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Environmental Economics

Econ 480

Lecture on Toxic Substances

1. There exist a number of well known environmental disasters associate with a variety of synthetic chemicals. Love Canal near Niagara Falls where in 1978, chemical from a dump starting leaking to the surface and resulted in spontaneous fires and vapors in basements. Medical reports suggested that residents had experienced abnormally high rates of miscarriage, birth defects and diseases of the liver. Another example is the explosion of chemical plant at Bhopal, India.
2. The standards that deal with point sources may not be effective in dealing with non-point sources. Also, water borne toxic pollutants are stock pollutants. Receiving waters cannot absorb them. Some additional form of control is necessary.
3. Nature of Toxic Substance Pollution. Toxicity occurs when living organisms experience detrimental effects following exposure to a substance. Normal concentrations of most chemicals are not toxic. Others, such as pesticides are toxic by design. In excess concentrates, even table salt can be toxic.
4. There are two main health concerns associated with toxic substance, the risk of cancer and the effects on reproduction. The cancer rate has increased throughout this century. The latency (the state of being concealed during the period between exposure to the carcinogen and the detection of cancer. Latency period for cancer runs from 5 to 40 years. Cancer has been linked to smoking. One suggested cause of the increase in cancer is the rise in the increase in manufacturing and use of synthetic chemicals. A number of chemicals have been shown in the laboratory to be carcinogenic. This does necessarily implicate them because it does not take exposure into account. Also, a growing body of scientific evidence suggests that smoking, alcohol and chemicals may contribute to infertility, may affect the viability of fetus, and health of the infant after birth, and may cause genetic defects, which can be passed on for generations.
5. Acute toxicity versus chronic toxicity. Test on animals to test for chronic toxicity are very expensive. Effects on laboratory animals are not perfectly correlated with effects on humans. Large doses administered over 3 years are not the same as small doses over twenty. Some of the effects are synergistic (the smoker exposed to the asbestos is 30 times more likely to get lung cancer than the non-smoker).
6. Occupational Hazard. 1978 American Cyanamid decided to respond to an occupational hazard by banning all fertile women from their jobs in the section manufacturing lead chromate pigment. But after litigation the Supreme Court

ruled this was not an acceptable way to control risks to a fetus. The hazards must be reduced. Can the market deal with occupational risks? Existing studies show that wages in risk occupations does strong risk premium. Two other conclusions: (1) the risk premium varied substantially across individuals (2) the reduced willingness to pay for risk-reductions are substantial. Market solutions may violate ethical norms. The knowledge is likely to be incomplete. The employer may have an incentive to suppress the information. Individual workers may have no incentive to obtain the information.

Current Policy

Common Law – One example of a judicial remedy is the kepone, which is a toxic substance used in the manufacture of pesticides. This material spilled into adjoining rivers, which affected workers and people eating contaminated fish. The Allied Chemical Company was indicted on criminal charges and sued by injured parties and had to pay \$20 million in compensation and penalties. By 1981 Allied had 400 employees concerned with environmental control. Negligence and strict liability are the liability rules used in the common law and criminal law is invoked in certain extreme cases.

Statutory Law

Federal Food, Drug and Cosmetic Act – FDA prohibits the sale of any food, which “contains” any poisonous or deleterious substance, which may render injuries to health. 1958 Delaney Clause stipulated that no additive should be used if it is found to induce cancer in humans or animals.

Occupational Safety and Health Act

Workplace standard are set to establish levels of pollutants to be acceptable in workplace atmospheres for carcinogens, ambient workplace standards are set followed by special handling requirement, protective devices and minimum contact regulations.

Resource Conservation and Recovery Act

Imposes standards for handling shipping and disposes of all toxic wastes. A manifest system keeps track of the fate of these substances from creation to disposal. Failure to comply is punishable by civil penalties and by fines or imprisonment.

Toxic Substance Control Act

This act decides which of the chemical substances not controlled by the above will be allowed to be commercially produced. Before production, firm must submit test results shown the chemicals will not present “an immeasurable risk” to human health or the environment.

Comprehensive Environment Response, Compensational Liability Act, "Superfund Act"
This act stipulates and provides funding to clean up existing toxic waste sites.

Hazardous Pollutants

These pollutants are distinguished from criteria pollutants by the greater degree of harm they cause. Their emission occurs at a limited number of key locations. By 1989, several pollutants, asbestos, mercury, benzene, and arsenic, were regulated. The regulatory strategy employed BACT. Differential standards are imposed depending on the number of persons exposed to these pollutants.