’s largest carpet manufacturer, also announced its exit from the use of polyvinyl chloride carpet backing. According to a company press release, “driving the decision is the growth of EcoWorx, a non-PVC carpet backing introduced in 1999. Over the past four years when presented with a choice, customers self-selected the new technology, which reached 70 percent of Shaw’s total carpet tile production by year-end 2003.”⁵⁵ Previously Shaw had been the recipient of EPA’s Presidential Green Chemistry Challenge Award, honoring the company for developing this recyclable, less energy intensive alternative to traditional PVC carpet tiles.

Investor Activism and Concern for Investment Value

Increasingly in the last five years, investor groups working together with environmental and public health advocacy groups have been demanding greater accountability in corporations’ management of toxic chemicals and products containing toxic chemicals. Shareholder resolutions have been directed at chemical producers (e.g., Dow, for its production and discharge of dioxin and other persistent pollutants), at companies (“chemical choosers”) that use chemicals to formulate consumer products (e.g., Avon, for its use of hormone disrupting chemicals in its cosmetic products) and retailers (e.g., SUPERVALU and JCPenney, for selling mercury thermometers). Some shareholder resolutions appear to have encouraged changes in corporate policies while others have not. In 1999, in exchange for the withdrawal of a resolution proposed by two religious groups and a union, Baxter International signed a memorandum of

understanding agreeing to a timetable for replacing the polyvinyl chloride in containers of intravenous solutions and to work on replacing PVC in all its medical products. Baxter also agreed to ask that various chemical industry groups refrain from using Baxter products in their public advertising campaigns.⁵⁶ In 2004, Boston Common Asset Management, Inc., on behalf of its client Brethren Benefit Trust, Inc. withdrew a resolution on mercury-containing medical devices when the McKesson Corporation provided information demonstrating its support of efforts to substantially eliminate mercury-containing waste from hospital waste streams.⁵⁷ Annex 1 lists additional resolutions and their impacts.

The contribution of sound environmental management to corporate well-being was reviewed in a 2002 report for The Rose Foundation, “The Environmental Fiduciary: The Case for Incorporating Environmental Factors into Investment Management Policies”.⁵⁸ Susannah Blake Goodman and her colleagues provide case examples from individual companies and a review of the pertinent academic literature. They show how a corporation’s ability to profit from environmental innovations and prepare for future environmental risks and exposures can have a significant impact on corporate earnings potential, cash flow, and growth opportunities. Goodman *et al* demonstrate how environmentally driven innovation can improve shareholder value while environmentally driven liabilities and risks can depress shareholder value.

The socially active investment community includes those who want companies to pursue specific social objectives and those who believe that pursuit of such goals can enhance shareholder value. The Global Environmental Management Initiative, a consortium of leading companies promoting excellence in corporate management of EHS (Environment, Health and Safety) issues, focuses on market valuation in its 2004 report, “Clear Advantage: Building Shareholder Value—Environment Value to the Investor.”⁵⁹ The report notes that there is “considerable evidence” that EHS contributes to shareholder value in a variety of ways, not only through such tangible contributions as risk reduction and profitability improvements, but also through such intangibles as brand equity, human capital, and strategy execution.⁶⁰

Mainstream investors are demonstrating growing interest in research on and disclosure of environmental and other social aspects of corporate governance. The U.N. Environment Programme (UNEP) Financial Initiative’s June 2004 report, “The Materiality of Social, Environmental and Corporate Governance Issues to Equity Pricing” found that such issues can affect long-term shareholder value, sometimes in profound ways, yet there is a paucity of reporting on these issues.⁶¹ Goldman Sachs, Nikko, Nomura, Deutsche Bank, and ABN AMRO were among the major brokerage houses contributing research to this report.

Further indicative of growing mainstream investor concern, a group of leading European institutional investors, managing a combined \$330 billion Euros in investments, have formed the “Enhanced Analytics Initiative”. The investors, including the Universities Superannuation Scheme (the third-largest UK pension fund), want greater integration of “non-traditional” corporate performance issues into financial analysis and have indicated to brokers and bankers that henceforth they will specifically allocate a portion of their research funding to such analysis.⁶²

Reflecting the growing interest in increased disclosure of environmental concerns, the American Bar Association recently created a Committee on Environmental Disclosure. The committee's co-chair, Tom McMahon, published an article in autumn 2004 captioned "Forget Past; Disclosure Is Inevitable Wave of Future".⁶³ McMahon observes:

"Whatever the pace, the direction is clear. The evolution toward increased environmental disclosure is in springtime bloom. This is no longer a fringe proposition."

Insurer Concern and Litigation Risk

The insurance industry is providing \$160 million of the \$600 million settlement reached in 2003 in PCB litigation in Anniston, Alabama.⁶⁴ The industry also is paying out billions of dollars in claims as a result of asbestos litigation in the United States that has bankrupted scores of companies.⁶⁵ It is only a matter of time before insurance and reinsurance companies begin to ask much tougher questions than they do now about corporations' manufacture and use of toxic chemicals associated with diseases and disabilities. Chemical producers and users may be able to mount formidable defenses based on scientific uncertainties, but the diversion of corporate resources to legal defenses, and associated reputational and market share risks, suggest that it will be in insurers' and reinsurers' best interest to take searching looks at how corporations are attempting to reduce and avoid toxic liabilities.

In 2003, the Swiss reinsurer Swiss Re announced that it would take corporations' policies on global warming into account when issuing officer and director liability insurance.⁶⁶ Insurers and reinsurers may want to consider taking a similar approach to directors' liability for financial risks arising from corporations' insufficient diligence in managing toxic chemical hazards in products.

Benchmarking Corporate Decision Making

Evolving Frameworks for Corporate Environmental Decision Making

A push for reducing the toxicity of products—by substituting or eliminating chemicals—builds on and extends corporate environmental strategies that have evolved during the last several decades' of modern environmental regulation. These years have witnessed the enactment of broad laws establishing new standards of environmental quality and creating new expectations for corporate performance. Such legal developments have moved forward in fits and starts; for example, after a torrid pace of enacting novel environmental legislation during the 1970s, the adoption of ground-breaking national environmental legislation in the United States has essentially ground to a halt. There have been, however, some noteworthy legislative enactments in the U.S. since the 1970s, such as the "Community Right to Know Act" that established the Toxic Release Inventory in 1986 and the 1990 amendments in the Clean Air Act that incorporate emissions-trading for acid rain control. Also, in 1996 the U.S. Congress enacted the Food Quality Protection Act, which not only called upon EPA to take special measures to protect children from pesticides, but also required EPA to establish a screening and testing program for hormone-disrupting chemicals.⁶⁷ In contrast to the U.S., the European Union has been more energetic in recent years in legislating environmental requirements.

Expectations about corporate behavior have also been changing against a backdrop of growing interest in the ideas of sustainable development and corporate social responsibility. These concepts have drawn particular attention as a result of the Rio Environmental Summit in 1992 and the follow-up World Conference on Sustainable Development in Johannesburg in 2003.

Corporate behavior has gone through a spectrum of changes, responding to waves of new analytical concepts and frameworks intended to improve corporate performance. An initial emphasis on end-of-pipe treatment has been supplanted by an emphasis on pollution prevention. Pollution prevention has been a building block of “eco-efficiency”. “Beyond Compliance” was a concept developed to underscore that industries could and should go beyond mere compliance with government codes, especially since industry managers frequently are in the best position to judge how best to reduce their environmental impact beyond uniform standards incorporated in government regulations. International codes of conduct and certification systems, such as the International Organization for Standardization (ISO) 14000 series have been developed as frameworks for creating corporate environmental management systems. Trade associations such as the American Chemistry Council have developed their own industry-specific codes. The “Global Reporting Initiative” has developed guidelines for “triple bottom line” reporting on economic, environment, and social impacts.⁶⁸ “Greening supply chains” has also been a popular feature of evolving corporate environmental management systems, an acknowledgement that vendors are important partners in improving corporate environmental performance.⁶⁹ “Life cycle assessment” and “industrial ecology” are additional tools in the corporate environmental management toolkit.⁷⁰

