

Toxic and Hazardous Materials

Health Objectives for the Year 2010: Reduce the public health risk posed by hazardous and toxic chemicals.

Health Implications

Adverse health risks for workers and for the public exposed to toxic materials released to the outdoor and indoor environment's are increasing. During the last half of the twentieth century, society became dependent on products that are synthesized from chemical materials. Plastics, synthetic fabrics, rubber products, coatings and finishing products, and cleaning solvents are but a few examples.

The health risks created by hazardous materials are present in our environment. Exposure to hazardous chemicals from cleaning chemicals, cosmetics, hobby materials, painting and redecorating supplies, and pesticide use in the home is believed to play a significant role in the increased incidence of asthma as well as other respiratory illnesses. Center for Disease Control (CDC) estimates that 15 million Americans, including almost 5 million children, suffer from asthma. The estimated number of asthma sufferers increased from 6.7 million to 13.8 million in from 1980 to 1994. Premature deaths are numbering 50,000 to 120,000 associated with exposure to toxic air pollutants and include 4,000 deaths from asthma.

In the work environment, people can be exposed to any number of hazardous

materials. In addition, some materials become airborne, where they become a threat to those who do not work directly with the materials. Some of the more common adverse health effects that can be attributed to exposure to toxic materials in the workplace are allergic reactions and contact dermatitis, which according to the CDC, make up 15% to 20% of all occupational diseases. More serious illnesses that may occur from exposure to toxics in the work place are central nervous system disorders; failure of vital organs, such as the heart and liver; lung damage; and cancer. Examples of hazardous workplaces include the horticultural services industry, where 17% of worker injury and illness is due to chemical exposure. Small trades businesses have a similar 17% rate of worker injury, and illness is due to chemical exposure. There is minimal data for many small businesses, including dry cleaners, beauty shops, furniture strippers, and auto repair shops. However, because of the use of solvents and other toxic products, workers in these industries can be at risk for both acute and chronic illnesses. In addition to routine workplace exposure, accidents involving hazardous chemicals may result in serious burns and acute poisonings.

Table 1. Toxic and Hazardous Materials Indicators

	Lancaster Recent	Lancaster Objective 2010	Nebraska Recent	Nebraska Objective 2010	National Recent	National Objective 2010
Poisonings by household chemicals among children under six per 1,000 population	7.2 ¹	5.4	--	--	--	Re. by 25% ²
Quantity of toxic pollutants released, disposed of, treated, or combusted for energy recovery through pollution prevention practices	-- ³	Re. by 25%	--	--	--	Re. by 25% ⁴
Percent of businesses that use hazardous chemicals	-- ⁵	25.0	--	--	--	--
Percent of adults who buy less toxic products	60.0 ⁶	75.0	--	--	--	--
Percent of adults who properly dispose of used car oil after changing it	37.0–49.0 ⁷	75.0	--	--	--	--
Proportion of waste loads containing hazardous waste based on random load checks	10.0 ⁸	7.5	--	--	--	--
Stormwater meets National Pollution Discharge Elimination System (NPDES) requirements	Att. ⁹	Maint.	--	--	--	--

Re.=Reduce levels Att.=Attained Maint.=Maintain attainment

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Family members of workers who transfer hazardous and toxic materials from the workplace to the home environment are also at risk of adverse health effects. Among the hazardous chemicals that have caused family illness are heavy metals, such as lead, beryllium, and mercury; pesticides, such as parathion and toxaphene; and other chlorinated hydrocarbons.

Health risks also result from contaminated water caused by release of toxic waste materials and fugitive air emissions. Because water is essential for life, contamination of water resources with hazardous and toxic materials is considered a vital health issue. Of primary concern are adverse health effects caused by contamination of drinking water for which the health risks are well documented. Small amounts of various chemicals, principally heavy metals and volatile organic compounds, are known to affect human health in various ways. There are relatively few incidents involving acute chemical poisonings from drinking water; the health effects are generally caused by ingestion of the contaminated water over a long period of time. Central nervous system disorders, damage to internal organs, and cancer may result from long-term ingestion of chemical contaminants. Improper and indiscriminate disposal of toxic chemical wastes plays a significant role in the contamination of both surface water and groundwater, both of which eventually become part of the public drinking water supply.

In rural Lancaster County, all drinking water comes from groundwater. With the exception of incorporated towns and villages, domestic sewage disposal is accomplished through use of in-ground septic systems. In areas with a proliferation of small acreages, groundwater contamination from household chemicals disposed of in septic tanks may become a public health issue.

