EPA

Profile of Environmental Quality

Iowa

Preface

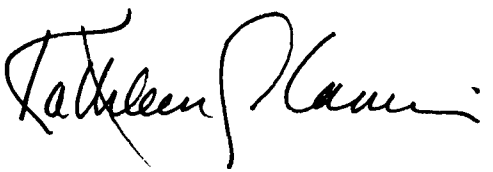
The Environmental Profile is a report to the people of Iowa on the quality of their environment.

At one time natural cleansing processes were adequate to maintain a livable environment, but these processes have not been able to keep pace with rapidly evolving modern society. Our aim for the future of Iowa must be to reach a reasonable balance between the benefits of economic growth (with its attendant increased energy demands) and the need for healthful air, clean water, and the aesthetic qualities of life that characterize the State.

Toward this end, I invite all Iowans to be involved in identifying and solving environmental problems.

The technical data on which this report is based are available from the Region VII office of the U.S. Environmental Protection Agency (EPA). Any persons interested in investigating a particular topic in greater depth or those needing additional detail for planning or management purposes should contact this office. Updated reports will be issued as improvements and expansions to the information become available.

Your comments, questions, and suggestions are welcome.



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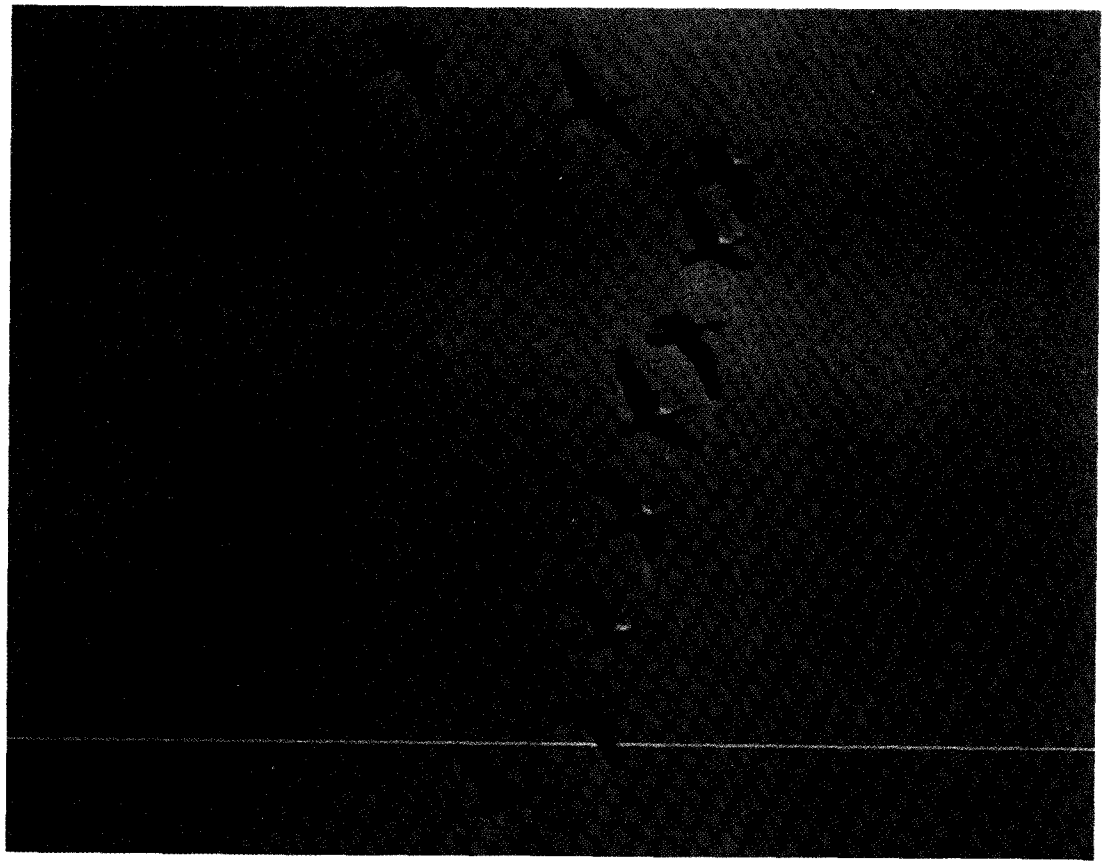
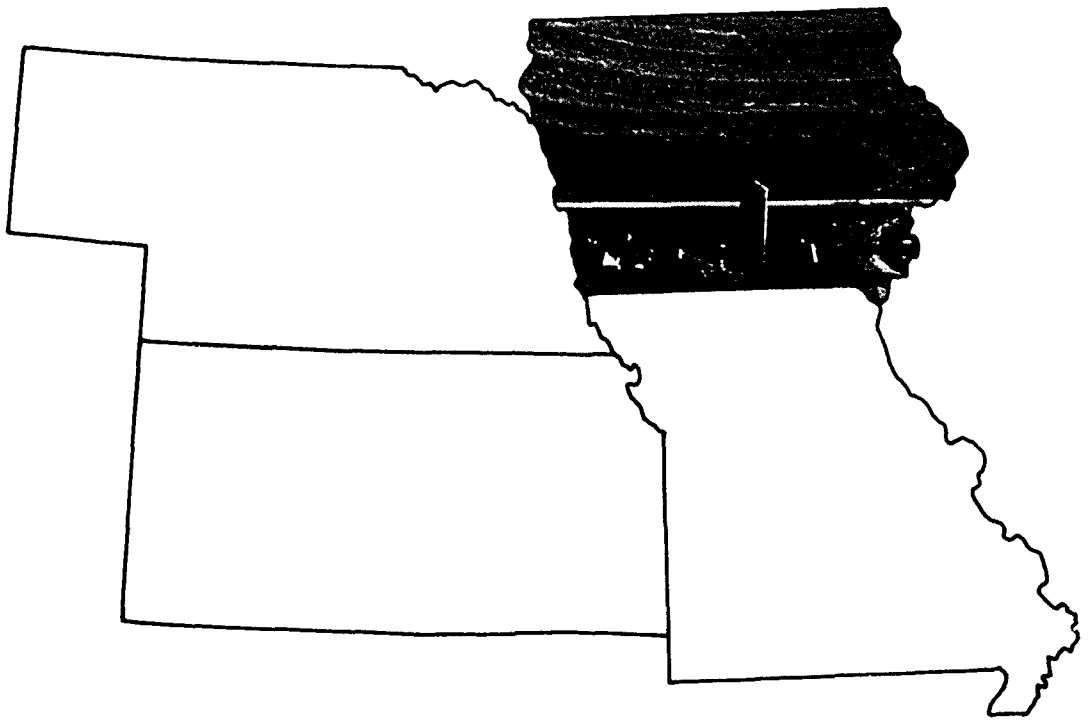


Introduction



Iowa, Kansas, Missouri, and Nebraska, which make up EPA Region VII, are among the leading corn and wheat producing States in the Nation. These States also produce a significant share of the soybeans, grain sorghum, fat cattle, and finished hogs that are supplied to American and foreign markets.

Although the States in Region VII can best be characterized as rural, 65 percent of their nearly 12 million people live in urban areas. In Iowa, metropolitan areas such as Cedar Rapids and Des Moines have environmental problems resulting from major industrial operations, municipal services, transportation, and energy production. Metropolitan areas, however, do not have a monopoly on environmental problems. Hundreds of communities with populations of less than 5000 have some of the same problems, but suffer the disadvantage of having inadequate tax bases to deal with them.

Few realize the extent and seriousness of the results of air pollution. It not only harms public health, but also corrodes physical structures of all kinds and damages agricultural crops.

Air quality varies widely throughout the region. Pollution in rural areas may result from higher-than-recommended background levels of suspended particles, whereas pollution in urban areas comes from industry and transportation. The means of controlling air pollution depends on the meteorology, the sources, and the background air characteristics, which will differ from area to area.

Iowa is blessed with an abundance of high-quality waters. Northeastern Iowa contains some of the Nation's finest streams and lakes. Nevertheless, many of our streams, rivers, and lakes are polluted. It would be difficult to find a body of water that does not bear some mark of man's activities. The pollution comes from various sources: inadequately treated sewage from some communities; oil and chemical spills by industry; and animal wastes, fertilizer, salts, and pesticides from farms.

Solid waste (some of which is hazardous) is a problem to everyone. Millions of tons are discarded in the Region each year. This waste ranges from common household trash to complex materials in industrial wastes, sewage sludge, agricultural residues, mining refuse, and pathological wastes from institutions such as hospitals and laboratories. Many dangerous materials discarded by society over the past few decades have endured in the environment.

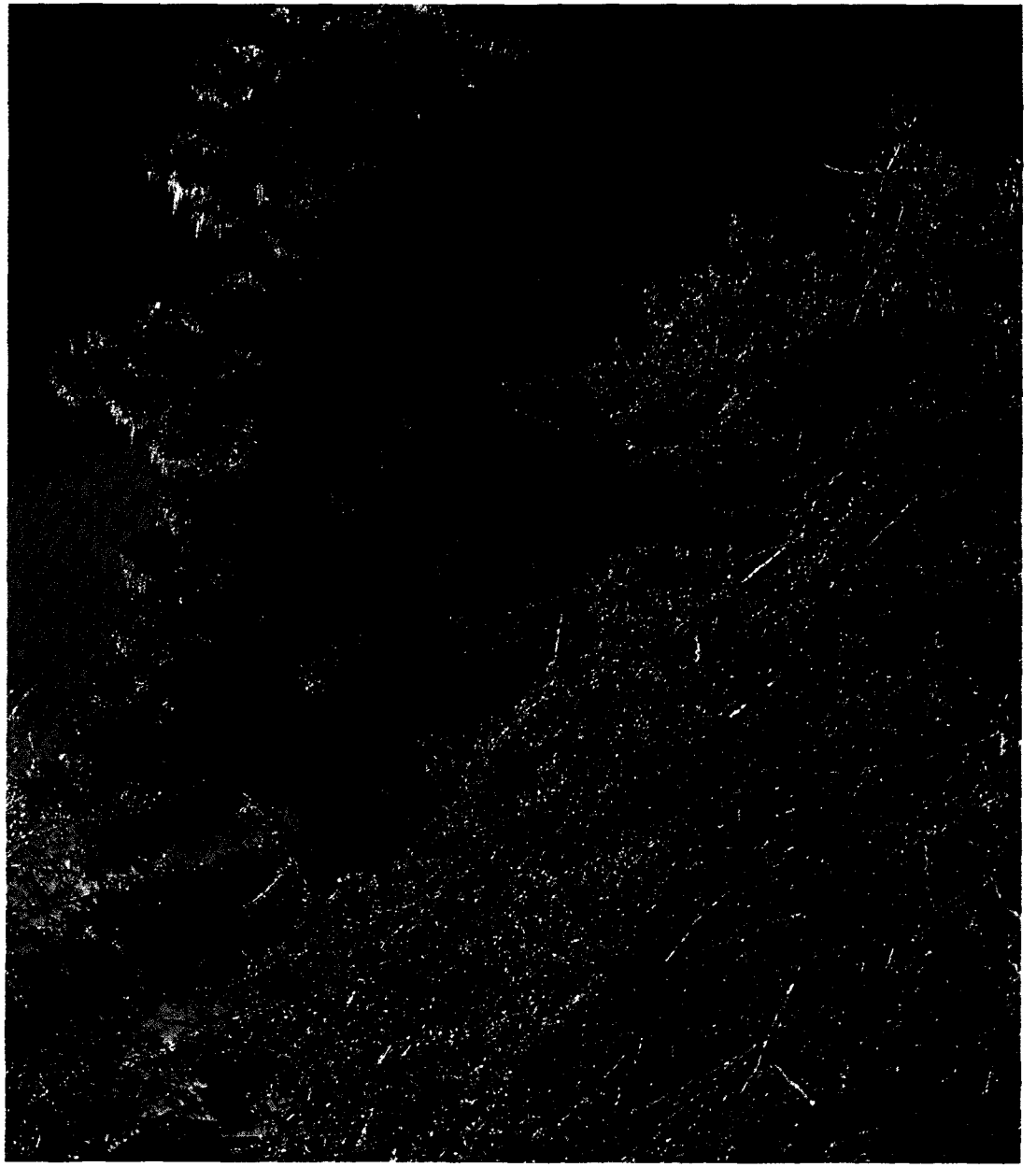
These materials may contribute to the pollution of groundwater because of improperly sited or operated landfills and surface waste disposal ponds. This is particularly critical in Region VII because nearly half of the

population uses groundwater as a source of drinking water. In addition, improper handling or disposal of hazardous waste can cause other kinds of environmental damage, such as air pollution, contamination of the food chain, and poisoning by direct contact.

