PRECAUTIONARY PRINCIPLE PROJECT

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Pollution is Personal

Precaution: Our Lives Depend on It

Pollution is personal. Chemical pollutants are found in our breast milk, sperm, and amniotic fluid, as well as our fatty tissue, blood, bone, and urine. There have been alarming increases in the incidence of certain diseases including breast, testicular and other cancers, endometriosis, and asthma. These diseases have suspected links to environmental pollution and their increase mirrors the increase in toxic chemical production, use, and release. While illness is the result of a complex interaction of genetic, social and environmental factors, the increased incidence of these diseases cannot be completely explained by non-environmental causes. Now is the time to focus on the environmental connection.

Statistics have been called tragedies with the tears wiped away. Thinking of the people affected by public health and environmental policies, we need to begin to practice precaution in relation to toxic threats, as if our lives depended on it -- because they do.

Many Disease Rates are Rising

- In 1950 about 25% of all Americans were diagnosed with cancer at some time in their life; by 1997 that figure had risen to 40%.
- The incidence of testicular cancer has doubled in the past 20 years in the U.S. 1
- The likelihood of a woman in the US developing breast cancer during her lifetime has gone from 1 in 20 in 1960 to 1 in 8 in 1999.
- A 53% decline in sperm count over the past 50 years has been documented among men in parts of all industrialized countries.
- The prevalence of Type I (insulin dependent) diabetes doubled between 1964 and 1981, and continues to increase each year.

**** Note:** That the population is living longer does not explain overall increases in cancer, particularly in childhood cancers. They are similarly not completely explained by better detection and earlier diagnoses.

The Problem Especially Affects Children

- The incidence of childhood cancers increased by 10.2% between 1973 and 1991. One in every 400 North American children is expected to develop cancer before age 15.
- There are now 5.5-million girls and women in the U.S. and Canada who have endometriosis. The percent of women with endometriosis reporting symptoms before the age of 15 has jumped from 15 percent in the mid-1980s to 38 percent in 1998.
- The prevalence of asthma in children ages 6 to11 has increased 58% from 1971 to 1980.
- 17% of children (12 million) up to age 18 have been reported to have one or more developmental disability
- At least 3 to 6% of children in the U.S. have been diagnosed with ADHD (Attention Deficit Hyperactivity Disorder) and the rates may in fact be much higher.
- Within the state of California, the number of children entered into the Autism Registry increased 210% between 1987 and 1998.

Synthetic Chemicals are Exploding into the Marketplace

- Most synthetic chemicals were introduced in large quantity after World War II. The U.S. production of synthetic chemicals increased 100-fold from 1920 to the end of the 1980s. Total production of the top 50 chemicals in commerce in 1993 was 685 billion pounds--more than 2400 pounds per person.
- There are more than 75,000 synthetic chemicals now in use (EPA 1996 TSCA Inventory), but fewer than 1,600 of them have been tested for carcinogenicity.
- In the U.S. about 2.23-billion pounds of pesticides are used each year; 82% of U.S. households use pesticides; 50% use weed killers; and 50% use flea treatments.
- Pesticides are designed to kill living organisms, but only about 10% of pesticides in common use have received comprehensive toxicological testing.
- In 1994, 2.26-billion pounds of toxic chemicals were released into the environment; 177-million pounds of them were known carcinogens. This figure is just for direct emissions from manufacturing facilities. However, it is suspected that the main sources of exposure to persistent toxics are the products themselves, not the manufacturing processes that create and use them. We don't even know the levels of toxics to which we are exposed from products we use.
- Forty possible carcinogens have been found in drinking water, 60 in the air, and 66 on food crops.
- Chemical production continues to grow at rate of 3.5% each year, doubling every 20 years

Many Toxic Chemicals are in Our Bodies, in Breast Milk, and in Newborns

- Residues from 177 different organochlorines (carbon-based substances that have chlorine as one of their constituent molecules) can be detected in the body of an average middle-aged U.S. man. Many of these residues are from known or suspected carcinogens.