“Green chemistry” provides yet another framework for driving decisions about reducing toxic chemical hazards in products.⁷¹ Green chemistry’s 12 “principles” incorporate toxicological, waste reduction, energy efficiency, and other interrelated concerns.⁷² A popular mantra of the modern environmental movement as it emerged more than 30 years ago was “think globally, act locally”. In view of advances since then in knowledge about both chemical toxicity and methods for constructing chemicals, green chemistry serves as a reminder to “think globally, act molecularly.” For purposes of product detoxification, the two key green chemistry principles are:

- Design chemical products to be fully effective, yet have little or no toxicity
- Design chemical products to break down to innocuous substances after use so that they do not accumulate in the environment

The principles of green chemistry can be used by innovative companies to reduce time-to-market, grab market share, anticipate and avoid regulatory burdens and, more broadly, build shareholder value. Screening tools developed and promoted by the U.S. Environmental Protection Agency can assist companies in speeding access to the market place. For example, the “PBT profiler” is an on-line screening tool jointly developed by EPA and industry with the support of and contributions from an environmental organization.⁷³ It identifies chemicals that may need additional technical evaluation for their PBT characteristics. It is one of a suite of EPA-supported screening tools. A Kodak and EPA-funded analysis of the economic and business benefits of using EPA’s tools found that they helped identify environmentally preferable products, lowered product development costs, reduced time to market and lowered

full-scale manufacturing costs.⁷⁴ This approach can reduce regulatory uncertainty by anticipating and engineering away from chemicals of concern.

Two additional and noteworthy analytical approaches incorporating reductions in product toxicity include The Natural Step and the McDonough-Braungart concept of “cradle-to-cradle” design.⁷⁵ The Natural Step’s principles call for “systematically substituting certain persistent and unnatural compounds with ones that are normally abundant or break down more easily in nature.”⁷⁶ The first of 12 principles of Green Engineering in the “cradle-to-cradle” approach states that product designers should strive to ensure that materials “are as inherently nonhazardous as possible”.⁷⁷ With respect to chemicals’ persistence, “targeted durability, not immortality” should be a design goal. A “materials assessment protocol” within the cradle-to-cradle concept evaluates chemicals on more than 10 human health criteria and also includes persistence and bioaccumulation among its ecological health criteria. The Natural Step and “cradle-to-cradle” approaches have been employed by several of the innovative companies whose cutting-edge management practices are profiled later in this brief.

GEMI’s report, “Clear Advantage: Building Shareholder Value”, summarizes well the economic benefits of these various efforts to reduce industries’ ecological footprint: “A substantial body of evidence exists on how EHS [environmental, health and safety] practices contribute to the bottom line, including reductions in operating costs, insurance premiums, and capital costs.”⁷⁸

Benchmarking Corporate Product Detoxification Measures

In 2003, the Investor Responsibility Research Center and CERES published “Corporate Governance and Climate Change: Making the Connection”, which establishes a set of benchmarks by which portfolio managers can judge corporate behavior. The report contains recommendations to investors, corporate boards and CEOs, and policy makers. The report’s “Climate Change Governance Checklist” identifies 14 action items in the five categories of “board level”, “management level”, “reporting”, “emissions data”, and “other actions”.⁷⁹

This brief adapts the IRRC/CERES global warming schema to provide a framework for benchmarking product detoxification efforts. The framework modifies IRRC/CERES benchmark provisions of good corporate environmental governance, deletes benchmark provisions specific to greenhouse gasses, and substitutes benchmarks that measure corporate commitment to using less toxic chemicals or non-chemical methods. (See framework on next page.)

PRODUCT TOXICITY^{††} AND SAFER ALTERNATIVES-- GOVERNANCE BENCHMARKING FRAMEWORK

Corporate Commitment to Safer Alternatives Policy

- Have the CEO issue a clear and proactive statement about the company's commitment to lowering product toxicity through elimination of known or suspected high priority toxicants and substitution of safer chemicals or non-chemical methods. The commitment should establish short, medium, and long-term deadlines and measurable goals for chemical substitutions, provide for routine reporting on progress, favor reductions in toxicity even in the face of scientific uncertainty, and make attainment of reductions in product toxicity an explicit factor in employee compensation.

Investor and Public Accountability

- In annual and quarterly SEC filings, discuss and analyze risks and opportunities to the company associated with hazardous and toxic chemicals, and with safer alternatives and cleaner production processes. Disclosures should include new government- or peer-reviewed studies of environmental and health hazards pertinent to toxic chemicals in company products; the range of potential liabilities and market risks associated with toxic chemicals in company products, and market trends associated with alternatives to toxic chemicals used in company products.
- Issue a sustainability report based on the Global Reporting Initiative or comparable "triple bottom line" format that includes a discussion of product toxicity and corporate milestones for and progress in reducing or eliminating hazardous or suspect chemicals.
- Engage in effective consumer disclosure practices regarding chemicals of concern (in product labeling, warning notices and catalogue listings) so as to avoid potential "duty to warn" liabilities and, where safer alternatives are offered, to publicize the benefits of these alternatives.

Data Development

- Develop procedures for systematically reviewing the chemical composition of company products and promote generation of toxicity data by chemical suppliers.
- Assess the chemical composition of company products against published lists^{‡‡} of known or suspected high priority chemicals, with particular emphasis on such categories as persistent and bioaccumulative substances, carcinogens, mutagens, reproductive toxicants, neurotoxicants, and hormone disrupting chemicals.

Internal Capacity Building and "Greening" The Supply Chain

- Create information, training, and incentive programs to help identify, research, and implement safer alternative ideas.
- Add "reduce inherent hazards" as a criterion for product formulation and chemical procurement, including a commitment to continuous improvement in use of safer materials and chemicals as effective, cost-competitive alternatives become available.
- Develop collaborative activities with vendors, including research and financial risk sharing, to procure or develop reduced toxicity chemicals or non-chemical alternatives.
- Devise supplier codes of conduct and certification programs, and associated corporate or third-party auditing methods, to identify suppliers' progress and problems in reducing toxicity of supplied materials.

Benchmarking Chemical Choosers, Not Producers. This framework is intended for application to companies that purchase chemicals—chemical users or choosers—rather than commodity or

^{††} Note: the word "toxicity" is used loosely throughout this checklist to denote chemicals of concern, which include persistent and bioaccumulative substances, endocrine disruptors, carcinogens, mutagens, reproductive toxicants, and neurotoxicants.

^{‡‡} For example, official lists include: carcinogens, mutagens, and reproductive toxicants of greatest concern as referenced in the European Union's Cosmetics Directive; six individual and classes of chemicals listed in the EU directive on hazardous substances in electrical and electronic equipment; priority substances listed under the OSPAR Convention; suspected endocrine disrupting substances listed by Japan's Ministry of Environment; and persistent organic pollutants listed under the Stockholm Convention.

specialty chemical producers. The framework can drive change by encouraging consumer products companies to modify products; they can shift their choices of chemicals or chemical suppliers and even find non-chemical methods to satisfy a product function. Moreover, since consumer goods companies usually are held in much higher esteem than chemical companies, they are more vulnerable to reputational pressures from consumers than are chemical companies. The chemical industry would be the first to acknowledge that its public reputation is not very good, as evidenced by discussions within the American Chemistry Council of a multi-million dollar public image campaign. There is not always a bright line between a chemical producer and a chemical user, since some chemical companies sell consumer goods directly and some consumer goods companies produce their own chemicals. Nevertheless, the average investor is not likely, for example, to view Dow Chemical Company as a consumer goods company or Procter & Gamble as a chemical company.

Benchmarking Amidst Scientific Uncertainty. The framework calls for detoxification in an environment of scientific uncertainty about the toxic hazards posed by most chemicals. This lack of closure is a byproduct of the inadequacy of contemporary toxicological tools for assessing newly recognized hazards, and the failure of regulators and the regulated community alike to analyze chemicals with existing tools and to disclose their hazards to the public. For example, it is widely recognized that sizeable proportions of chemicals marketed in the United States and Europe lack basic public screening data on toxicity. In Europe, only 14% of the highest production volume chemicals have sufficient publicly available data to do even the most basic safety assessment.⁸⁰ A similarly high level of toxic ignorance exists in the United States, although catch-up data collection efforts have begun.⁸¹ With respect to hormone disrupting chemicals in particular, in 1996 the U.S. Congress required the U.S. Environmental Protection Agency to establish a screening and testing program for hormone disrupting chemicals, but a formal program has not yet been promulgated because screens and tests are still undergoing development and validation.