The Environmental Protection Agency (EPA) is engaged in a massive effort to restore America's water quality, to reduce air pollution, and to find a comprehensive approach to other environmental problems associated with pesticide use, radiation, solid and hazardous waste disposal, mechanically generated noise, and toxic substances. The EPA is first and foremost a regulatory agency with responsibility for setting and enforcing standards. The agency also offers technical and financial assistance for environmental protection efforts at all levels of government.

As a research body, the EPA monitors and analyzes the environment and conducts scientific studies. The agency provides technical and scientific information to the public and the training necessary to develop the skilled environmental capability that the Nation needs.

The EPA, State and local governments, and private citizens must work together to restore the quality of our environment and protect the Region's natural resources for future generations.



Water Resources

Sources of Water Pollution

Water plays a crucial role in the lives of every person living in Iowa. Good quality water for drinking, agriculture, and other daily needs is essential. Water is also needed for recreational activities such as swimming, fishing, and boating. Cities and towns that have grown along waterways frequently depend on these waterways for waste disposal and sometimes for water supply. Industries require fresh water to produce goods and to carry away treated wastes resulting from their operations.

As a result of the demand made on them, the waterways of Iowa are often contaminated. Pollution sources can be categorized as either point or nonpoint. A point source is a polluting discharge with an identifiable outlet, such as a pipe to a lake or stream. Examples are industrial and municipal wastewater treatment plants. A nonpoint source has no particular outlet; rather, it allows pollutants to enter the waterways at several different places and often over broad areas. Examples of contaminants from nonpoint sources include fertilizers, pesticides, and sediment from agricultural practices; metals, salts, solids, and other contaminants in runoff from city streets; and sulfates, metals, and solids from mining activities.

Both point and nonpoint sources affect the water quality of Iowa's rivers. The lowered quality manifests itself in such things as fish kills and lake use impairment. These same pollu-

tant sources also affect Iowa's groundwater, which is the principal source of drinking water.

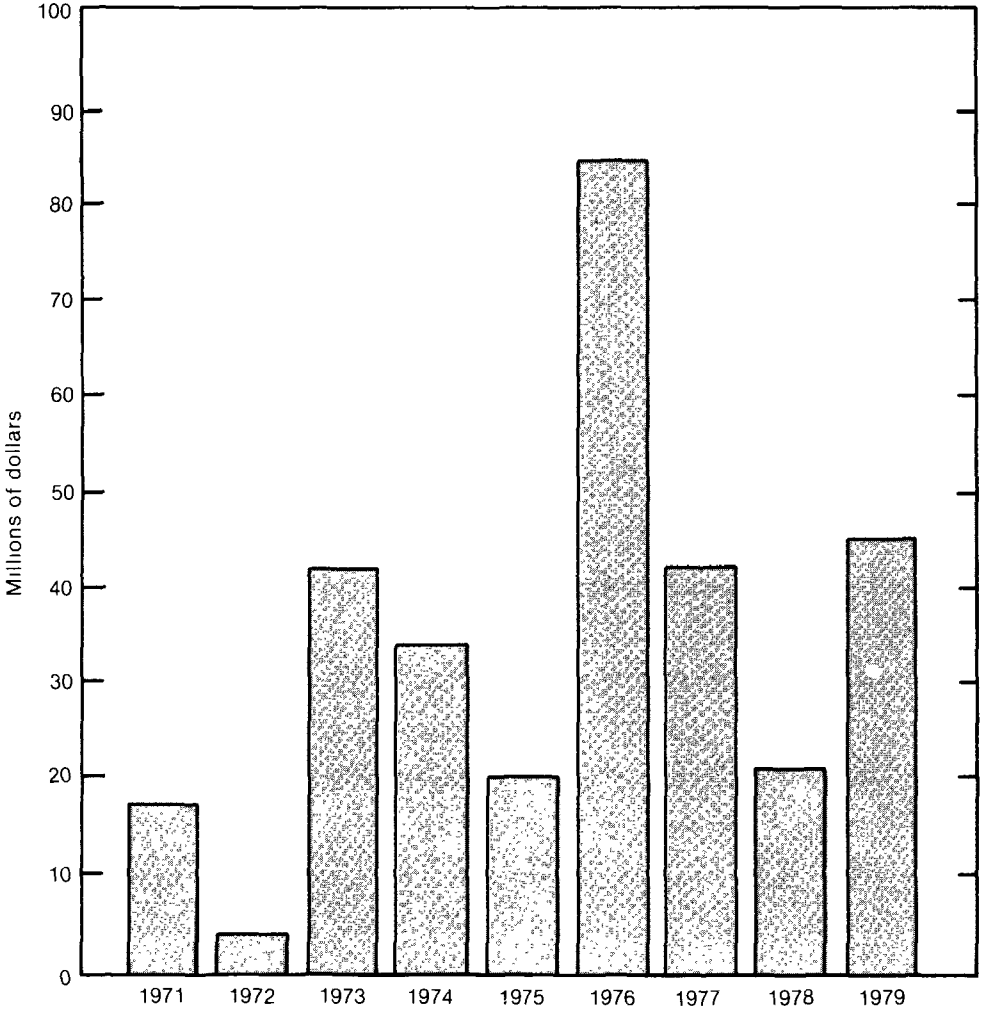
Point Sources

Point source discharges into water bodies are both municipal and non-municipal in nature.

The people and industries served by municipal sewerage generate more than 25 billion gallons of sewage every day in the United States. In the past, some communities provided only primary treatment of their waste; that is, they screened floating solids and allowed other solids to settle in holding ponds. Present laws require that wastewater be further treated by a series of processes called "secondary treatment," which is required of all publicly owned sewage treatment plants. In certain cases, treatment beyond the secondary level may be mandated to meet water quality standards in the receiving streams or lakes.

Recognizing that many State and local governments could not afford to build needed treatment facilities without financial assistance, Congress developed a program of Federal aid, in which grants are offered to cover 75 percent of the costs of constructing publicly owned sewage treatment works. The State government pays 5 percent of the remaining 25 percent and the local government pays 20 percent. The graph shows the amount of Federal construction

Federal Support Obligated for Wastewater Treatment Facilities in Iowa



Sources of Water Pollution (continued)

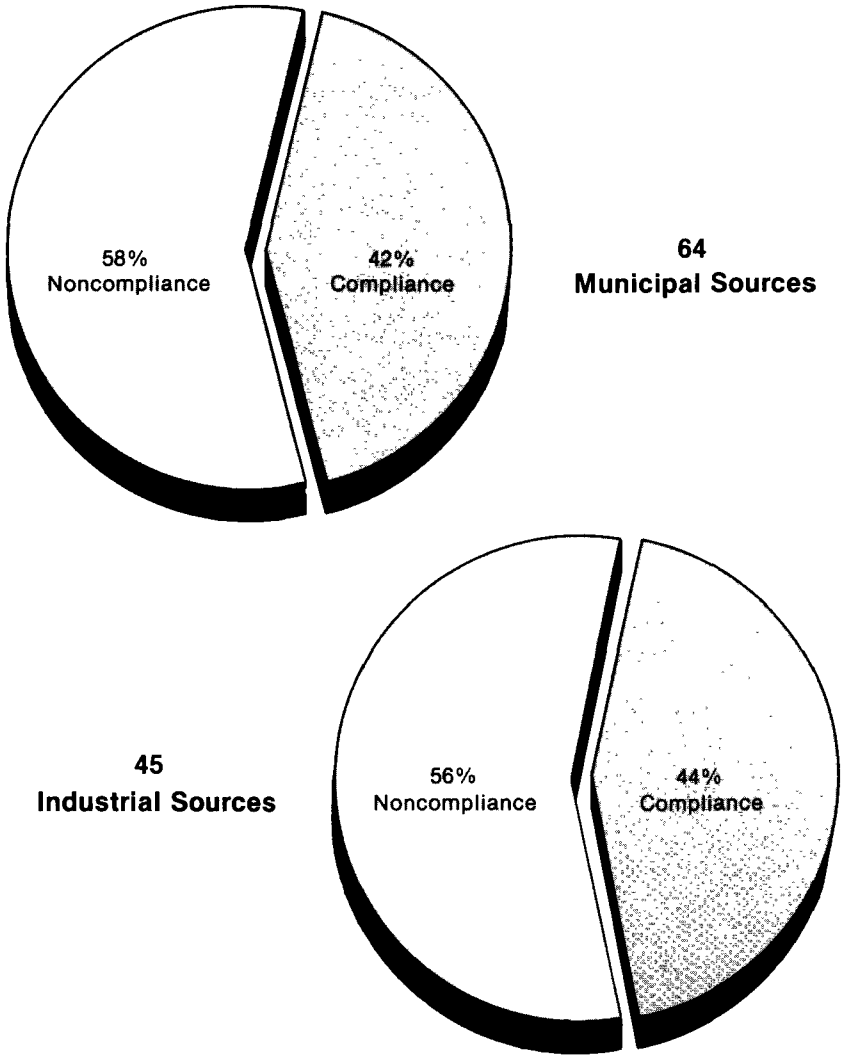
Point Sources (continued)

grants provided in Iowa in recent years. More than 17,000 such grant projects are active nationwide.

The EPA has established effluent limits on the amount and kind of pollutants that can be discharged from various categories of non-municipal sources such as chemical plants, oil refineries, and meat packing plants. No point source, municipal or nonmunicipal, can discharge wastes into a body of water unless it first obtains a permit from the State. The permit states what and how much can be discharged and still meet effluent limits and water quality standards. The pie charts show compliance with permit conditions.

Federal and state agencies also use other means of controlling pollution from point sources. These include (1) a requirement that some very strong or toxic industrial wastes be "pretreated" before they are discharged into public sewer systems, (2) a special program to regulate toxic pollutants, and (3) the issuance of permits for disposal and use of dredged and fill material in or near the water.

Percentage of Major Sources Meeting Permit Requirements for Effluents in Iowa (1979)

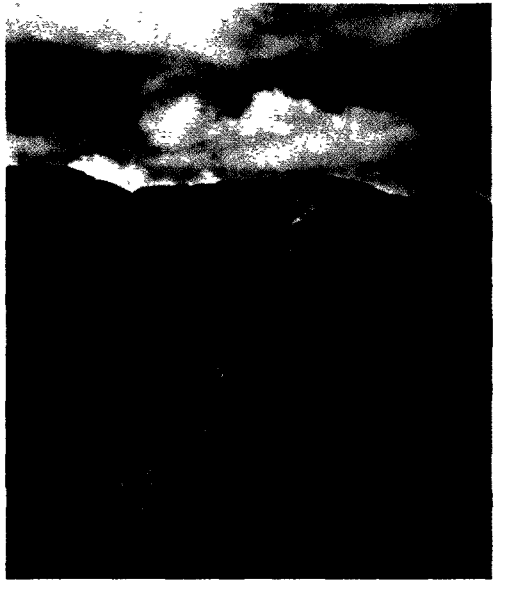


Nonpoint Sources

Agricultural runoff is a major nonpoint source of pollutants. Runoff from farming and grazing land contributes significant amounts of suspended solids, nutrients, and bacterial contamination to Iowa's water.

Iowa has prepared a water quality management plan to assess existing and possible water quality problems and is developing a strategy to deal with these problems. A key element of this planning has been the designation of those areas most in need of practical and effective measures to curb runoff from agricultural operations and thereby minimize soil erosion and water contamination. Known as Best Management Practices, these measures include terraces, drainage tiles, grassed waterways, schedules for efficient application of fertilizers and pesticides, and other conservation practices.

The water quality management plan also deals with pollution from other nonpoint sources, such as urban stormwater runoff, septic tank and wastewater lagoon failures, roadside erosion, streambank erosion, construction site runoff, and leaching from landfills.



Water Resources

Rivers

Stream Quality

The 1983 goal of the Clean Water Act is to make our Nation's waters suitable for swimming and fishing wherever that goal is attainable. Many types of pollutants now affect these and other uses. Important aspects of clean water are described below.

- Water temperature is vital. Each fish species has its own range of water temperature tolerance. When these tolerances are exceeded, aquatic life can be harmed.

- Oxygen dissolved in water is as important to aquatic life as oxygen in air is to humans. Pollutants such as improperly treated sewage can deplete oxygen and suffocate fish and other aquatic life.

- The pH of water, which relates to the acidity and alkalinity, is measured on a scale from 0 to 14. The value of 7 is considered neutral; anything over 7 is alkaline; anything under 7 is acidic. Either too high or too low a pH adversely affects stream life. Extreme values in either direction can be harmful in themselves or can increase the toxicity of other substances in the water. Changes in pH can affect fish life by preventing fish eggs from hatching and by destroying floating plants and animals that serve as food for the fish.