- Dioxin is present in humans in amounts at or near those known to cause metabolic and immune changes in lab animals.
- Mercury now contaminates fish so severely that it has triggered more than 1,600 government warnings against eating certain freshwater fish. Even frequently eaten commercial fish such as tuna, swordfish, and shark are frequently found to have unsafe levels of mercury. "According to EPA estimates, 1.16 million women of child-bearing age eat sufficient amounts of mercury-contaminated fish to pose a risk of harm to their future children" (*In Harm's Way,* 2000).
- Despite the fact that DDT has been banned from use in this country since 1972, everyone in the U.S. has detectable levels of DDT and PCBs in their tissues..
- In1976 about 25% of human breast milk in the U.S. was too contaminated to have been sold as food; there is evidence that at least some of these contaminants are passed on to nursing babies.
  PCBs, pesticides, and phthalates have been found in umbilical cord blood of some newborn children.
- Lead, an element not naturally found in the body, is now present in the bodies of humans and all other living things on the planet. About 4.4-million women of childbearing age may have blood lead levels higher than the maximum safe levels for fetuses.
- The Inuit people, who live near the Arctic Circle, and other populations that live far from sites of manufacture or use of synthetic chemicals have some of the highest body burdens of persistent toxic chemicals because of the global dispersion of these chemicals.

How We Know About Pollution's Affect on Human Health

While the links to disease of many chemicals have not been conclusively proven scientifically, suspicions about their toxicity and effects warrant caution in their use. Sources of evidence for health effects are:

Occupational studies: A number of known carcinogens were discovered initially through studies of workers' diseases. Links between cancers and vinyl chloride, chimney soot, arsenic, uranium, aniline dyes, and asbestos were all first found in those exposed in their workplaces. We can think of workers as the guinea pigs of our society. It is workers that we study to understand the health effects of chemicals.

Environmental Epidemiology: Studies that compare people who have been exposed to high levels of environmental hazards with other people who have been exposed to lower levels or have not been exposed, help us to see what health effects environmental exposures may cause. These studies are important but difficult to do. Often groups of exposed people are small, so it is difficult to tell if their exposures caused their health problems (in scientific terms, to get a statistically significant result).

Animal studies are critical for predicting potential health effects of chemicals on humans. While it is complicated to extrapolate from animal studies to humans, such evidence is an important tool for recognizing potential effects in humans, and often provides enough information to act to prevent exposure in the absence of direct human

evidence of harm. The same is true for studies of wildlife and domestic animals, which can serve as sentinels for human health effects of environmental toxins.

In Vitro Cell Studies: Evidence from isolated human or animal cells studied in the laboratory provides information to support other scientific data in the decision-making process. For example, evidence of a chemical's ability to mimic estrogen can quickly and cheaply be obtained through studies on human breast cancer cells. While such studies do not provide proof that the effects will occur in humans, these studies provide an indication of the potential for human effects and an opportunity for preventive action. They can also identify early subtle effects that wouldn't be obvious in whole animals or people.

There is much that we do not know. Traditionally we have studied chemicals and their effects one at a time; however, most of us are exposed to many chemicals at home, at work, in our gardens, etc. We do not have good ways to study the effects of exposure to mixtures of chemicals or the cumulative effects of multiple exposures over a lifetime. Thus, we probably underestimate the impact of our exposure to chemicals because our estimates assume that the exposure being studied is the only one we experience.

Examples of How Pollution Effects Our Health

Neurological effects: Mercury, lead and other heavy metals readily pass from a mother's blood to the fetus, where they can damage the developing nervous system. Recent results from a long term study in the Faroe Islands found that 7 year olds who had been exposed to even low levels of mercury while in the womb had deficits in attention, memory and language.

Mercury is emitted to the air by coal-fired power plants and trash incinerators. It is washed into waterways and builds up rapidly in the food chain. Various fish species have levels of mercury that are unsafe for children and women of child-bearing age to eat on a regular basis. Power plants are still not tested or controlled for mercury, and air quality guidelines ignore the problem of food chain accumulation.

Cancer: Benzene is an organic chemical whose ring-like structure forms the foundations for many other industrial chemicals. It is most widely used as a gasoline additive. Benzene and related compounds (such as toluene) are also used as solvents or reactants in the ink and dye, oil, paint, plastics, rubber, adhesives, chemical, and drug industries. It is among the 50 most released industrial chemicals in the United States, with 9.54 million lbs. released to the air, water, and land from manufacturing facilities in the United States in 1994. This figure does not include the amounts of benzene released to the air from gasoline pumping and auto emissions. Benzene attacks the blood and its components. Its potent toxicity to blood was first described in the 19th century. A relationship between benzene exposure and myelogenous leukemia was first reported in workers 1927. Since then, evidence in workers and laboratory experiments have proven that benzene exposure causes acute and chronic blood

diseases including various types of leukemia, and is likely to cause various other types of lymph and tissue related cancers. Benzene may be the most widely used and dispersed chemical carcinogen. EPA estimates that the air in every county in the United States has more benzene than is safe.