Even though human and animal bodies carry scores of synthetic chemicals, existing screening and testing programs generally assess chemicals' safety on a chemical-by-chemical basis, so possible additive and synergistic toxic effects evade assessment. Only within the last few years has the U.S. EPA begun to assess the cumulative effects of one set of pesticides that share a common mechanism of action. Toxicologists traditionally have relied upon animal testing to test toxicity, but as the tale of PBDEs at the beginning of this brief suggests, defenders of chemicals highlight differences between animals and humans to deflect concern about toxic effects revealed in animal tests. And when epidemiologists use human studies to trace patterns of associations between chemical exposures and incidence of human health disorders, critics try to pick apart the studies, questioning inferences drawn or noting potentially important variables that may not have been taken into account.

As indicated, some chemicals are relatively well-characterized, but most are not. This scientific uncertainty notwithstanding, the proposed benchmarking framework calls upon companies to systematically identify the chemicals in their products, review what is known and suspected about chemicals' toxicity or other potentially undesirable characteristics, and then take steps, in consultation with vendors, to reduce or eliminate the chemicals. In cases where chemicals are very persistent in the environment or are very bioaccumulative, these characteristics may be

sufficient to encourage a search for substitutes, even in the absence of robust data on toxicity. This substitution process itself admittedly is problematic, because there may be scientific uncertainty about the toxic hazards posed by substitute chemicals, but this itself could drive a quest for improved data.

Despite scientific uncertainties and data gaps, certain chemicals and classes of chemicals have been identified for regulation in existing government programs or have been targeted for prospective research and regulation. Governments have had long-standing concern about carcinogenic toxicants. Governments have also worried about such heavy metals as lead and hexavalent chromium. Persistent and bioaccumulative chemicals have in recent years become the focus of international agreements that ban existing chemicals and establish frameworks for listing new ones. Hormone disrupting chemicals are a relatively new focus. Emerging information about the impact of early exposures on childhood learning and behavior has triggered calls for increased screening and testing of chemicals for neurotoxicity. Some of the official lists that can be used as starting points for corporate action are cited in the second footnote of the framework. Additional information about some of these lists is provided in Annex 3 of this brief.

Operationalizing and Refining the Benchmarking Framework. A January 2004 report commissioned by UK-based ISIS Asset Management from the Impact consultancy illustrates how two of the framework's capacity-building and supply chain elements can be quantified.⁸² The report identified leaders and laggards among information and communication technology companies in management of supply chains with regard to labor standards and environmental performance. Dell, Hewlett Packard, Nokia, Sharp and Sony were identified as "race leaders" in environmental management, Siemens was labeled "on the starting grid" and five other companies in the middle were labeled as "the chasing pack".

In ISIS's report, a company that provides training for its staff plus assistance to its suppliers earns a top score of 3, a company training only its staff earns a 2, raising staff awareness but providing no staff skill training garners a 1, and no training yields a score of zero. With respect to audits of suppliers' environmental performance, audits of "first tier/high risk suppliers" earn a 3, "some, predominantly desk-based audits" earn a 2, initial steps to introduce audits or monitoring yield a 1, and no monitoring scores zero. These and other scores are aggregated to distinguish outstanding companies and those lagging behind.

Operationalizing the public disclosure provisions of this framework represents an especially great challenge, especially with respect to disclosure of environmental hazards in U.S. Securities and Exchange Commission (SEC) filings. Existing SEC disclosure requirements for environmental risks and liabilities are not especially stringent and are not well-enforced.⁸³ Even though current disclosure requirements are not very tough, the most points in this benchmarking framework might be accorded to the company that discloses (in the management discussion and analysis portions of its quarterly and annual reports) any new studies that emerge from government or from the peer reviewed literature that indicate potential health or environmental hazards associated with toxic chemicals used in company products.

Operationalizing the broader public disclosure component will also require ingenuity. For example, it may be desirable in product catalogues to distinguish a product that contains a chemical of concern (e.g., a phthalate in a medical device) from an equivalent product that is free of the chemical. Catalogue distributors in various business segments might score higher on the framework if they make such disclosures, as compared to catalogue distributors that do not. Such disclosures would allow forward-looking catalogue distributors to service the growing numbers of environmentally preferable purchasing programs. But there's a much larger challenge effectively communicating product information to consumers in conventional retail settings and ranking consumer goods makers and retailers accordingly.

The framework proposed here is merely a starting point. Investment organizations and companies are invited to embrace it in its present form but, like the broader Global Reporting Initiative discussed previously, it is intended to be an iterative benchmark that should be elaborated and refined over time. The suggested elements, some of which are so aspirational that even the most progressive, innovative, and best-managed companies may not score well on them, must be translated into measurement scales that can usefully distinguish leaders from laggards and separate meaningful green action from greenwash. Moreover, as companies develop innovative approaches to safer chemicals and substitution policies, they will raise the bar for acceptable and outstanding performance.

This basic framework might also be supplemented by sets of additional benchmarks tailored to specific corporate sectors. For example, a supplement might ask retailers of "house brand" products to seek information and product changes from the suppliers of their house brands, whereas producers of "name brand" products might be called upon to rely on internal staff to generate information and design product changes. Food processors might be asked to form partnerships with growers to fund research and trials on reduced use of pesticides in fruit and vegetable production.

Chemical Substitutions in the Electronics Sector. The ISIS-commissioned report cited above indicates there are promising governance developments in the electronics sector. Additional positive signs have surfaced since the ISIS report was published.

Samsung. In response to Greenpeace finding brominated flame retardants, phthalates, and organotin compounds in its products, Samsung agreed in mid-2004 to conduct an inventory of chemicals and to formulate a substitute development program with targeted phase out dates.⁸⁴ Samsung, which had not been rated in the ISIS report, indicated it would act on the basis of common sense and "scrupulous scientific research". But Samsung also stated that it would also act in a precautionary manner in some cases, taking into account suspected-but-not-definitively-proved links between chemical causes and health effects. Samsung set a phase-out target date for various substances and also set dates by which it expects its suppliers to meet its new standards. It also indicated areas where additional research on alternatives would be needed.

Fujitsu. The Fujitsu company also appears to be taking steps to improve its management of toxic chemicals. In contrast to many companies that are dismissive of hazards from hormone-disrupting chemicals (endocrine disruptors), Fujitsu states that it is evaluating and hopes to reduce the annual use by its facilities of approximately 70 chemicals that Japan's Ministry of

Environment has designated as exerting potentially harmful endocrine effects.⁸⁵ For example, the Fujitsu Group's reported use of Bisphenol-A went from 83,000 kilograms in FY2001 to 63.4 kilograms in FY2003.⁸⁶

Sony. Sony Corporation, chastened by the Netherlands' exclusion of PlayStations from the Christmas market several years ago, has adopted broad-ranging measures that reduce the likelihood of such a multi-million dollar market loss recurring because of violations of toxic chemical requirements. These developments are summarized in Sony's 2004 corporate social responsibility report, "Sony and the Global Environment."⁸⁷ Sony has made available to its suppliers a list of chemicals that will be prohibited immediately, phased out by targeted dates, or reduced in concentration. Sony also has established a Green Partner Environmental Quality Approval Program that lays out for its suppliers chemical management standards; Sony follows up with audits. Sony is especially proud of the substantial progress it has made in reducing use of lead-free solder and the use of PVC in packaging. Sony scientists have been working to develop vegetable-based plastics; these already have been used in a number of Sony products. Among these plastics are compounds with flame-retardant properties comparable to standard flame-retardant plastics.

The examples of Samsung, Sony, and Fujitsu above illustrate cutting edge detoxification efforts in the electronics sector. Six corporate vignettes below provide additional examples of diverse approaches to product detoxification and, where readily available, associated cost savings. Although these approaches have contributed to measurable savings in some cases and burnishing of corporate reputations, it is largely impossible to link the practices in these six cases in particular to changes in stock prices. Among the six are a privately owned company and a unit of a large multinational corporation. Moreover, investment rewards realizable from product detoxification efforts in some of the companies have been dwarfed by larger issues influencing corporate performance and investors' valuations of companies. Drawing on analyses of a far larger number of companies, the studies cited earlier in this brief provide additional data on cost savings and linkages between sound environmental management and shareholder value.