Improper and indiscriminate disposal of toxic chemical waste may also play a

significant part in creating health risks in recreational waters. Pesticides washed into natural waters used for swimming may be responsible for an increase in the number of cases of central nervous disorders, damage to internal organs, and cancer. In addition, exposure to other toxic chemicals in water may cause an increase in contact dermatitis among swimmers. Small creeks and streams are favorite places for children to explore. Chemical wastes indiscriminately dumped in small streams can cause acute poisoning from contact with the chemicals.

Some people in the community rely on fish as a primary source of food. Those same people often fish area lakes, rivers, and creeks to obtain fish to eat. This is particularly true with minority populations, principally Asian Americans. Excessive and improper use of pesticides, together with illegal disposal of toxic chemical wastes, may cause the fish and other edible aquatic life to become carriers of toxic materials, which poison those who eat them. As with contamination of groundwater, the public health implications are generally long-term effects from continual consumption of these fish and other edible aquatic life as a food source.

The number of chemically related accidents in the home, especially among children is rising.

Nationally, misuse of household chemicals results in thousands of accidents each year. These accidents typically occur when a product is used for a purpose for which it was not intended or when two chemicals are mixed together, resulting in a violent chemical reaction and release of toxic gases. The most common exposure is to chlorine, which causes severe upper respiratory distress. Such a reaction may be fatal in instances where the exposure is to small children, those with existing respiratory illness, and the elderly.

The U.S. Environmental Protection Agency (EPA) states that according to a

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recent survey, 75% of households in the nation use at least one pesticide per year. When ingested or misused, household pesticides can cause acute poisoning from ingestion and cause damage to

the nervous system, which may be permanent. There is also a health threat to family members when a worker brings home toxic products from the workplace for household use.

Current Status and Trends

In 1962 the book, *Silent Spring* by Rachel Carson, offered the first frightening look at widespread environmental degradation through pollution of the land, water and air. *Silent Spring* planted the seeds of environmental awareness that continue to grow. Initial efforts to address environmental concerns focused on controlling pollution. Over a thirty-year period, billions of dollars were spent attempting to reduce the amount of pollution by controlling emissions from industry and transportation. While these efforts have led to successful reductions of pollution in a single environmental medium (i.e., air, water, land), in many cases, the pollution was only transferred from one medium to another, (e.g., land to air) and the threat to public health was not effectively addressed.

In the 1990s, the focus turned to reducing pollution by eliminating the chemicals and processes that create the pollution. The principles of "pollution prevention" center around the idea of not creating the products that cause pollution and are accomplished by using fewer toxic products, reducing quantities of polluting wastes, reusing waste products, and recycling wastes. Reduction is accomplished by selecting raw materials that cause less pollution and developing processes that create less polluting waste. By eliminating toxic materials, pollution prevention takes away the threats to public health created by them.

Pollution prevention is not exclusive to industry. Pollution prevention should involve all sectors of society from the largest industry to the small "mom and

pop" business to the individual homeowner. To gain a better understanding for establishing community pollution prevention goals, we need to examine pollution prevention as it relates to three segments of the community: large industry, small businesses, and households.

Large Industry

In Lincoln and Lancaster County, there are thirty-four businesses which are of sufficient size to require submission of a Toxic Release Inventory (TRI) to the EPA. The TRI provides an indication of those large industries that contribute toxic materials to the environment.

Large industries tend to be more closely regulated than small businesses by the EPA and the Occupational Health and Safety Administration (OSHA). As a result, large industries have been forced to be more proactive in addressing health, safety, and environmental issues. In addition, many labor and union groups become proactive in environmental issues in the workplace as well as the community.

Large industries have found that the cost to control and dispose of toxic wastes has become a very significant burden in their attempt to minimize costs. The demand for raw materials that result in fewer toxic wastes has spurred raw-materials producers to develop less toxic products. To remain competitive, large industries must keep up with changing technology, including machines and processes that reduce the regulatory impact through pollution prevention. In addition, programs with a pollution prevention component are

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often pursued by companies to increase public trust and reduce worker compensation costs.

Finally, larger industries tend to have more resources to devote to environmental issues, often including at least one staff person. They also have the resources necessary to implement changes in products and processes that reduce the waste generated by the facility. When new technology is developed, the larger businesses are more able to justify the cost of change. In fact, a process change often results in cost savings due to the decrease in costs of hazardous waste disposal.