Reproductive effects: Chlorpyrifos, one of the most widely used pesticides, belongs to a class of organophosphates originally developed as nerve warfare agents. In animal studies it has been linked to adverse reproductive and developmental effects, including birth defects, neurobehavioral impairment, hyperactivity, and motor dysfunction, and it has even been shown to decrease synthesis of the building block of life, DNA. Yet it is one of the top 5 pesticides used in residential settings, accounting for one-quarter of all home use by pounds, and is also regularly used in schools, day care centers, hotels, restaurants and hospitals. Its breakdown chemical has been found in the urine of a representative sample of over 80% of the adult population, and in 92% of children tested in a recent Minnesota study.

Climate Change: Infectious diseases such as encephalitis, dengue fever, hanta virus, and malaria; respiratory problems such asthma; and water borne toxin-related illnesses such as cholera and shellfish poisoning; may all become more frequent in the United States and other countries as a result of climate change. These are some of the human health effects that are predicted to occur as a result of shifting weather patterns and temperature changes that can cause disease “carriers” to move into new places, air pollution to increase, and bacteria to thrive in warmer and wetter climates. Other effects that may well be magnified include crop failures, droughts, floods, hurricanes, and rising sea levels, which all have effects on human and ecological health.

Why We Got Here: A Failure to Act

Current laws and regulations designed to protect health contain several key flaws:

1. Unlike chemicals used as medicines, which must be tested for safety and side effects before use, industrial chemical products and emissions historically have not routinely been screened for health effects despite widespread dispersal into the environment.

2. To allow government to take health protective action on a product or pollutant, the burden of proof of harm is generally on government and the public, and the standard of proof to take action (usually cause and effect) is unrealistic given the lack of data and inherent uncertainties in its interpretation. “Excessive faith has been placed upon the limited data about the safety of a product or process, ignoring many possible eventualities where there is little or no information”(UK Environmental Change Programme).

3. Even chemicals with identified health hazards are still often produced, used, and emitted based on a “Risk Management” system of decision-making that allows an arbitrary “acceptable level of risk,” such as accepting the risk of one cancer death per million people exposed to the substance.

4. Acceptable risk decisions are based on analysis of one chemical at a time, often from just one source, and for only one health effect, and often considering only adult, healthy members of the population. The real world cumulative impact of all the chemicals or pollutants on our health is generally not evaluated.

5. A cost-benefit analysis of possible health protective action is often required before action is taken, and action is not taken if the monetary cost is too high. Decisions are influenced by political and legal pressure from the proponents of a substance or process, and the victims of potential health impacts, who may be unknown, are not usually represented in the decision-making process.

We Need the Precautionary Principle

To adequately control our exposure to environmental hazards, we need a decision-making and action tool with ethical power and scientific rigor. The "Precautionary Principle," which has become a critical aspect of environmental agreements and environmental activism throughout the world, offers a forceful, common sense approach to public health problems.

The Precautionary Principle has been summarized as:

> *When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.*

Using the Precautionary Principle means:

- Taking action in the face of uncertainty
- Shifting the burdens of proof to those who create risks
- Considering alternatives to potentially harmful activities
- Using democratic decision-making that includes those who might be affected

Instead of asking what level of harm is acceptable, a precautionary approach asks: How much contamination can be avoided? What are the alternatives to this product or activity? Are they safer? The Precautionary Principle focuses on maximizing health protection and on options and solutions rather than risk.

Most of the information in this fact sheet came from:

Generations at Risk: Reproductive Health and the Environment by Ted Schettler, M.D., Gina Solomon, M.D., Maria Valenti, and Annette Huddle, 1999, MIT Press, Cambridge, MA.

Living Downstream: A Scientist's Personal Investigation of Cancer and the Environment by Sandra Steingraber, 1998, Vintage Books: New York.

In Harm's Way: Toxic Threats to Child Development by Ted Schettler, M.D., Jill Stein, M.D., Fay Reich, PsyD. And Maria Valenti, 2000, Greater Boston Physicians for Social

Responsibility.

For additional references, please call Clean Water Fund.

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