Chemical Substitutions by Manufacturers of Consumer Goods. Promoters of The Natural Step and cradle-to-cradle design, which can be placed in the category of "life cycle" approaches to environmental management, have figured prominently in cutting-edge efforts by consumer goods companies to reduce product toxicity. As noted, such consumer goods companies are "chemical choosers" who select for their products chemicals manufactured by commodity and specialty chemical producers. Consequently, they can help drive change and innovation within the chemical manufacturing sector. The experience of two such companies—SC Johnson and Son, Inc. and Nike—further illustrate some of the metrics of the benchmarking framework.

SC Johnson and Son, Inc. In a fully operationalized benchmarking framework, SC Johnson and Son, Inc., likely would score quite high. SC Johnson, a privately-owned multinational corporation with sales in about 100 countries, launched its trade-marked Greenlist process in 2001.⁸⁸ The Greenlist process reflects the long-standing social ethic of a company that brands itself as "a family company". It builds on SC Johnson's reputation for being an early adopter of measures to reduce environmental impact, even in the face of scientific uncertainty.

For example, in 1975, SC Johnson removed ozone-depleting chemicals from its aerosol cans, three years prior to a government mandate to do so.

SC Johnson systematically reviews the toxicity of chemicals used in its product lines and, working with its suppliers, seeks to marry excellent product performance with reduced toxicity. Chemicals are assigned a numerical rating in accordance with a judgment of “best”, “better”, “acceptable”, or “restricted use material” (RUM). These are used to challenge managers to increase their scores each year. The goal for FY02/03 was an 8 percent improvement in scores over the FY00/01 period, and the actual increase was 12.5%.

The Greenlist process moves the company beyond its previous successes in “eco-efficiency”—reducing waste and lowering packaging requirements—to the cradle-to-cradle concept of “eco-effectiveness”—using better materials to get a job done.⁸⁹ The company initially conducted screenings for six categories that constitute 80% of its purchases and sales and in 2004 added an additional four categories.⁹⁰

The Greenlist process may simply encourage an existing supplier to substitute one off-the-shelf chemical for another. SC Johnson has shared Greenlist with suppliers representing most of its raw material purchases. The company indicates that many suppliers are now proactively offering lower-toxicity replacements for existing chemicals.

Greenlist can also spur development of new materials by creating a market that otherwise might not exist. As the company states in its 2004 report, “Earning Your Goodwill”, “Raw materials that may not have gotten out of trial are making it to market with sales viability to SC Johnson. This effort is truly a win for our business, our suppliers, and the environment.”⁹¹

SC Johnson has made the Greenlist process integral to its staff development process. For example, it trains new employees on Greenlist shortly after they join the company, and managers’ compensation is tied to their success in reducing product toxicity.

The company also has realized cost savings.⁹² In reformulating floor wax emulsion, the company has eliminated the most hazardous chemicals—RUMs—and has cut costs without sacrificing performance. It eliminated five such ingredients from an all purpose cleaner, again reducing cost with no sacrifice in performance. It reformulated an insecticide by eliminating a RUM active ingredient and replacing it with a natural active ingredient that improved product performance. By the end of 2002, the company had eliminated PVC from bottles globally, eliminating the use of 1705 metric tons of PVC. Chlorine bleached paper for packaging also was eliminated by the end of 2002.

In assessing surfactants, SC Johnson is identifying potential replacements for RUMs, contacting suppliers and requesting data to fill data gaps on high volume surfactants, and providing additional tools for chemists and formulators to make appropriate choices. SC Johnson also was the first consumer products manufacturer to participate in the pilot US Environmental Protection Agency “PBT-profiler” program. The company has worked closely with EPA to evaluate all SC Johnson product ingredients for possible PBT characteristics. As of 2003, 3,000 chemicals had been reviewed, with 10 classified as PBTs and added to the RUM list.

Nike. During the 1990s, along with other companies, Nike began transitioning from use of petroleum-based solvents to new water-based technologies.⁹³ By 2001, it had accomplished a nearly 90% reduction, yielding raw material savings of \$4.5 million with accompanying improvements in workplace environments. Nike has worked with both The Natural Step and McDonough-Braungart. Nike began working with the McDonough-Braungart team in 1998, focusing primarily on footwear operations. Chemicals known or suspected to have adverse effects on human health or biological systems are targeted for replacement. Nike is creating a “positive list” of preferred substances and works with its vendors to establish replacement guidelines. The first phase of Nike’s project began in 2000, focusing on chemicals targeted by national legislation in various countries. A second phase begun in 2001 focused on chemicals used in Nike’s manufacturing process. Nike has as its 2020 goal “eliminating all substances that are known or suspected to be harmful to human health or the health of biological or ecological systems.” Nike has made a priority of phasing out polyvinyl chloride (PVC) from its products. Nike notes that the vinyl chloride monomer used to make PVC is a carcinogen; PVC incineration can result in emissions of persistent, highly toxic, bioaccumulative dioxins; additives used in PVC contain toxic heavy metals such as lead and cadmium; and phthalates used to soften PVC have been identified as hormone disruptors. Nike’s commitment to phasing out PVC drew criticism from the vinyl industry. As it states in its FY2001 Corporate Responsibility Report, “We were hit with a torrent of e-mails, phone calls and letters, telling us to reconsider.” By 2002, Nike had succeeded in eliminating PVC from both its footwear and non-screenprint apparel.

Chemical Substitutions by Retailers. The concept of environmentally preferable purchasing that underlies changes in the institutional cleaning industry, the health care industry, and the selection of chemicals by consumer goods manufacturers can be extended as well to the retail sector. As noted, Friends of the Earth-UK has sought pledges from major retailers in the U.K. to reduce toxic chemicals. Marks & Spencer and Boots Group PLC were among the top-ranked retailers in FOE-UK’s 2004 survey of retailers. Other retailers scoring well included IKEA (the well-known furniture company), The Body Shop (the high profile cosmetics company), and B&Q (the prominent U.K. home maintenance do-it-yourself company).

Marks & Spencer.⁹⁴ Marks & Spencer is one of the UK’s leading retailers, once characterized by reknowned management analyst Peter Drucker as probably being “more entrepreneurial and innovative” than any other company in western Europe over five decades.⁹⁵ Marks & Spencer publishes a corporate social responsibility review that outlines both its priorities and progress across a wide range of environmental and social issues. It is implementing a program to phase out the use of 79 potentially harmful pesticides in the production of fruit, salad, and vegetables and has established a long-term goal of selling these items free from pesticide residues. In a “chemicals strategy” document, it has examined chemicals used in manufacturing its products and has assessed them against a wide range of emerging environmental concerns. “These include substances that are toxic, carcinogenic, mutagenic, endocrine (hormone) disrupting, or non-biodegradable.” The result is a “hotlist” of 15 chemicals, including chemicals targeted under the European regional agreement (OSPAR) for protection of the Northeast Atlantic and North Sea. Marks & Spencer has phased out PVC in virtually all food packaging and targeted PVC phase out in other packaging by the end of 2003.

Flame retardants, heavy metals, and phthalates are among the other chemicals on Marks & Spencer's list.

Boots Group, PLC.⁹⁶ Boots Group, a U.K.-based company, operates over 1,400 “Boots The Chemists” stores in the U.K. and the Irish Republic. Boots Group's product development and manufacturing operation launches around 1,500 new products yearly. Its nearly 70,000 employees generated sales in more than 130 countries of more than 5 billion pounds sterling (approximately \$8.5 billion) in fiscal year 2003. Boots has noted the scientific uncertainty around many toxic chemicals issues—“many of the issues remain unproven”—but adds that “at Boots we take a precautionary approach.” Put another way, “Any lack of scientific certainty surrounding an issue will not in itself be used to justify inaction.” Boots has developed a publicly-available Priority Substances List, updated periodically and available on its website, which details chemicals, actions, and targets. Evidently reflecting the company's precautionary approach, the March 2004 priority substances list indicates that Bisphenol A-based epoxy resins in permanent food contact applications, (i.e., in metal cans and metal lids on jarred food) were scheduled for elimination by mid-2004.