- The trophic state of a river refers to the productivity of the water. An overabundance of nutrients, especially nitrogen and phosphorus, can create excessive plant growth, which not only is unsightly, but also affects recreational and other uses of the water.

- The toxicity of water refers to the concentrations of toxic materials found in it. Pesticides, polychlorinated biphenyls (PCBs), heavy metals, cyanide, and ammonia are examples of toxic materials.

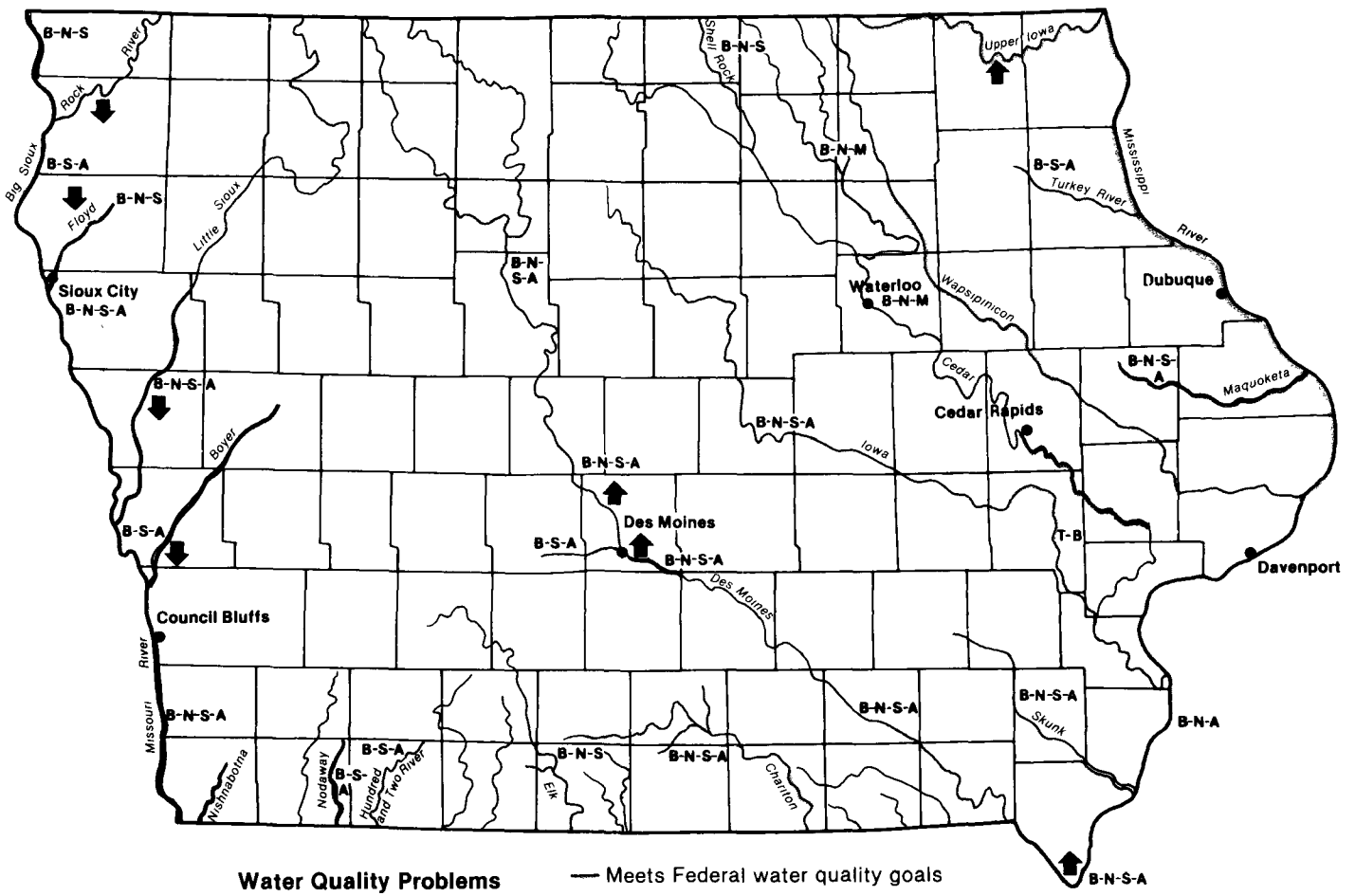
- Excessive levels of bacteria cause streams to be unfit for activities involving human contact, such as water-skiing and swimming. The amount of fecal coliform (bacteria that normally live in the intestines of humans and other warm-blooded animals) is directly related to the amount and kinds of pollution from sewage and animal waste sources in the water. These bacteria are used as indicator organisms to alert the possible presence of other, more harmful organisms in the water.

- The total volume of solids refers to the dissolved and suspended material in the water. These solids affect the clarity, hardness, and corrosiveness of the water.

- Aesthetic value refers to the general beauty and quality of the water and takes into consideration the levels of oil and grease, visual clarity, and taste-tainting chemicals.

The information depicted in the stream quality map is based on a comparison of those physical, chemical, and biological data with recommended Federal Water Quality Criteria.

Stream Quality
(1972-1978)



Water Quality Problems

- O Oxygen
- T Organic toxicants
- B Bacteria
- N Nutrients
- S Solids
- M Toxic metals
- A Aesthetic deterioration

— Meets Federal water quality goals

— Moderate water quality; provisionally meets Federal water quality goals

— Does not meet Federal water quality goals

— Insufficient data to determine quality

⬆ Water quality improving

⬇ Water quality deteriorating

Note Where no arrows are shown for a stretch of river, either the water quality has been stable for the past 7 years or data were insufficient to determine trends

Water Resources

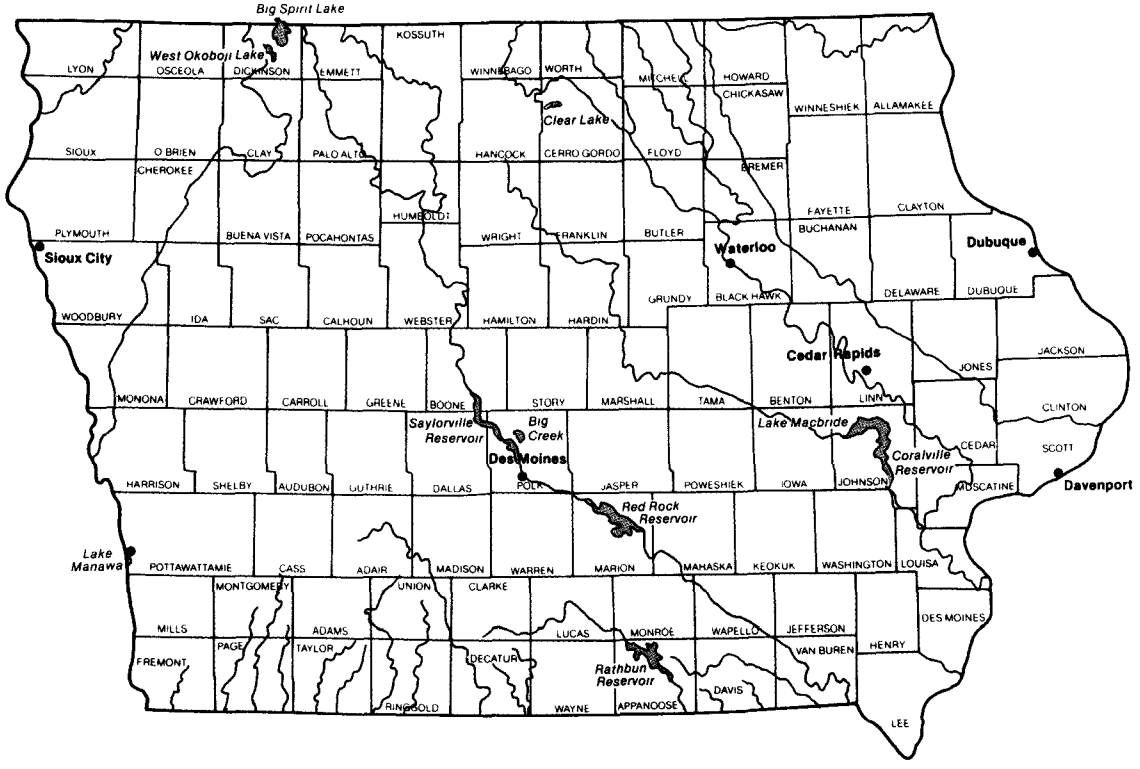
Lakes

Lakes are important water resources for recreation, water supply, and aesthetic appeal. Increases in pollution from nutrients such as nitrogen and phosphorus can impair the value of Iowa lakes. Although plant life is an important part of a lake's ecosystem, an overabundance of nutrients will cause excessive growth of algae and larger plants. Such overgrowth can choke the lake of needed oxygen, decrease light penetration, and be a nuisance to those using the lake for recreational or other purposes. Siltation and turbidity from agricultural runoff, construction activity, and other nonpoint sources may also affect light penetration and contribute to premature filling of lakes by sedimentation.

Publicly owned lakes with these and other water quality problems may receive help through the Clean Lakes Program. This program provides funds to assist the State of Iowa in (1) ranking its public lakes, (2) conducting lake studies, and (3) restoring and protecting these lakes. The following lakes have received assistance under this program: Blue Lake, Green Valley Lake, Lenox City Lake, Lake Manawa, Olewein Lake, and Swan Lake.

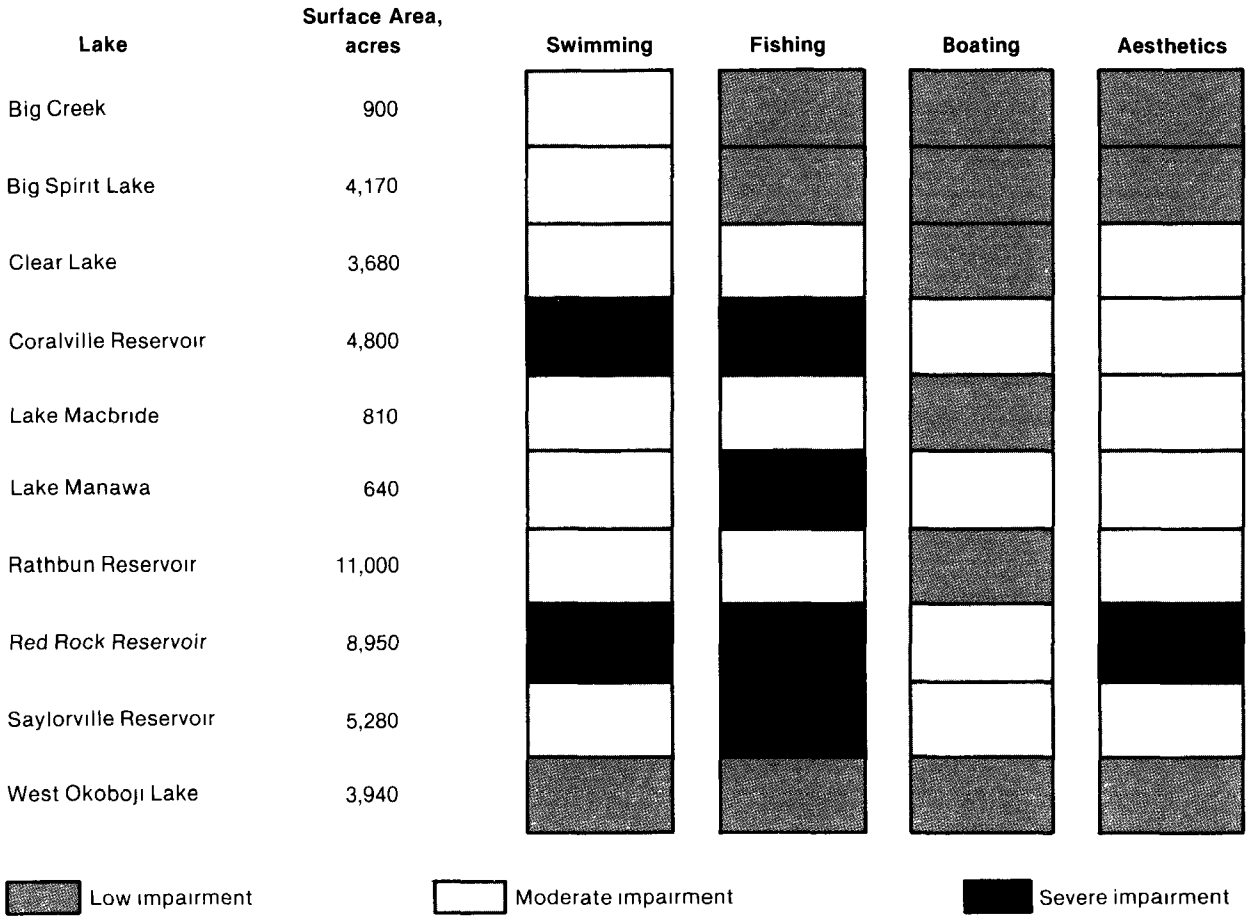
The table shows the level of impairment to principal lakes resulting from pollution. The map shows the principal lakes in Iowa — those that have a surface area greater than 6400 acres and some smaller lakes that have significant recreational importance, are easily accessible to urban areas, or are used extensively by the public.