The City of Lincoln and Lancaster County have chosen to regulate certain business wastes that pose a health risk to the public and to employees working at disposal facilities for better safety and to assure compliance with state and federal waste-management regulations. The program requires Special Waste Disposal Permits for those wastes that present health risks. A significant effort has been made over the life of the program to encourage the business community to use the principles of pollution prevention to reduce the amount of special waste being disposed of in the community.

Small Businesses

Small businesses have considerably fewer incentives and resources to adopt pollution prevention practices. There are many factors that influence the decisions of the small business owner regarding pollution prevention.

Many small business owners do not possess a clear understanding of potential health risks from exposure to hazardous and toxic materials. The complexity of environmental rules and regulations makes them difficult to understand and apply. Because time is so important, small business operators may not take adequate time to become familiar with the health risks posed by the products they use, to prevent

releases and clean up spills, to take advantage of training opportunities, or to implement process changes or product substitutions.

For the small business owner, there is less regulatory pressure because state and federal regulations typically exempt small businesses. As a result, small business owners often spend fewer resources on pollution prevention, opting to use them to expand the business. Because of close profit margins, a small business owner is less likely to purchase alternative products to implement a pollution-prevention strategy. Small business owners are often not familiar with nonregulatory options concerning waste management. They may not be aware of cost-effective ways to reduce the use of hazardous or toxic materials, to reuse the materials, or to safely recycle these materials.

Small businesses may not have access to training or may not be aware of training opportunities. With limited time, money, and staff, a small business owner may conclude that it is not economically feasible to focus on pollution-prevention practices. The costs to train, change processes, and implement new methods can significantly affect their decisions.

Many small business owners are fiercely independent and have been successful in business for a long time. They know what works for them, and they often resist suggestions to change their way of doing business. When a business has operated successfully for many years, the resistance to change can be very great. In many cases, government is viewed as an impediment to effectively and efficiently conducting business. Although independent, many small business owners reach out to others for advice in running their businesses. Small business associations, trade associations, and nonregulatory business assistance agencies, such as the Small Business Administration SCORE program, could provide support

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in encouraging small businesses to practice pollution prevention.

As industry and small businesses recognize and experience the benefits of pollution prevention, the trend will be for them to continue adopting the principles of pollution prevention. Community efforts should continue to encourage both large and small companies to actively practice pollution prevention. Education and technical assistance are the keys to success in this endeavor.

Households

In 1990, the American Association of Poison Control Centers reported that 79,000 children were involved in common household pesticide poisonings or exposures. According to data from emergency rooms in Lincoln, 30 to 35 children are seen for household chemical poisoning each year.

From September 1990 to September 1999, LLCHD emergency response staff responded to 20 calls related to accidental releases or improper handling of toxic chemicals in homes. Two of these incidents involved acute adverse health effects on residents living in the homes.

Based on information from the Community Pollution Prevention Assessment conducted in 1995, skills in selecting products that are less toxic or less hazardous were rated low by householders. Product effectiveness was the key factor in purchasing, and 81%

of those surveyed indicated they would be willing to pay more for less toxic materials. This suggests that with more education about the toxicity of products, homeowners would buy less-toxic but more expensive products if the product was equally as effective.

From 1992 to 1998, over 144 tons of household hazardous waste were collected from Lincoln and Lancaster County residents. In 1998, 33 tons were collected. These wastes included pesticides, solvents, items containing PCBs, and heavy metals. Citizens with waste locally recyclable, such as motor oil, antifreeze, batteries, and fluorescent bulbs, were referred directly to local recyclers.

Citizens unsure how to get rid of a waste will often store it, increasing health risks in the home. In a 1993 survey taken at household hazardous waste collections, 45% of participants reported that they would have continued to store the hazardous waste at home if the collection was not available. Twenty-three percent of collection participants would have put the hazardous waste into a trash can. In a 1995 minority survey, 39.8% of respondents said they or someone in their home changes their own car oil. Of those changing their own oil, 11.5% keep or store it and 33.5% dispose of it improperly (put it in the garbage or pour it down the drain, in the street, or in the backyard).

Health Disparities

“Environmental Health Hazard Risks In The Minority Community,” a study conducted by the LLCHD in 1997, revealed the following influences on the risk of exposure to toxic and hazardous materials in the minority populations in Lincoln:

- ♦ The tendency to use hazardous materials for purposes other than

their intended use. An example is using gasoline as a cleaner.