Pesticide Use Reduction. Pesticide use reduction represents a second approach to reducing product toxicity. Recognizing both the uncertainties associated with existing regulatory assessment methods and the broad exposures of farm families, migrant workers, and others to pesticides, pesticide use reduction represents a focused effort to reduce the quantity and/or the toxicity of pesticides applied in agricultural production. Growers' ability to reduce use of pesticides depends on numerous factors, including the cost and availability of alternative methods. Individual growers can elect to reduce use, especially where alternative chemicals and methods are known, but larger-scale efforts often are based on partnerships among food processors and growers. Where additional research on alternative chemicals and methods is required, academic researchers, often funded by companies, are essential members of reduction programs.

Research supported by Consumers Union and published in the peer-reviewed literature in 2003 documents the difference focused pesticide use reduction programs can make in terms of eliminating pesticide residues and consequent human exposure. Based on information from the Pesticide Data Program of the U.S. Department of Agriculture, the Marketplace Surveillance Program of the California Department of Pesticide Regulation, and private tests conducted by Consumers Union, the researchers found striking differences in pesticide residues among conventionally grown crops, organically grown crops, and crops marketed with Integrated Pest Management or No Detectable Residue claims. For example, 46 percent of the conventional crops in the USDA database had multiple residues of pesticides, as compared to 24 percent of the IPM/NDR samples and 7 percent of the organic samples.⁹⁷

The Gerber Products Company, now a unit of Novartis,^{§§} and Chiquita Brands, provide examples of pesticide use reduction initiatives.

Gerber Products Company. The Gerber Products Company dominates the baby food market in the United States and distributes almost 200 food products in 80 countries. Its website

^{§§} Gerber Products merged with Sandoz Ltd in 1994. Sandoz merged with Ciba-Geigy in 1996 to form Novartis.

proclaims it to be “the world’s best-known baby food company”.⁹⁸ Gerber’s pesticide use reduction efforts are especially noteworthy because its primary consumers may be especially vulnerable to toxic chemicals.⁹⁹ Gerber Products Company has a goal of no detectable pesticide residue in its baby food. To this end, Gerber has implemented a comprehensive pesticide reduction program, beginning in the farm field and ending in baby food preparation. Major program elements include IPM (Integrated Pest Management) research, educating contract growers with respect to economic-based models of IPM and working with crop consultants and scouts, full pesticide use reporting, and extensive testing for residues. Improving IPM is a core research focus of Gerber, which supports research in 16 universities on nutrient and pest management strategies for fruit and vegetable production. The company requires its growers to adhere to strict pest management practices that substantially reduce pesticide use, especially for pesticides that cannot be removed in processing. Gerber has sponsored and sometimes subsidized new agricultural techniques, even if they are more expensive, and then diffuses the practices among its growers. Like Campbell Soup, another company that has successfully reduced pesticide use (and saved money while doing so), Gerber helps its growers shoulder the risk of testing new approaches.¹⁰⁰ For example, it covers the difference in cost between a new practice and a conventional practice. Gerber also covers the loss of a crop that is part of a demonstration. However, it has never had any significant loss in yield or change in quality.

The Del Monte Company, which recently acquired the baby foods business of the H. J. Heinz Company, appears to be taking a cue from Gerber. Del Monte has set a goal of eliminating infant exposure to all detectable residues of potentially harmful chemicals. It is instituting a pesticide residue and chemical contaminant management program that includes a variety of information and compliance monitoring measures.¹⁰¹

Chiquita Brands. Chiquita Brands provides yet another example of pesticide use reduction.¹⁰² Chiquita is the second largest producer/marketer of bananas in the world, operating in 40 countries and selling in 60.¹⁰³ As a result of a campaign by Rainforest Alliance and other non-governmental organizations, principles of socially and environmentally sound banana cultivation in Latin America were developed beginning in the early 1990s, ultimately evolving into the “Better Banana Project”. The principles were complemented by certification protocols; one of the first companies to be certified was the Costa Rican subsidiary of Chiquita Brands. Ultimately Chiquita made a commitment to certify all its farms in the region. The certification program stringently regulates every aspect of agrochemical transport, storage, and application. It requires steady reductions in agrochemical use, based on analyses of soils, plants, and insect populations. Accomplishments by Chiquita include the planting of “cover crops” on all its farms to suppress weed growth, resulting in zero herbicide use in Colombia and an 80 percent reduction in herbicides in Costa Rica. There has been an overall reduction of nematicides by 50 percent and the total removal of the pesticide Paraquat from all farms. By 2000, the Better Banana Project had certified roughly 10 percent of the commercial banana production in Latin America and the Caribbean.

Conclusion

The “business case” for promoting reduced product toxicity is powerful. It addresses both the tangible and intangible business concerns of executives. As described in the previously-cited

reports of the Global Environmental Management Initiative and in such recent books as “The Sustainable Company: How to Create Lasting Value Through Social and Environmental Performance” and “The Sustainability Advantage: Seven Business Case Benefits of a Triple Bottom Line”, these business concerns and rewards can include:

- Improved worker safety
- Reduced insurance costs
- Cost savings from waste reductions and energy efficiencies associated with process changes
- Reduced regulatory hurdles and speeded time to market
- Increased market share and competitive advantage
- Enhanced corporate reputation and avoidance of adverse publicity
- Increased corporate productivity associated with lowered occupational risks, reduced employee turnover, and lowered recruitment costs
- Lowered vulnerability to toxic torts litigation
- Easier financing/reduced cost of capital¹⁰⁴

Corporate directors, as they diligently identify and manage risks for the long term, sustainable benefit of shareholders, must also pay attention to these considerations.

Investment organizations employing environmental screens may wish to add a product detoxification screen to their armamentarium. Organizations devising socially responsible investment indices may wish to add product detoxification as a criterion when evaluating corporate performance and making judgments about “best in class”. Investors concerned about enhancing corporate profits and reducing future liabilities may want to press corporate management to launch chemical substitution efforts and to increase disclosure about progress.

The converging pressures outlined in this brief present sizeable risk, but they also represent substantial opportunity. Companies whose corporate cultures still view “environment” primarily through the mental lens of compliance requirements and regulatory burdens are unlikely to appreciate this opportunity fully. In contrast, nimble, innovative, entrepreneurial consumer goods companies will seize it. Through shrewd product evaluations, research, and more creative partnerships with suppliers, they can select a future path leading to enhanced profitability, a reduced ecological footprint, and a healthier future for all.

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- ³ Great Lakes Chemical Corporation Press Release, “Thanks to New Product Technology, Great Lakes Chemical Corporation Announces It Will Cease Production of Penta-PBDE Flame Retardant by End of 2004”, November 3, 2003.
- ⁴ “New Research Challenges Assumptions About Popular Flame Retardant,” Environmental Science and Technology Science News (November 6, 2003). http://pubs.acs.org/subscribe/journals/esthag-w/2003/nov/science/kb_flame.html. (Accessed November 7, 2003). See also, Ronald A. Hites, “Polybrominated Diphenyl Ethers in the Environment and in People: A Meta-Analysis of Concentrations,” Environmental Science and Technology, February 15, 2004, pages 945-956.
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- ⁶ See “Perfluorinated Chemicals: Jumping From Frying Pan to Fire?” ENDS Report, July 2004.
- ⁷ See Amy Cortese, “DuPont’s Teflon Dilemma: How Chad Holliday, the Champion of Sustainability, is Managing an Environmental Challenge,” *Chief Executive* (Issue 193, November 2003).
- ⁸ Report in the journal *Environmental Science and Technology*, cited in “Teflon Mystery Raises Safety Questions”, Philadelphia Inquirer, September 19, 2004.
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- ¹⁰ “DuPont’s Teflon Dilemma...”
- ¹¹ “Teflon Maker Sets Aside \$45 million for Defense in Chemical Trial”, Associated Press, July 28, 2004.
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- ¹⁷ Toxicological Profile..., page 205.
- ¹⁸ Toxicological Profile..., page 205.
- ¹⁹ Toxicological Profile..., page 205.
- ²⁰ Global Assessment..., page 128.
- ²¹ Toxicological Profile..., page 207.
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- ²⁷ “Are U.S. Homes a Haven for Toxins?” Environmental Science and Technology, November 1, 2003, page 407A.
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- ³³ www.psr.org (Accessed February 17, 2004).
- ³⁴ www.preventionisthecure.org (Accessed February 17, 2004).
- ³⁵ www.protectingourhealth.org (Accessed February 17, 2004).