Principal Lakes



Pollution-Related Use Impairment of Principal Iowa Lakes (1980)

Lake	Surface Area, acres	Swimming	Fishing	Boating	Aesthetics
Big Creek	900				
Big Spirit Lake	4,170				
Clear Lake	3,680				
Coralville Reservoir	4,800				
Lake Macbride	810				
Lake Manawa	640				
Rathbun Reservoir	11,000				
Red Rock Reservoir	8,950				
Saylorville Reservoir	5,280				
West Okoboji Lake	3,940				



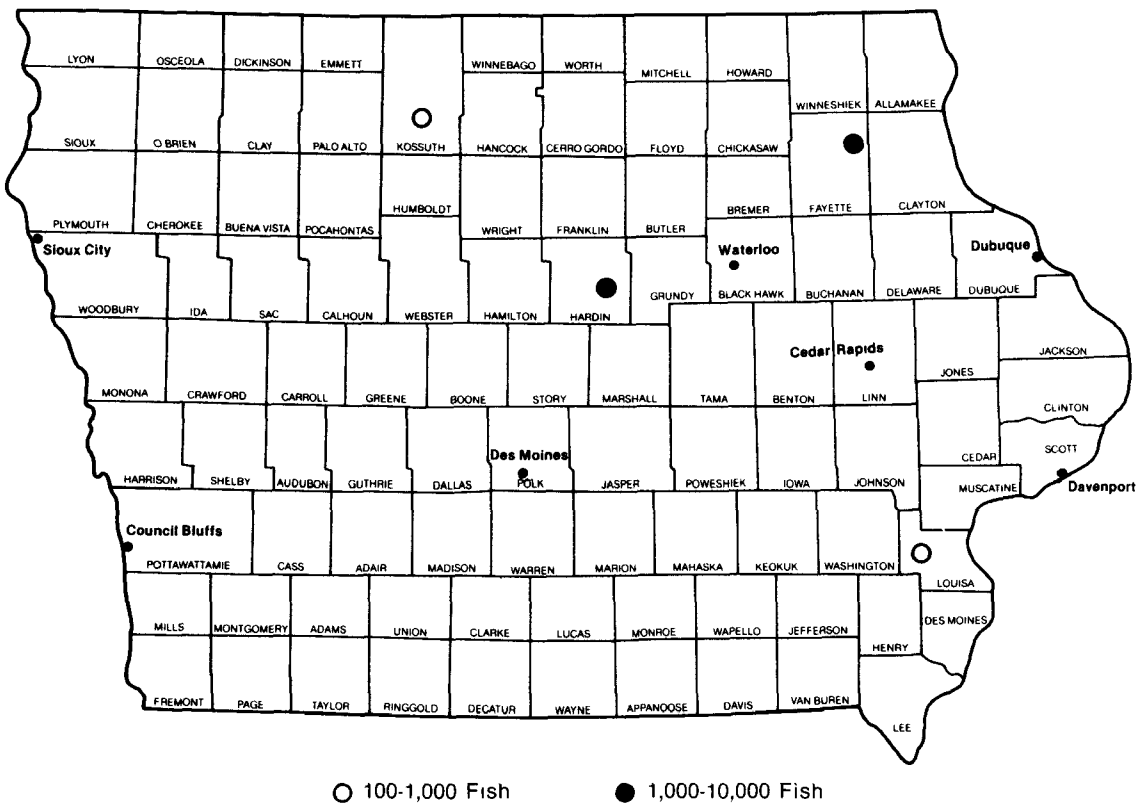
Water Resources

Fish Kills

Reports indicate that approximately 6000 fish were killed in four separate incidents of water pollution in Iowa in 1976. The most significant of these incidents, which killed 2500 fish, was caused by fertilizer spilled into Otter Creek near Elgin in Fayette County. The accompanying map shows the location, size, and cause of the 1976 kills.

Because reporting is entirely voluntary, the information shown probably represents only a fraction of the kills that occurred. Numerous small kills go unnoticed or unreported, and some significantly large kills are not included because information is insufficient to determine if the kills resulted from pollutants in the water or from natural causes.

Reported Pollution-Caused Fish Kills (1976)



Groundwater

Water held in underground gravel, sand, and silt layers (aquifers) is referred to as groundwater. Surface water and precipitation trickle through cracks and pores in the earth to reach the aquifers. The quality of groundwater is important because it is the water source for a large segment of the State's population. The contamination of groundwater supplies by nitrates and toxic substances is receiving increased attention.

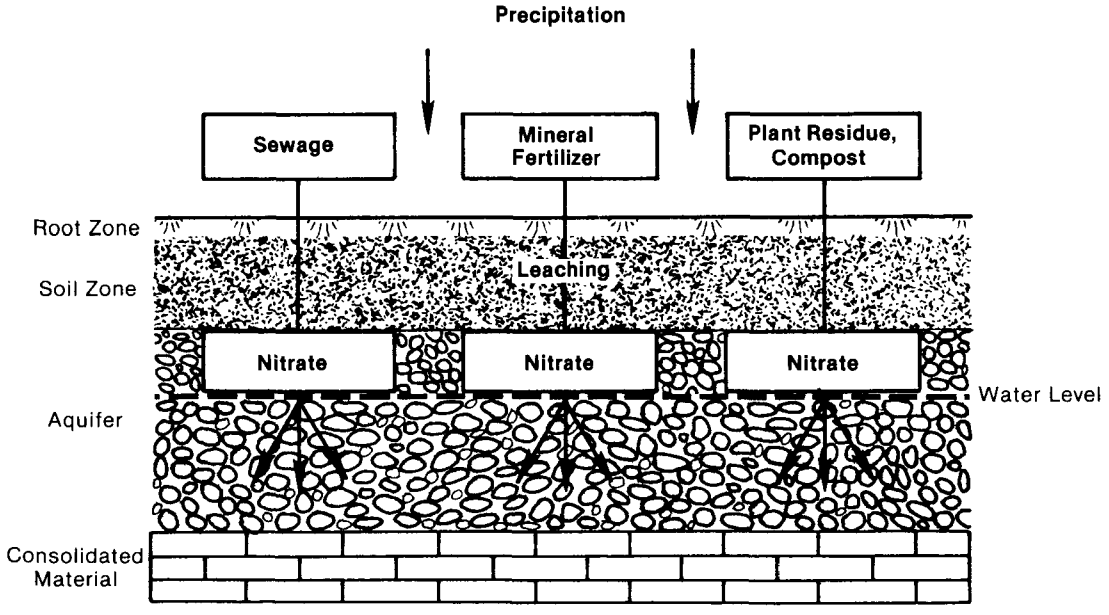
Nitrates are known to cause anemic conditions in infants. Although nature provides some of the nitrates in groundwater (through decaying organic material), the amount of nitrates can be increased by modern agricultural practices requiring irrigation and the use of such fertilizers as ammonia and liquid nitrogen. The application of more fertilizer than the plant roots can use allows the excess to reach the groundwater, and porous soils allow nitrates to enter the groundwater rapidly, before the plants can take them up. The groundwater in several areas in the State has high nitrate levels, but concentrations tend to vary widely.

Uncontrolled toxic chemical disposal sites are another possible source of groundwater contamination. The Resource Conservation and Recovery Act of 1976 addresses this problem. It requires such sites to have an impermeable barrier to prevent groundwater contamination from the buried material.

Naturally occurring radiation, selenium, and fluoride released from underlying rocks have contaminated groundwater in some areas. Concentrations of these contaminants vary erratically and sometimes reach levels of concern.

Once groundwater has become contaminated, purifying it by natural means is very slow at best. Therefore, prevention of groundwater pollution is critical. To this end, the EPA has instituted the Underground Injection Program to limit the injection of wastes underground. States may assume responsibility for this program.

Sources and Pathways of Nitrogen to the Aquifer



Water Resources

Drinking Water

The average adult consumes from one and a half to five quarts of water a day. Most people assume the water they drink is safe, and it usually is. Sometimes, however, it can be contaminated by bacteria, metals, toxic chemicals, or other pollutants.

At least 4000 documented cases of waterborne illnesses occur each year in the United States; the actual number is probably much greater, as many go unreported. In addition, the health effects of long-term, low-level exposure to contaminated water are not well known. Nevertheless, these also should be of concern to each of us.

To help fight these health threats, Congress (in the Safe Drinking Water Act) directed EPA to establish drinking water standards for all public water supplies having 15 or more service connections or regularly serving 25 or more persons. The pollutants for which standards have been established are briefly described below.

Bacteria — Coliform bacteria from human and other animal wastes can be found in improperly treated drinking water. These bacteria may indicate the presence of other harmful organisms. Waterborne diseases such as typhoid, cholera, infectious hepatitis, and dysentery have been traced to improperly disinfected drinking water.

Nitrate — Drinking water having nitrate levels above the national standard poses an immediate threat to children under three months of age. In some infants, excessive levels of nitrate have been known to react with the hemoglobin in the blood to produce an anemic condition commonly known as "blue baby."

Arsenic — This element occurs naturally in the environment. It is also found in insecticides, foods, tobacco, shellfish, drinking water, and air. Consumption of water that continuously exceeds the national standard can cause fatigue and loss of energy. High levels of arsenic intake can be fatal.

Barium — This element also occurs naturally in the environment in some areas, but it is not as widespread as arsenic. Barium can also enter water supplies through industrial waste discharges. Although small doses are not harmful, consumption of large quantities is quite dangerous and can cause high blood pressure, nerve damage, and even death.

Cadmium — Only minute amounts of this element are found in natural waters in the United States; however, improperly treated waste discharges from electroplating, photography, insecticide, and metallurgy industries can increase cadmium levels. Although most cadmium enters the

body through cigarette smoking and food intake, minute quantities have also been found in water supplies having galvanized pipes and fixtures.

Chromium — Cigarettes, foods, and air are the most common sources of chromium. High levels of chromium in drinking water may cause skin and respiratory ailments. Although some studies suggest that minute amounts of chromium may be essential to humans, this theory has not yet been proven.

Lead — This metal is found in the air, in food, and in the pigment of some older paints. The lead in drinking water comes from plumbing, auto exhausts, and other sources. When standards are greatly exceeded, humans may suffer from nervous system disorders or from brain or kidney damage.

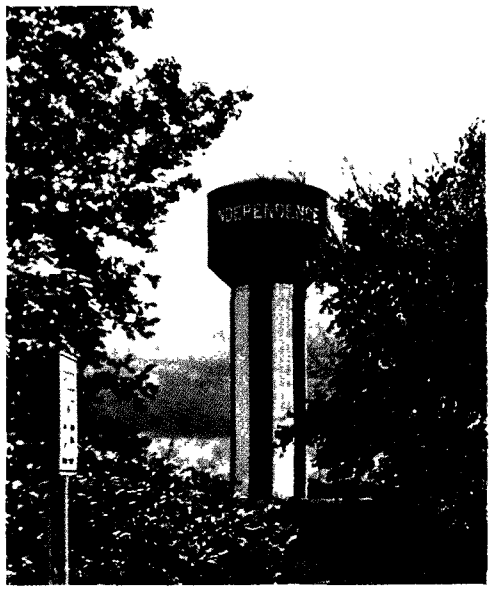
Mercury — Mercury levels in water can be raised above normal by industrial discharges and mercury-based pesticides. A greater health risk results from eating fish from such waters than simply from waterborne mercury itself, because the element becomes concentrated in the fish tissues. Ingested mercury can cause liver, intestinal, circulatory, kidney, and neurological ailments — even death. Mercury poisoning can be acute, as a result of large doses, or chronic, as a result of smaller doses received over an extended time.

Selenium — This material occurs naturally in soil and plants and is found in meat and other foods. Although selenium is believed to be essential in the diet, indications are that excessive amounts may be toxic. Studies are under way to determine the amount required for good nutrition and that which may be harmful.

Silver — The need to set a drinking water standard for silver arises from its intentional addition as a disinfectant in some water supplies. Overexposure to silver causes discoloration of the skin and mucous membrane. When absorbed through the skin or consumed at high levels, silver can cause kidney, liver, and spleen damage.