- ♦ The tendency to accumulate hazardous materials as a form of wealth.
- ♦ Consumption of fish from water sources that may contain toxic pollutants.
- ♦ Distrust of the safety of public drinking water.

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- ♦ Lack of familiarity with public facilities for hazardous waste disposal.

The reasons for these disparities involve barriers caused by cultural differences, language, social upbringing, and lack of education. Further development of educational programs to reduce risks among the minority populations is

needed. No single community program will work for all minority communities. To overcome these barriers, the overall community needs to develop and support programs within the minority communities that fit the culture and language of that community.

Public Health Infrastructure

An ongoing mechanism for evaluating the impact and success of community interventions to reduce the public health risk posed by hazardous and toxic

materials is needed. The development and periodic implementation of an environmental health behavior and risk survey is recommended.

Recommendations

Reduce the public health risk posed by hazardous and toxic chemicals the following actions are recommended:

- ♦ Community efforts should continue to encourage large businesses to actively practice pollution prevention. Education and technical assistance are the keys to success in this endeavor.
- ♦ Pollution-prevention efforts for small businesses need to be directed toward the development of educational partnerships that target trade associations and small business as a means of reaching the small-business owners. Programs with incentives should be offered to small businesses to overcome the factors that inhibit small businesses from practicing pollution prevention.
- ♦ Pollution prevention efforts need to be facilitated through organizations in order to be successful in the small-business community. Community colleges and technical schools should be partners in promoting pollution prevention in small businesses.
- ♦ More effort and resources should be directed toward addressing pollution prevention in the home, with a focus on reducing the health risks associated with use of toxic products.
- ♦ The community needs to continue to regulate the disposal of hazardous and toxic waste in the city and county to assure that the health risk to public and city workers is minimized.
- ♦ The overall community needs to develop and support programs within the minority communities that fit the culture and language of that community.

Notes

Related discussion or indicators are located in the chapters on *Water Management*, *Clean Outdoor Air*, *Clean Indoor Air*, *Public Health Emergency Management*, and *Waste Management*.

Table 1

- Currently no data source.
1. Lincoln–Lancaster County Health Department. Estimated number of poisonings of children under 6 due to household chemicals, 1992–1995. Tabulation derived using E-codes 850–869 with available Injury Surveillance Data (Emergency Room Visits) 1992–1995, mortality data 1987–1998, and inpatient hospitalization discharge data. The local objective represents a 25% reduction, which is the overall national objective as well.
 2. U.S. Department of Health and Human Services, Office of Public Health and Science, *Healthy People 2010 Objectives: Draft for Public Comment*, September 1998. The national objective is to reduce by 25% the number of poisonings from those tabulated in 1995 by the Toxic Exposure Surveillance System, American Association of Poison Control Centers. While national tabulations of poisonings are not comparable to the local rate, the goal of a 25% reduction is the same.
 3. Currently no data source. A measurement strategy for this grouping of pollutants needs to be developed. The local objective parallels the national objective of a 25% reduction.
 4. U.S. Environmental Protection Agency, *EPA Strategic Plan*, 1997, pp. 37. The national objective is to reduce this type of pollution by 25% from the 1992 level by the year 2005. No data, pollutants or measurement methods are specified in the EPA Strategic Plan document.
 5. Currently no data source. A measurement strategy needs to be developed that utilizes data from Tier II, TRI, RMP and Special Waste categories of hazardous substances used by businesses.
 6. Lincoln–Lancaster County County Health Department, *Community Pollution Prevention Assessment: Household Report*, 1995. Household survey data indicating the percentage of adults reporting that they purchase less toxic products “often” or “very often”.
 7. Lincoln–Lancaster County County Health Department, *Community Pollution Prevention Assessment: Household Report*, 1995 (49%) and *Environmental Health Hazard Risks in the Minority Community*, 1997. (37%). Household survey data indicating the percentage of adults reporting that they properly dispose of used car oil after changing it.
 8. City of Lincoln, Department of Public Works. 1998 data provided by staff from the results of random load checks at both Lancaster County landfills.
 9. Lincoln–Lancaster County County Health Department, Environmental Health Division. The standard is maintained – toxicity levels are below NPDES required levels. The objective is therefore to maintain these toxicity levels below NPDES limits.