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- ³⁷ See www.eeb.org/activities/chemicals/Index.htm (Accessed June 7, 2004)
- ³⁸ See www.foe.co.uk/campaigns/safer_chemicals/press_for_change/league_table/pledge.html (Accessed June 7, 2004)
- ³⁹ See <http://www.nottoopretty.org/eudecision.htm>. (Accessed February 17, 2004).
- ⁴⁰ <http://www.insightinvestment.com/responsibility/bulletin/Spring2004/reach.asp>.
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¹⁰¹ Del Monte’s efforts are described on the website of the U.S. Environmental Protection Agency Pesticide Environmental Stewardship Program (PESP). PESP features information exchanges among multiple voluntary partnerships designed to reduce pesticide risks. See www.epa.gov/oppbppd1/PESP/strategies/2004/delmonte04.htm. (Accessed May 18, 2004).

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Annex 1—Selected Shareholder Chemical Alternatives Resolutions and SEC Letters

Apple, Compaq, Dell, Gateway, Hewlett Packard, IBM

2002 resolutions requesting Board of Directors' report on feasibility of adopting policy, implementing program, and auditing progress of producer responsibility for products. Report to be produced within six months of annual shareholder meeting. Apple and Dell resolutions withdrawn by Calvert because of positive company responses. Compaq merged with HP, Gateway resolution received 7.8% of votes, HP resolution received 8% of votes, and IBM resolution disallowed by SEC on technical grounds.

Abbott Laboratories

June 27, 2001 letter from multiple Socially Responsible Investment groups to SEC seeking SEC advice to Abbott re PVC, DEHP and emerging health science issues. (There had been a 1999 shareholder resolution re PVC.) Letter also sought general SEC staff guidance re corporate publicizing of relevant emerging science.

2003 shareholder resolution requesting company to phase out production of PVC- and phthalate-containing medical supplies "where safe alternatives are available" Resolution filed by ICCR withdrawn.

Avon

2003 shareholder resolution requesting company report by October 2003 evaluating feasibility of removing, or substituting with safer alternatives, all parabens from products. Resolution filed by Domini and Breast Cancer Action received 6.18% of votes. A 2004 resolution supported by Breast Cancer Action and others received 8.7% of votes.

2003 resolution seeking report by October 2003 on feasibility of removing dibutyl phthalate from products. This resolution by Trillium withdrawn on technical grounds. Avon announced just prior to its 2004 meeting that it plans to remove dibutyl phthalate from products in Europe to comply with an EU ban and would study the feasibility of reformulating all products without DBP.

Baxter International

In March 1999, in exchange for withdrawal of a resolution by religious groups and a labor union, Baxter International agreed to produce a list of its products containing PVC, to develop a timetable to replace PVC in intravenous solution containers, and agreed to update shareholders on steps towards replacing PVC in other medical products.

Bristol-Myers Squibb and Tyco

2002 shareholder resolution asking Bristol-Myers Squibb to phase out production of PVC-containing medical supplies. Resolution withdrawn by ICCR.

2003 shareholder resolution led by Christian Brothers Investment Services and Catholic Healthcare West asking Tyco to adopt policy of phasing out production of PVC-or phthalate-containing medical supplies. Resolution received 2.91% of votes. 2001 resolution received 7.9% of votes.

2004, new Tyco management, replacing old management discredited by corporate scandal, urged shareholders to vote “yes” on a shareholder resolution led by Christian Brothers Investment Service asking the company to assess its corporate-wide environmental management system

Cardinal Health and HCA

2002 resolution asking Cardinal Health Board of Directors to report to shareholders by September 1, 2002 on efforts to adopt a policy of phasing out use of mercury-containing devices by January 1, 2005. Resolution withdrawn by Walden. 2001 resolution also. Cardinal agreed to the phase out.

2002 resolution asking HCA Board of Directors to report as per Cardinal Health resolution above. Resolution withdrawn. HCA agreed to take the requested action.

Dow

2003 resolution requests a company plan and timeline for phasing out each product containing a persistent, bioaccumulative chemical or byproduct, or an explanation of why alternatives cannot be substituted, explaining how the company will respond to rising regulatory, competitive, and public pressure. Also a company report by October 2004 on how REACH and other prospective legislation will affect Dow Chemical’s products. The resolution received 6.9% of votes.

General Electric

2003 shareholder resolution requesting Board of Directors report on site-specific annual expenditures (1990-1999) related to PCBs and hazardous substance laws and regulations, to include attorney and expert fees and lobbying and public relations costs. Resolution received 25.6% of votes. 2002 shareholder resolution roughly along same lines received 21.7% of votes. 2001 resolution received 10.6% of votes.

Georgia Pacific, Mead, Weyerhaeuser, Willamette Industries

2001 shareholder resolutions requesting reports on environmental liabilities. Georgia Pacific resolution withdrawn, Mead resolution omitted, Weyerhaeuser resolution received 4.59% of votes, Willamette Industries resolution omitted. Resolutions based on research by World

Resources Institute showing corporate failure to report environmental liabilities in contravention of SEC guidelines.

Kimberly-Clark and Weyerhaeuser

2003 shareholder resolution requesting Kimberly-Clark Board of Directors to adopt policy of phasing out manufacture of PVC-containing medical products, where safe alternatives are available. ICCR withdrew resolution. Kimberly-Clark agreed to note issue in their environmental report.

2002 shareholder resolution requesting Kimberly-Clark to phase out of chlorine-bleached paper. ICCR withdrew resolution.

2001 resolution requesting Weyerhaeuser to report on phasing out chlorine in papermaking. Received 3.4% of votes.

Kodak and ChevronTexaco

2003 shareholder resolution requesting Kodak to adopt plan for virtual elimination of bioaccumulative halogenated pollutants, identifying inputs of chlorine and bromine, sources of dioxin and other bioaccumulative pollutants, and options for eliminating generation of these pollutants. Resolution received 6.4% of votes.

2002 shareholder resolution asking Chevron/Texaco to take same steps as Kodak above and to report annually to shareholders. ICCR resolution received 5.395% of votes. 2001 resolution (Chevron only) received 7.5% of votes.

SUPERVALU and JC Penney

2003 Shareholder resolution requesting SUPERVALU Board of Directors to adopt policy of phasing out sale of mercury thermometers. Resolution withdrawn by Brethren Benefit Trust. SUPERVALU has phased out mercury thermometers.

2002 resolution requesting J.C. Penney Board of Directors to adopt policy of phasing out sale of mercury thermometers by December 31, 2002. Walden withdrew resolution. J.C. Penney's Eckerd pharmacy chain has phased out mercury thermometers.

Annex 2--Selected Activist Internet Resources on Chemical Exposure-Disease Linkages

- www.environmentalhealthnews.org

By clicking on the “subscribe” button at this website, one can subscribe at no cost to “Above the Fold”, a daily news update from Environmental Health News. Above the Fold provides daily links to top news stories published in English news sources from around the world.

This service provides a useful means of “taking the pulse” of media attention to environmental health issues.

- www.rachel.org

This is the homepage of the Environmental Research Foundation, publisher of “Rachel’s Environment and Health News”. Published several times each month, Rachel’s features 4-5 page summaries of major developments by editor Peter Montague and guest writers. Each issue focuses on one major topic, but sometimes several consecutive issues are devoted to a particular topic to allow for detailed coverage. Rachel’s characterizes itself as one of the few newsletters serving grass-roots environmental justice and toxics activists with important information on cutting edge environmental news and policy. It summarizes not only scientific information, but also such new policy developments as the “precautionary principle” and the European Union’s new chemical management policies. Free on-line subscriptions are available, and archives of back issues are searchable.

- www.protectingourhealth.org

This is the science website for the Collaborative on Health and the Environment (CHE). This website summarizes scientific evidence on the connection between health disorders and environmental exposures. The disorders discussed are asthma, brain cancer, breast cancer, childhood leukemia, endometriosis, infertility, learning/behavioral disorders, prostate cancer, and testicular cancer. Each disorder has its own section with a review of the disorder, a peer-reviewed analysis, news on recent results and scientific papers, references, and links. Also included are recent news articles on important research, essays, commentaries, and conference and workshop notices. This website is still in development.