Pesticides — Each year some of the millions of pounds of pesticides used on croplands, forests, lawns, and gardens in the United States drain off into surface waters or seep into underground water supplies. If they get into drinking water and the water is not properly treated, many of them may pose health problems. The pesticides for which drinking water standards have been established are Endrin, Lindane, Methoxychlor, Toxaphene, 2,4-D, and 2,4,5-TP Silvex.

Radioactivity — Radiation, which results from both natural and man-made processes, is of concern because it is known to cause cancer and genetic defects in humans. Some water supplies within the State have been found to contain radioactivity above the concern level.



Radioactivity is discussed further in the radiation section of this publication.

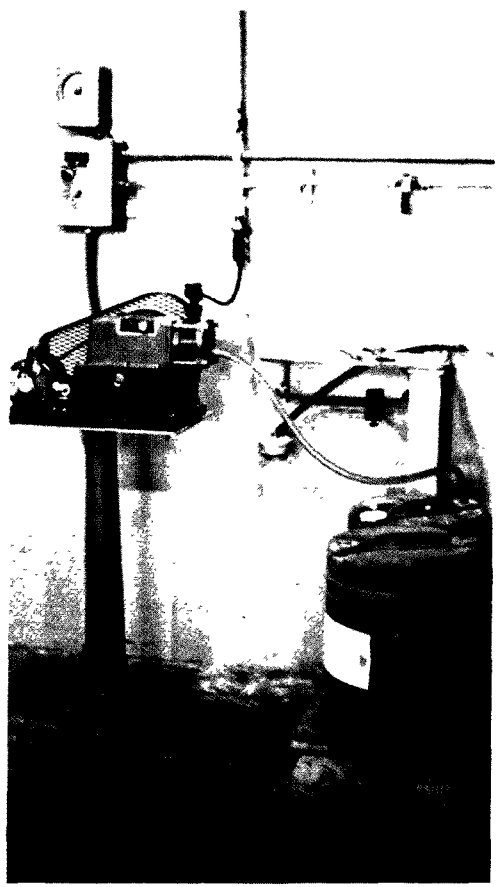
Turbidity — Turbidity (cloudiness resulting from minute suspended particles) in drinking water interferes with the aesthetic quality of the water. Excessive turbidity can also interfere with disinfection and allow disease-causing organisms to survive. National standards have been set to correct this problem.

Water Resources

Drinking Water (continued)

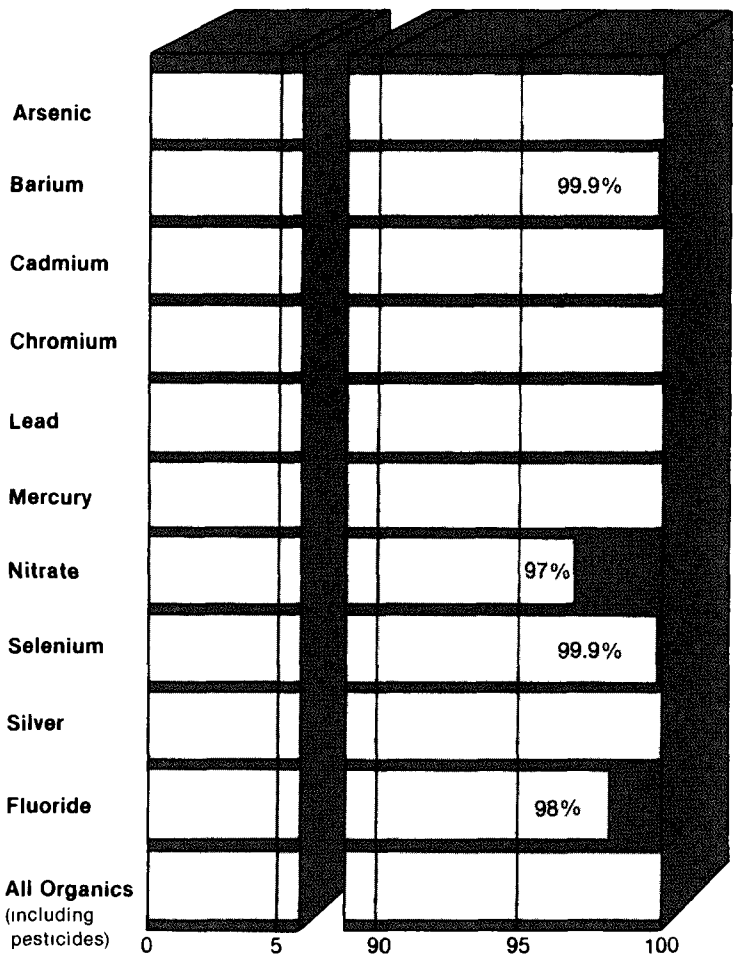
The figure shows the percentage of Iowa communities meeting drinking water standards for each of these contaminants.

Percentages out of compliance are based on total number of violations divided by the number of community water supplies.



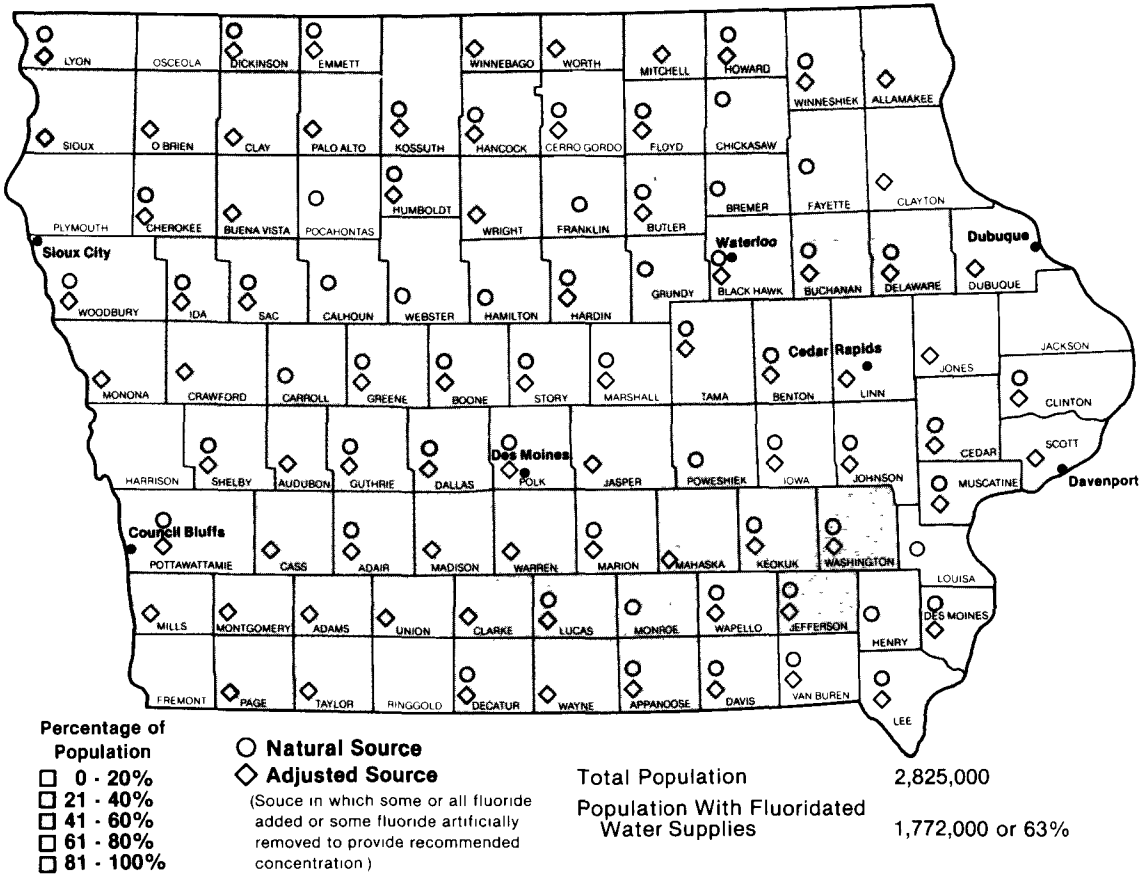
Compliance of Iowa Community Water Supplies With Chemical Drinking Water Standards

(1289 Supplies)



Fluoride is a naturally occurring element that is commonly added to water supplies to help prevent tooth decay. The recommended concentration is 1 part per million (ppm). Because too much fluoride can cause mottling of teeth, concentrations above 2 ppm are a cause for concern. The map shows Iowa counties that have adequate fluoride in their drinking water.

Population Receiving Adequately Fluoridated Water (1980)



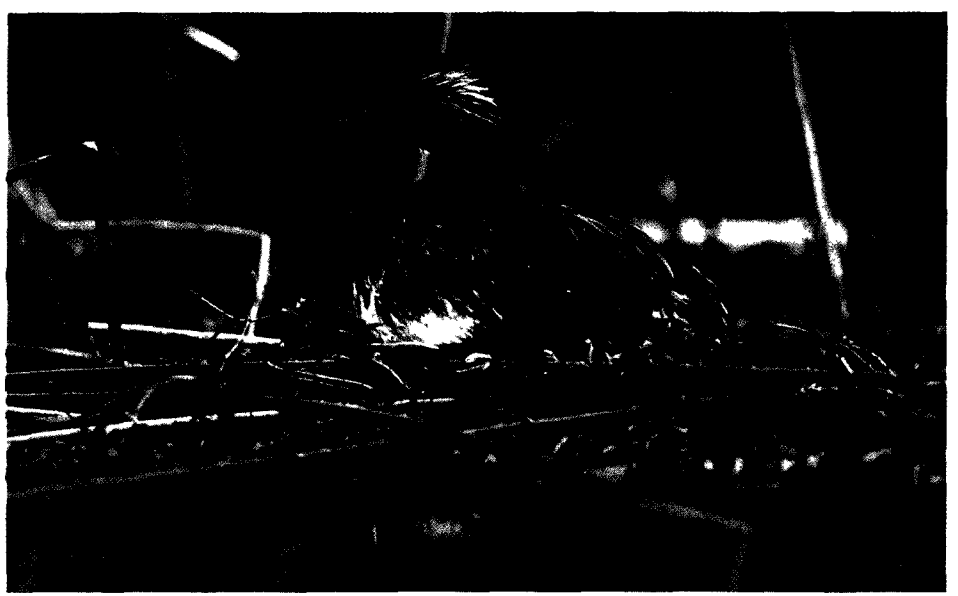
Water Resources

Wetland Areas

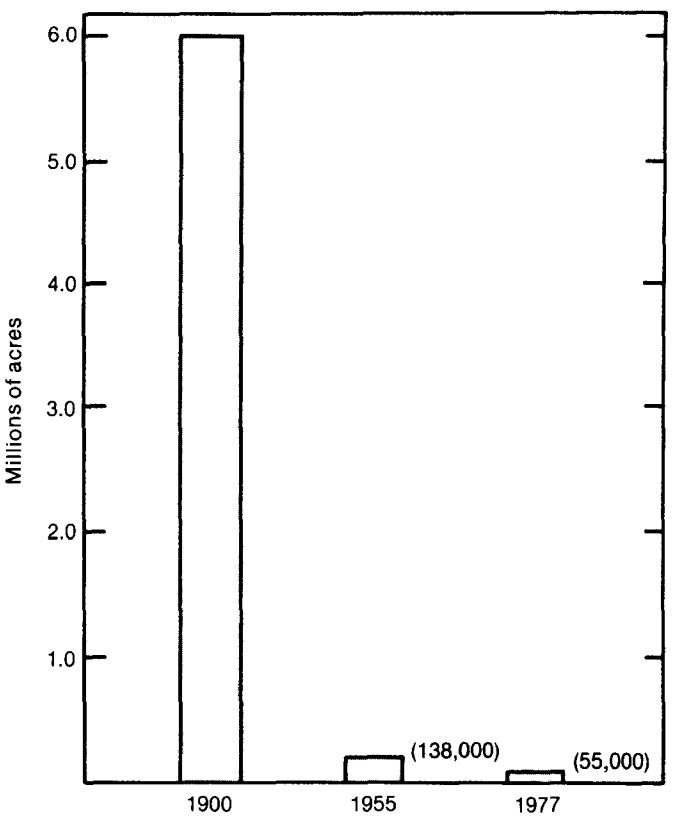
Wetlands are lowland areas, such as marshes or swamps, that are saturated with moisture all or part of the year. These lands represent unique ecosystems of major importance. Iowa's wetlands provide unique recreational areas, which support hunting and fishing, are high in aesthetic value, and contain irreplaceable plant and animal life that make them especially valuable for educational and scientific studies.

Some other roles and functions of wetlands are often not appreciated. For example, these areas can recharge groundwater supplies and help to maintain flow during dry periods. The dense vegetation, acting as a filter, traps pollutants and helps to maintain water quality in nearby streams and lakes. By storing floodwaters and excess runoff, the wetlands can serve as buffer zones and reduce erosion by dissipating the energy of floodwaters. They also can be a source of harvestable timber and crops.

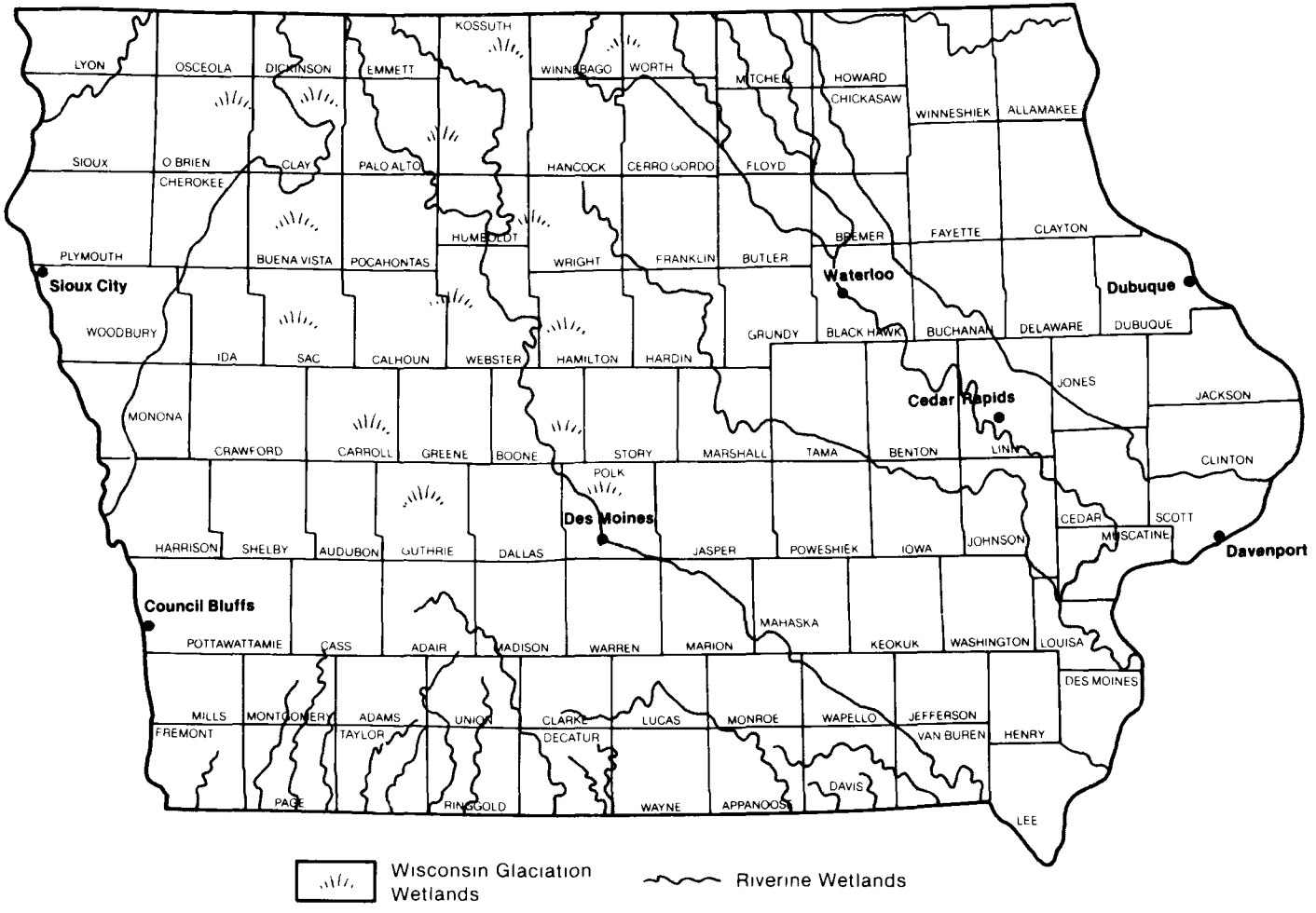
The major zone of wetlands in Iowa, known as the Wisconsin Glaciation Area, is located in the north-central part of the State, as shown on the map on the opposite page. Most of these wetlands have been destroyed as a result of artificial drainage for agricultural purposes. Over 99 percent of the wetlands in Iowa have been destroyed since the turn of the century. An estimated 55,000 acres of wetlands still remained in 1977.



Wetland Acreage Remaining in Iowa



Zones in Which Remaining Wetlands Are Located



Air Quality

Air Pollutants and Standards

The objective of the EPA's air pollution control program is to meet the requirements of the Federal Clean Air Act by achieving and maintaining National Ambient Air Quality Standards (NAAQS) by 1983. Toward this goal, the EPA provides research on health effects, offers the State both technical and financial assistance, and sets standards for specific sources.

The primary concern is the effect of air quality on public health. Commonly known effects of air pollution are respiratory aggravation and cardiovascular stress. Air pollution also threatens crops, forests, fish, lake ecosystems, and property values. These are referred to as public welfare considerations.

The many sources of air pollution range from natural sources, such as dust, to the daily emission of thousands of tons of pollutants from industrial smokestacks and automobile exhausts.

State Implementation Plans

The EPA required that all states have an approved State Implementation Plan (SIP) by 1972. The plans were to detail the state's program for achieving and maintaining the National Ambient Air Quality Standards and the regulatory mechanisms for accomplishing that goal. When monitoring shows that a particular pollutant exceeds standards, an inadequacy in the original SIP is indicated. The area where this occurs is declared a nonattainment area.

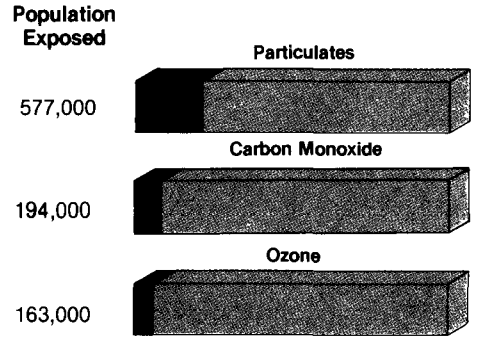
Revisions to the SIP must be submitted to EPA for the nonattainment area and pollutant standard being violated. The revised SIP must indicate additional controls for existing and new sources and the supporting regulatory mechanisms. As part of the control program, all existing point sources must apply Reasonably Available Control Technology. All new point sources must apply the more stringent Lowest Achievable Emission Rate control.

Further, in the interim period before the SIP revision is approved by EPA, no new point sources can be built unless emissions from other sources are correspondingly reduced. After the SIP is approved, every new point source must be evaluated to demonstrate that its proposed emissions will not cause a violation of the applicable air quality standard.

Standards have been written for six criteria pollutants: Total suspended particulates (TSP), ozone, carbon monoxide (CO), sulfur dioxide (SO_2), lead (Pb), and nitrogen oxides (NOx). Primary standards are written to protect public health, whereas secondary standards are written to protect public welfare.

The State determines compliance with National Ambient Air Quality Standards (by monitoring air quality)

Population Exposure Where Ambient Air Health Standards Are Exceeded in Iowa

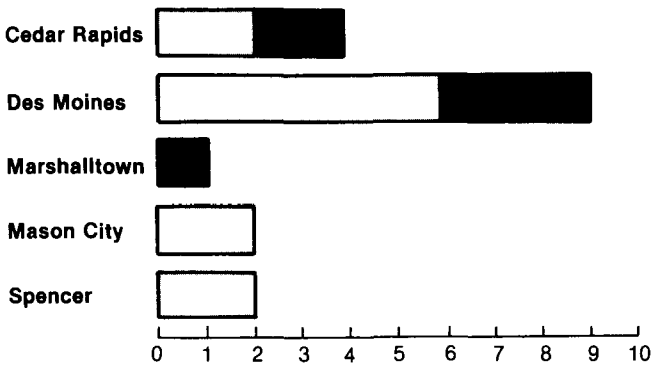


Total State Population
2,824,376

and acts as the primary enforcement agent. The Des Moines-Polk County Health Department and the Linn County Health Department assist the State in these tasks.

In addition to emissions of the six criteria pollutants for which ambient standards have been established, the EPA also regulates emissions of a special group of hazardous air pollutants — asbestos, vinyl chloride, mercury, benzene, beryllium, and radioactive particles. All of these have been shown to cause cancer in humans. The three sludge incinerators and one asbestos processor in Iowa are all in compliance with the National Emission Standards for Hazardous Air Pollutants.

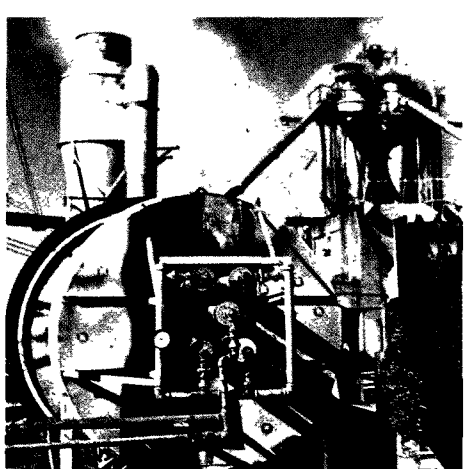
Number of Days National Total Suspended Particulate Standards Were Exceeded in Iowa in 1978*

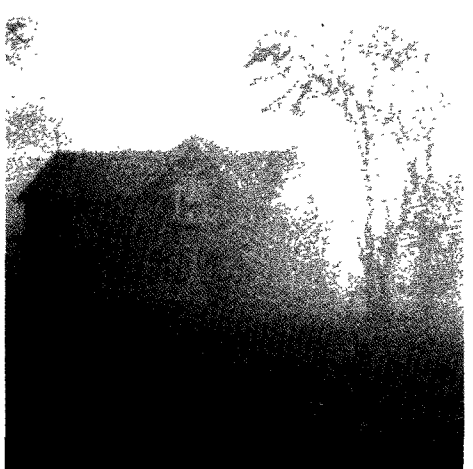


Health standard exceeded

Alert level exceeded

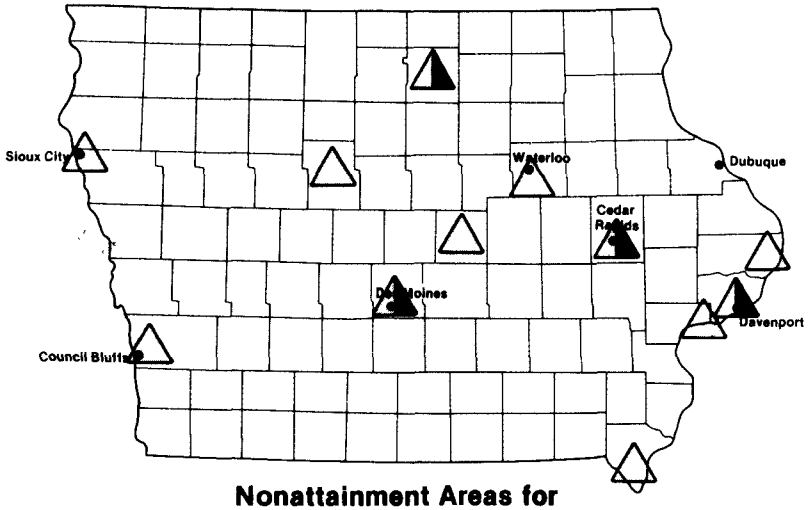
*Note: Because consideration must be given to natural meteorological events, exceeding Ambient Air Quality Standards for one day during a single year does not constitute a violation; the standard must be exceeded at least two days in a single year to be considered a violation.





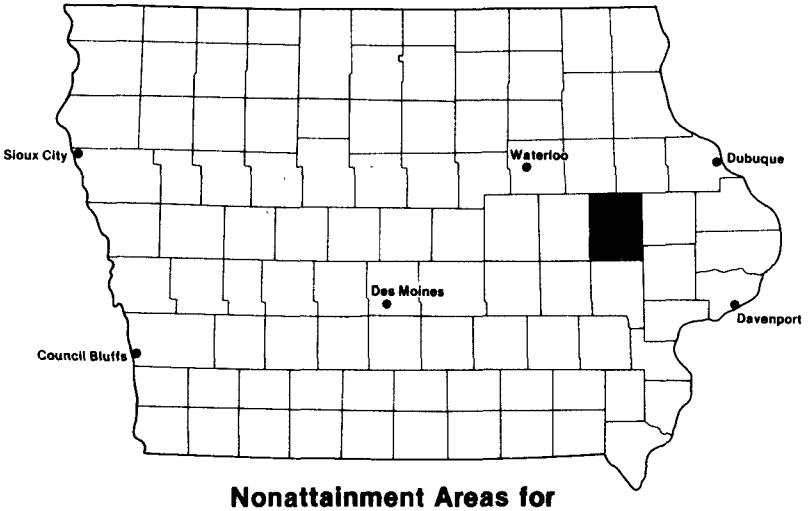
Air Quality

Air Pollutants and Standards (continued)



Nonattainment Areas for Total Suspended Particulates (TSP) (1980)

△ Part of county violates the secondary (public welfare) standard.
◭ Part of county violates primary standard and part violates secondary standard.