- www.sfms.org

The website of the San Francisco Medical Society provides access to the on-line copy of the November-December 2002 issue of the society’s journal, *San Francisco Medicine*. This issue, “Environmental Health: Emerging Science and Collaborations” provides excellent short overviews of different facets of environmental health. The 1-4 page articles include the consensus statement from the Collaborative on Health and Environment and other useful synopses. For the table of contents and links to the articles, see <http://www.sfms.org/sfm/sfm1102.htm>.

- www.psr.org

The Environment and Health section (www.psr.org/home.cfm?id=environment) of this Physicians for Social Responsibility website is the entry point for finding information on children’s environmental health, air pollution and health, chronic disease and the environment, and safe drinking water. Each section provides a page long description and related links (e.g., under “Toxics” one can find a section on Persistent Organic Pollutants

[POPs] and heavy metals). Also included are press releases, links to related reports by other organizations, and information on how the public can take action.

The chronic disease and environment section (www.envirohealthaction.org/environment/disease_environment/) contains links to .PDF files of two PSR reports, one on non-Hodgkin's Lymphoma and a second on Parkinson's Disease. A third report, on diabetes, is forthcoming.

The site also features a copy of *Bearing the Burden: Health Implications of Environmental Pollutants in our Bodies*

http://www.envirohealthaction.org/upload_files/Bearing%20the%20Burden%20summary.pdf
This body burden report is a companion to the CDC's 2003 Second National Report on Human Exposure to Environmental Chemicals. The Executive Summary describes PSR's interpretation of the CDC report data. The rest of the report is primarily toxicological profiles of contaminants generally found in humans with discussion of associated health effects.

- www.childenvironment.org

This website is organized by staff of the Center for Children's Health and the Environment at Mount Sinai School of Medicine in New York City, although it is not an official publication of Mount Sinai. It features .PDF files of advertisements run in the New York Times in 2002, and background scientific summaries, focusing on links between toxic chemical exposures and human health. The advertisements address such issues as learning disabilities and behavioral problems, childhood brain cancer, contaminated breast milk, and reproductive problems. The site also contains numerous links to official government sites on environmental health.

- www.cehn.org

This website is sponsored by the Children's Environmental Health Network, a national multi-disciplinary organization whose mission is to protect the fetus and the child from environmental health hazards and promote a healthy environment. The website contains a useful resource guide containing profiles of organizations and projects. It can be searched numerous ways, including by toxicant, health effect, exposure route, or social or political factor (e.g., right-to-know).

- www.chechnet.org

This website is sponsored by the Children's Health Environmental Coalition, whose mission is to inform parents and all those concerned with the welfare of children about preventable health and development problems caused by exposures to toxic substances in homes, schools and communities. Its HealtheHouse feature provides information on how to reduce environmental health risks to children in and around the home.

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- www.ourstolenfuture.org

This website (named for the book *Our Stolen Future* and run by one of the book's authors) is a resource for information on hormone disrupting chemicals (a/k/a endocrine disruptors). It is updated regularly with information about recent news stories and scientific articles related to different aspects of hormone disruption. This searchable site includes information on specific chemicals, associated health effects, health trends, low dose effects, and regulatory policy. Also included are consensus statements from conferences and workshops on the subject of hormone disruption, information that dispels certain hormone disruptor myths, and links to other informative websites.

- www.noharm.org

This website is supported by Health Care Without Harm, an international coalition of 431 organizations in 52 countries. HCWH's goal is to transform the health care industry worldwide without compromising patient safety or care, so that industry practices are not a source of harm to public health and the environment. HCWH also works collaboratively with the American Hospital Association, American Nurses Association and EPA in the "Hospitals for a Healthy Environment" project. This website focuses on such topics as polyvinyl chloride (PVC), incineration, healthy buildings, mercury, pesticides and cleaners, and green purchasing practices. The website includes background information (including information on alternatives), reports, press releases, and other resources. The site is searchable and includes links to local organizations.

- www.breastcancerfund.org

The Breast Cancer Fund, based in San Francisco, is one of the leading organizations in the United States emphasizing reduction in exposures to toxic chemicals as a means of preventing breast cancer. It is promoting biomonitoring programs and has produced a 30 page report, "State of the Evidence: What is the Connection Between Chemicals and Breast Cancer?" The text of the executive summary and a link to a .PDF file of the entire report are available at www.breastcancerfund.org/environment_evidence_main.htm.
www.preventingharm.org

This website, sponsored by the Clean Water Fund, focuses on children and the environment. The Download Center section of the website contains fact sheets for physicians and the public on how chemical exposures affect human health. This site offers a link to a downloadable version of the full text and executive summary of *In Harms Way*: (<http://www.preventingharm.org/execsum.html>) This report by Ted Schettler *et al.* examines the contribution of toxic chemicals to neurodevelopmental, learning, and behavioral disabilities in children. These disabilities are clearly the result of complex interactions among genetic, environmental, and social factors that impact children during vulnerable periods of development. Toxic exposures deserve special scrutiny because they are preventable causes of harm.

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- www.ewg.org

This is the website of the hard-hitting Environmental Working Group. Featured topics include perfluorinated chemicals (such as those used by DuPont to make consumer products), perchlorate used in manufacturing rocket fuels, arsenic in decks and play sets, mercury in tuna, and phthalates in cosmetics.

- www.nottoopretty.org

This website, sponsored by Health Care Without Harm in collaboration with other organizations, focuses on phthalates in cosmetics. Phthalates have been shown in animal studies to pose a hazard to numerous body organs. In January 2003, the European Parliament voted to prohibit the use of two specific phthalates in cosmetics.

- www.safecosmetics.org

This is the website of “The Campaign for Safe Cosmetics” that began in 2002. Noting Europe’s ban on known or suspected carcinogens, mutagens and reproductive toxins in cosmetics, the campaign asks cosmetics companies to make safer products available in all markets worldwide where they sell their products. Companies are asked to sign “The Compact for Global Production of Safer Health and Beauty Products”. Signers of the pledge commit to implement substitution plans that replace hazardous materials with safer alternatives within three years. They commit to inventorying chemicals in their products, seeking out and substituting safer alternatives, and publicly reporting on progress to meet these goals.

- www.cleanproduction.org

Clean Production Action (CPA) partners with environmental organizations, public health advocates, labor unions and community groups around the world to develop and build technical support for clean production policies. These policies and strategies promote the use of products that are safer and cleaner across their life cycle for consumers, workers, and communities. Current projects focus on building links between North American and European efforts on extended producer responsibility and the substitution of hazardous chemicals in products and production processes. CPA has asked companies in numerous sectors to sign “The Safer Products Pledge”. The pledge commits companies to replace hazardous materials with safer alternatives within three years. Component actions of the pledge include inventorying chemicals of concern in products, moving to safer chemicals, conducting a continuous review, working with upstream suppliers to provide toxicity data, and publicly reporting on progress in meeting these goals.

- www.svtc.org

This is the website of the Silicon Valley Toxics Coalition, which works domestically and in international networks on problems associated with use of toxic chemicals in producing high-

technology products such as computers. SVTC is deeply involved in product stewardship campaigns to encourage or require computer manufacturers to take back used computers. The site also provides information on “green design” and on European product stewardship initiatives.

- www.healthybuilding.net

This is the website of the Healthy Building Network, a network of green building professionals, environmental and health activists, socially responsible investment advocates, and others interested in promoting healthier building materials as a means of improving public health and preserving the global environment. Its website features information about healthy building practices for the healthcare industry, PVC and vinyl, and its campaign to transform the pressure-treated wood industry.

- www.mercurypolicy.org

This is the website of the Mercury Policy Project. The project promotes policies at all levels of government to eliminate mercury uses and to reduce mercury exposures. The website tracks major science and policy developments pertaining to mercury, contains the text of model mercury legislation that is reflected in most recent U.S. state and federal legislation on mercury, and contains links to and texts of reports.

- <http://sustainableproduction.org>

This is the website of the Lowell Center for Sustainable Production at the University of Lowell in Massachusetts. Center projects include research and training on clean production, analysis and advocacy of “the precautionary principle” in public policy for toxic chemicals, and promoting awareness in the United States of European toxic chemical policy initiatives.

- www.wwf.org.uk/chemicals/

This website is the homepage of the Chemicals and Health Campaign of WWF-UK. WWF-UK is campaigning, along with other WWF organizations in Europe, for major reform of the European Union’s policies for managing chemical hazards. The publications portion of the website (www.wwf.org.uk/chemicals/publications.asp) connects to the results of WWF-UK’s UK-wide biomonitoring survey of human blood, briefing papers on chemicals and human health, chemicals and wildlife, and chemicals and health in Europe, and reports on the social cost of chemicals and the impact of new chemical regulations on innovation in the chemicals sector.