Nonattainment Areas for Ozone (1980)

■ County violates standard.

Total Suspended Particulates (TSP)

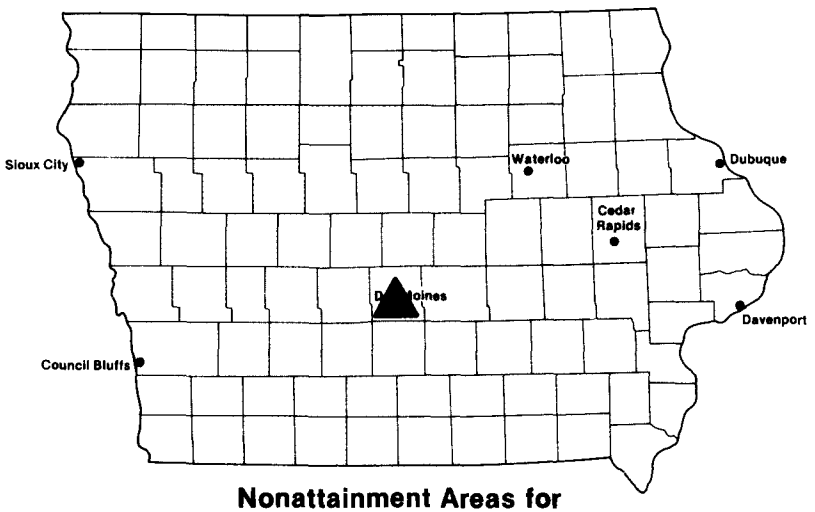
Northern Mason City, central and southern Cedar Rapids, parts of Des Moines and West Des Moines, and central Davenport are primary nonattainment areas for total suspended particulates. Muscatine, Clinton, Sioux City, Fort Dodge, Waterloo, Council Bluffs, Keokuk, Northern Davenport, outer Des Moines, and portions of Mason City and Cedar Rapids are secondary nonattainment areas.

The term TSP refers to all the solid material floating in the air, such as dust, soot, and fly ash. Agricultural activities, construction sites, unpaved roads, grain handling, automobile exhaust, and coal combustion are all sources of TSP. All TSP affects the respiratory system, but the smallest particles are the most harmful. In addition, toxic materials such as pesticides and lead are sometimes carried by these suspended particles.

Ozone

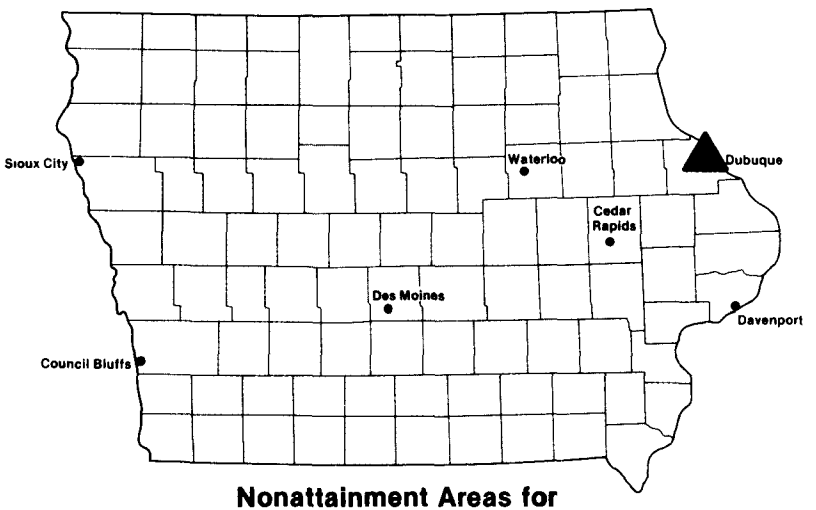
Linn County is a nonattainment area for ozone.

Ozone is a major component of photochemical smog formed by a series of chemical reactions that occur when hydrocarbons and nitrogen oxides are exposed to sunlight. Hydrocarbons include the fumes from any of numerous oil-derived liquids (for example, gasoline, kerosene, diesel fuels, lacquers, and thinners). The most common sources of airborne hydrocarbons are automobiles, refineries, fuel transfer facilities, painting operations, fuel combustion in stationary sources, and nature itself. Ozone, which is a severe irritant to mucous membranes, aggravates respiratory disorders, reduces lung function, and increases susceptibility to bacterial infection.



Nonattainment Areas for Carbon Monoxide (CO) (1980)

▲ Part of county violates standard.



Nonattainment Areas for Sulfur Dioxide (SO_2) (1980)

▲ Part of county violates standard.

Carbon Monoxide (CO)

Downtown Des Moines is a nonattainment area for carbon monoxide (CO).

Carbon monoxide, a toxic byproduct of incomplete combustion (automobile exhausts are the major source), reduces the amount of oxygen available to lung tissues, impairs visual perception, decreases alertness, and in high concentrations, can be fatal.

Sulfur Dioxide (SO_2)

Julian Township in Dubuque County is a nonattainment area for sulfur dioxide.

Sulfur dioxide results from the combustion of sulfur-containing coal and oil, the smelting of metal ores, the refining of oil, and other industrial processes. This compound reacts readily with other atmospheric pollutants to form a group of substances called sulfates, which aggravate heart disease and such respiratory ailments as bronchitis, emphysema, and asthma. Sulfur dioxide also reacts with moisture to produce acid rain, a problem affecting the delicate ecosystems of lakes and forests.

Air Quality

Air Pollutants and Standards (continued)

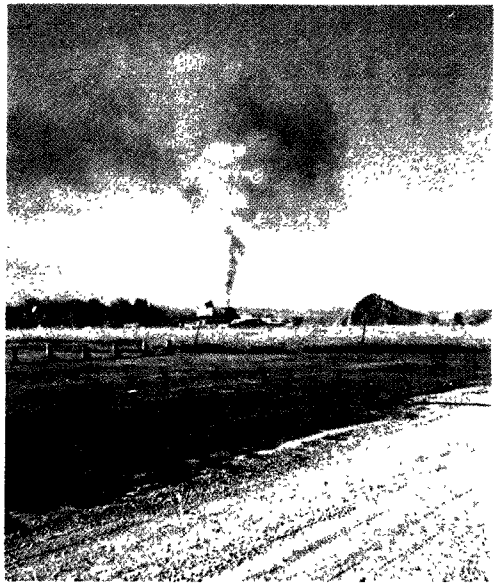
The entire State of Iowa meets the national standards for the other criteria pollutants, which are described briefly below.

Lead

The metal lead (Pb) reaches the air primarily through the use of leaded gasoline. Other sources include lead and zinc mining and processing sites, lead recovery plants, battery manufacturing facilities, and certain industrial chemical processing factories. Lead is particularly harmful to the soft tissues of the body, the reproductive system, and the nervous system. It also can cause anemia and irreversible brain damage.

Nitrogen Oxides

Nitrogen oxides (NOx) are produced by fuel combustion and come from both stationary and mobile sources. Coal- and oil-fired furnaces and automobiles are major sources. These compounds react with hydrocarbons in the presence of sunlight and produce ozone. They also cause acid rain. Nitrogen dioxide (NO_2), a form of NOx, can affect lung tissue, reduce resistance to disease, contribute to bronchitis and pneumonia, and aggravate chronic lung disorders.

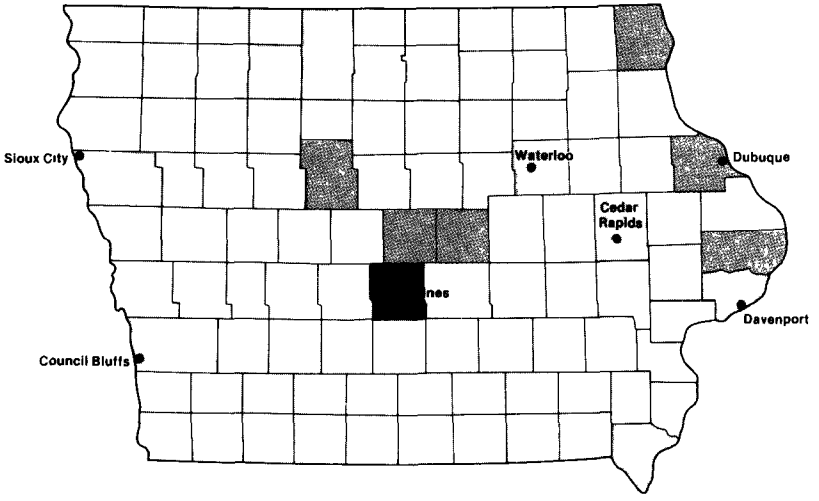


Emissions

No SIP revisions are required in areas where monitoring indicates compliance with NAAQS. Existing sources, however, must meet applicable State and local regulations, and new sources may also be subject to more stringent regulations. Some new source categories must meet New Source Performance Standards. Major new sources must meet Prevention of Significant Deterioration regulations.

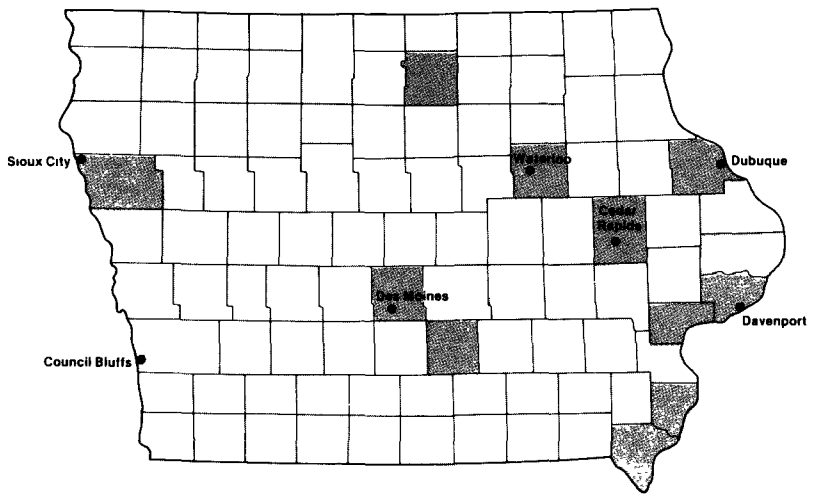
Of the 532 existing major point sources in Iowa, 525 sources are in compliance with applicable emission regulations.

Ranges in color keys indicate 1000's tons/yr.