- www.panda.org/campaign/detox/index.cfm

This web page provides entrée to the DeTox Campaign of the WWF family of organizations. The DeTox Campaign lobbies for enactment by the European Union of a strong new REACH law for improved management of hazards from toxic chemicals. Calling for “Safer

Chemicals for a Healthier Future”, this campaign website provides links to downloadable reports on European toxic chemical policy initiatives and on hazards from specific chemicals. These documents include reports and statements produced in cooperation with other leading European advocacy organizations.

- www.greenpeace.org.uk

This is the website of the UK branch of Greenpeace. Laboratory analyses sponsored by Greenpeace-UK’s toxics campaign have detected hazardous chemicals in such consumer products as children’s pajamas, toys, baby feeding bottles, perfumes, and paints. Greenpeace-sponsored analyses also detected hazardous chemicals in house dust, which can contribute to exposures to these chemicals in the home. “The Chemical Home” is an interactive portion of the website where consumers can find which chemicals may be present in their bodies and which household products are responsible.

Annex 3--Selected International, European, and U.S. State and Local Policy Initiatives on Toxic Chemicals

International

Stockholm Convention on Persistent Organic Pollutants. The “POPs Convention” is an international treaty that entered into force in May 2004. It initially addresses 12 POPs chemicals and classes of chemicals, most of which are pesticides that had been previously banned or regulated in the United States and Europe. Under the Stockholm Convention, releases of dioxins and PCBs should be prevented or minimized, while most other chemicals’ use is banned immediately. In August, 2004, the European Commission announced that it wished to add 9 additional contaminants to the convention, including the octa- and penta- forms of PBDEs. (Other international treaties—the Rotterdam and Basel Conventions—govern the import and export of various toxic chemicals.)

Europe

Cosmetics Directive. In February 2003, the European Union amended its “Cosmetics Directive” [76/768/EEC] to prohibit the use of known or suspected carcinogens, mutagens and reproductive toxicants (CMRs) in cosmetics. By September 2004, cosmetics sold in EU countries must not contain these CMRs.

EU Restrictions on Chemicals in New Electrical and Electronic Equipment. The “Restriction of Hazardous Substances in Electrical and Electronic Equipment Directive” [2002/95/EC] (the ROHS Directive), outlaws the use of six individual and classes of chemicals in new electrical and electronic equipment. Effective July 1, 2006, products cannot contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs), or polybrominated diphenyl

ethers (PBDEs). Certain exemptions, reviewable every four years, are provided, and in February 2005 the European Commission will review new scientific evidence pertinent to the directive.

EU Requirements for Manufacturers and Distributors to Recycle Used Electrical and Electronic Equipment. The “Waste Electrical and Electronic Equipment Directive” [2002/96/EC] (the “WEEE Directive”), aims to reduce the waste arising from electrical and electronic equipment. By August 2005, manufacturers, sellers, and distributors will have increased financial responsibility for managing waste goods. By December 2006, producers will be required to achieve a series of demanding recycling and recovery targets for different categories of appliances. WEEE influences the choices companies make about the chemicals used in their products.

OSPAR Convention. The OSPAR Convention on the Protection of the Marine Environment of the North-East Atlantic came into effect in 1998, replacing the 1972 Oslo Convention on dumping waste at sea and the 1974 Paris Convention on land-based sources of marine pollution. The OSPAR Commission, representing the governments of the 15 contracting nations and the European Commission, oversees implementation of the agreement. The hazardous substances component of the agreement has as its goal the elimination of discharges of hazardous substances within one generation—by 2020. It calls upon signatory parties to prevent and where possible eliminate pollution. The convention incorporates precautionary “polluter pays” principles and the strategy for hazardous substances incorporates the principle of substitution, “i.e., the substitution of hazardous substances by less hazardous substances or preferably non-hazardous substances where such alternatives are available.” The commission has published a list of priority substances for control and additional substances of concern. It specifically invites industry’s cooperation in the promotion of “green chemistry”, including the “encouragement of the use and development of environmentally sound products and the development of less hazardous, or preferably non-hazardous, substances.” For further details, see <http://www.ospar.org/eng/html/content.htm>

REACH. REACH is a proposed integrated chemicals management regulation whose enactment is being considered by the European Union. REACH is an acronym for Registration, Evaluation, and Authorization of Chemicals. Under development for several years, the most recent version of REACH was proposed in October 2003. The final version of remains to be determined by the European Parliament and Council of Ministers. The Registration component of REACH increases the burden of proof and public reporting on companies with regard to the safety of their chemicals. Chemicals of greatest concern based on their inherent hazardous characteristics will have to undergo an authorization process to continue their use. Chemicals would be phased out and replaced by safer alternatives, unless industry can show adequate control of the risk from their use or that the chemicals’ socio-economic value outweighs the risks. Chemicals of very high concern include, for example, carcinogens, mutagens and reproductive toxicants, very persistent and very bioaccumulative substances, and endocrine disruptors.

U.S. State and Local Governments

California. California has earned a strong reputation for its innovations at the state level in environmental management. Because of the enormous size of the California market, state actions can resonate through the national U.S. marketplace. For example, in 2003, California's ban on the penta- and octa- forms of PBDEs by 2008 contributed to a national voluntary phaseout of these chemicals by Great Lakes Chemical Corporation. In mid-August 2004, as this brief was being completed, California's Assembly and a Senate committee had passed a bill outlawing carcinogens, mutagens, and reproductive toxicants in cosmetics. California's governor had signaled his willingness to sign the bill. In 2004, California's state legislature considered enactment of the first-ever statewide biomonitoring program in the United States. The bill passed the State Senate but failed to secure the 10 votes needed (the vote was 9-5) to pass in a State Assembly committee. The San Francisco enacted an ordinance adding a "precautionary principle policy statement" to the city and county environment code, intending it to help promote environmentally healthy alternatives. San Francisco's Board of Supervisors has also adopted a resolution supporting Europe's REACH initiative endorsing policies to promote safer alternatives and to shift the burden of proof to industry to develop information on the environmental and health effects of chemicals.

Maine. Like California, Maine enacted legislation to ban the penta- and octa- forms of PBDEs. Maine also outlawed the deca- form by 2008 unless certain exemption requirements are met. Maine has also taken pioneering action on mercury. The state has enacted laws banning the disposal of mercury products (requiring collection for recycling instead), required new products to be labeled, and has established a consumer right to know regarding the mercury content of products sold in Maine. Automakers are required to fund a system to collect and recycle mercury switches from old cars, a precedent in the US for manufacturers to take responsibility for toxic products at the end of their useful life.

Massachusetts. In 1989, Massachusetts enacted the pioneering Toxics Use Reduction Act (TURA) to promote safer and cleaner production. Under TURA, companies that use toxics above a certain quantity must report on their use and do TUR planning. In late 2003, "An Act for a Healthy Massachusetts: Safer Alternatives to Toxic Chemicals" was introduced into the state legislature. It would create a program to replace toxic chemicals with safer alternatives, beginning with 10 named chemicals and chemical classes. The bill requires the state Department of Environmental Protection to develop an action plan for each chemical that includes use, emissions, and alternatives analyses, and timelines for substituting safer alternatives. The bill was not enacted but will be reintroduced in the next legislative session. This and other environmental health legislation is supported by a broad-based coalition of civic, public health, labor, and community organizations, The Alliance for a Healthy Tomorrow. In October 2003, the Boston City Council passed a resolution encouraging elimination of dioxin emissions through city procurement practices, giving purchasing preference to products that do not generate dioxins during manufacture or disposal.

Washington. In 2000, the State of Washington's Department of Ecology proposed a program to phase out persistent, bioaccumulative, toxic chemicals by the year 2020. The proposal

encountered strong opposition from industry in Washington, leading to elimination of its funding by Washington's legislature in 2003. However in 2004, the state legislature agreed to provide funds for the state departments of ecology and health to develop an action plan for PBDEs. Additional sums were provided to implement a 2003 action plan for reducing exposure to mercury and for establishing criteria and procedures for selecting additional toxic chemicals for action plans in the future.