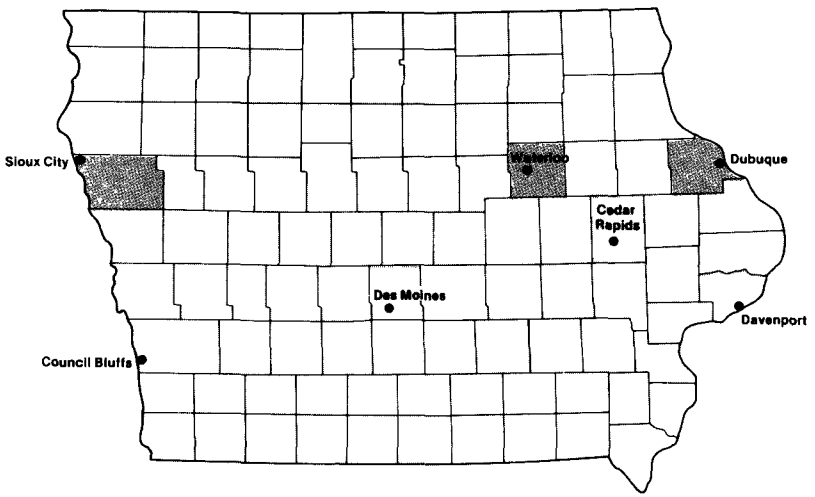
Particulate Emissions

□ <10 ▨ 10-20 □ 21-50 ■ >50



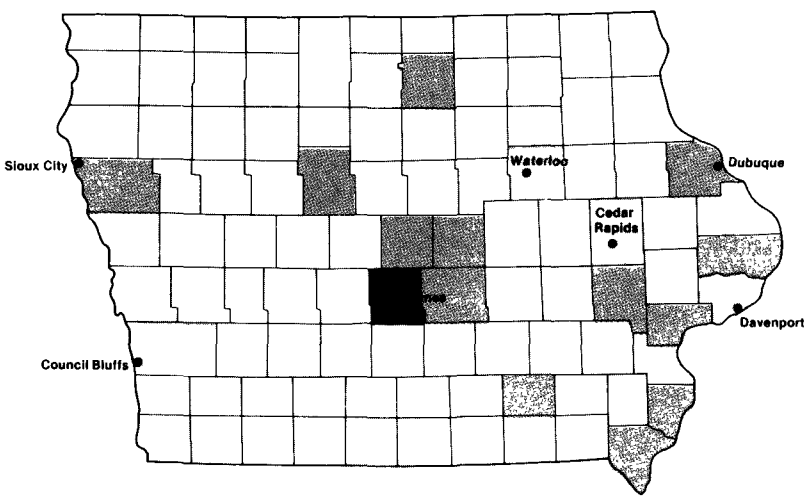
SO_2 Emissions

□ <10 ▨ 10-50 □ >50



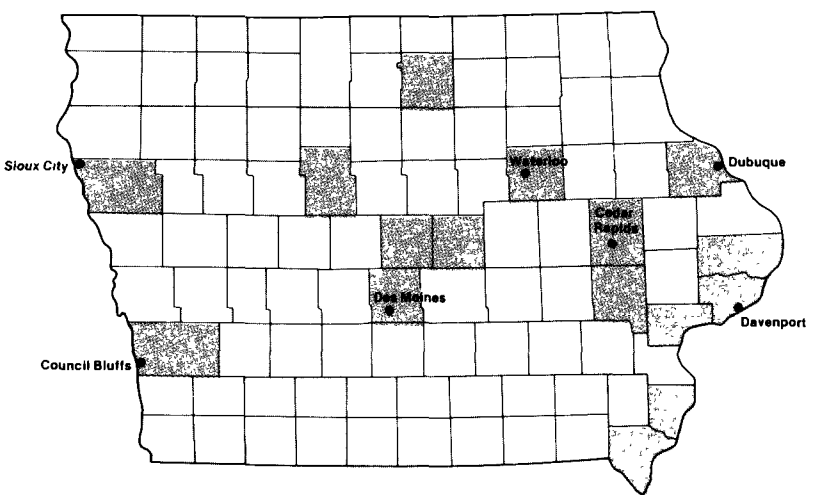
Hydrocarbon Emissions

□ <10 ▨ 10-20 □ 21-50



CO Emissions

□ <20 □ 20-75 □ 76-140 ■ >140



NO_2 Emissions

□ <5 □ 5-40

Solid Waste

Disposal and Recovery

Besides the well-known household garbage, solid waste includes such material as waste from agricultural, industrial, and mining activities; sludges from water and air pollution control facilities; demolition material; and abandoned cars. National statistics show that 87 percent of the solid waste in the United States is produced by agricultural and mining activities, 9 percent by industrial activities, and 4 percent by residential and commercial activities. The amount of solid waste constantly increases, and its composition changes with the Nation's population growth and technological advancement.

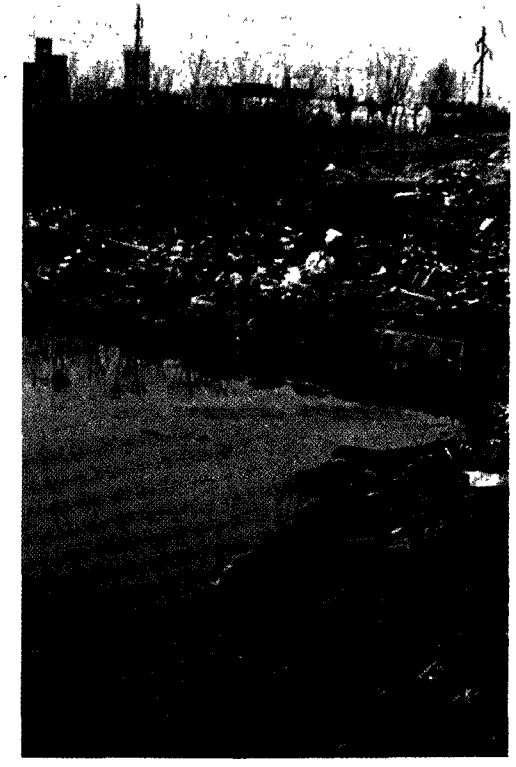
Increases in solid waste result in the littering of city streets, country roadsides, and any available open spaces. Such littering diminishes our enjoyment of the environment and creates an expensive cleanup problem.

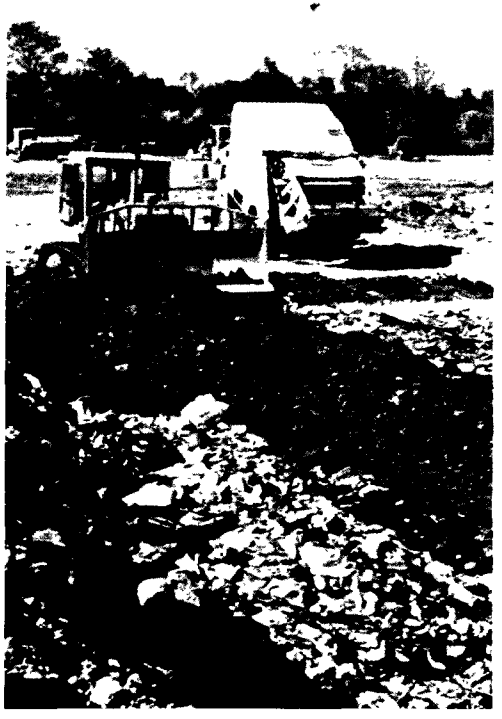
The most fundamental ways to lessen environmental damage from solid waste are (1) to generate less waste or (2) to recover and reuse valuable resources from those wastes. Both approaches would not only reduce degradation, but save energy and materials as well.

Generation of solid waste by municipalities is high — about 1300 pounds per person per year; the rate of resource recovery is low — about 7 percent. The rising cost of land disposal, however, is likely to make resource recovery and conservation increasingly more attractive.

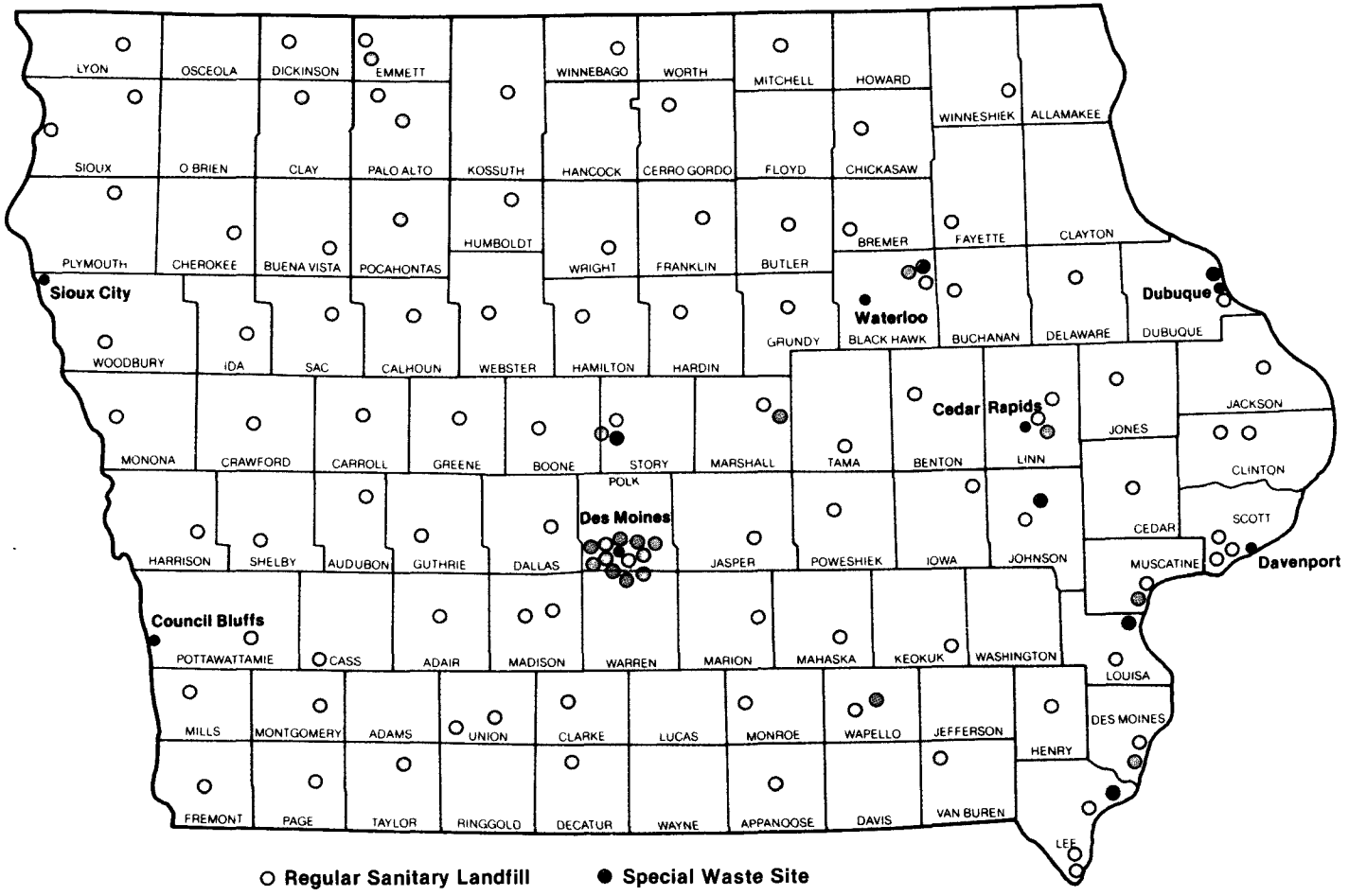
Passage of the Resource Conservation and Recovery Act (RCRA) in 1976 accelerated solid waste management programs at all levels of government. Uncontrolled open dumps and open burning of solid waste will soon be a thing of the past. Sanitary landfills are the most common replacement for open dumps in solid waste management programs. The design of these landfills is such that solid waste can be buried in a manner efficient enough to protect both groundwater and surface water. The map indicates the approved sanitary landfills in Iowa.

Proper operation of the landfills is essential to adequate control of the waste placed there. Also, every Iowa citizen must recognize his or her role in environmental protection by assuring that any household waste, dead animals, pesticide containers, and the like are disposed of properly.





Permitted Solid Waste Disposal Facilities
(1980)



Hazardous Materials

Hazardous Waste

The use of large quantities of chemicals has become a way of life in our society. The list of more than 4,000,000 recognized chemical compounds grows at the rate of 6,000 per week.

Many of these chemicals are beneficial, but some are known to produce adverse effects in our food, water, and air; the effects of many others are still unknown. The EPA estimates that at least 57 million metric tons of waste generated in the United States in 1980 may be classified as hazardous.

Many once believed that the Midwest would never have to worry about health hazards associated with improper handling of chemicals such as those experienced in the East — for example, the nationally publicized Love Canal incident in New York. The problem is brought closer to home by the hazardous waste problem involving Salsbury Laboratories and the La-Bounty dumpsite in Charles City. Waste products from the laboratory and dumpsite have been shown to contain such contaminants as arsenic, phenol, orthonitroaniline, and nitrophenol. The ground and surface water resources potentially involved are used by 300,000 Iowans. The Iowa Department of Environmental Quality and the EPA have taken several actions to deal with the problem, including the preparation of a remedial plan that details how the laboratory is to perform the necessary work to correct the situation.

In the 40 years preceding the passage of the Resource Conservation and Recovery Act (RCRA) in 1976, the disposal of hazardous wastes was largely unregulated. The act mandated a comprehensive "cradle to grave" hazardous waste management program. Such proper environmental control will cost more, but eliminate the astronomical costs of correcting poor disposal practices. For example, a 1979 EPA study reported that cleaning up abandoned and improperly operated hazardous waste sites could cost as much as $44 billion, of which only a portion would likely be paid by the owners of the sites.

The RCRA plan of attack consists of two phases. The first provides a system for following hazardous waste from its point of origin to its final disposal. This system includes:

- Identifying hazardous waste.
- Setting standards for producers and shippers of hazardous waste.
- Specifying performance, design, and operating requirements for facilities that treat, store, or dispose of hazardous waste.
- Providing a system for issuing permits to such facilities.
- Furnishing guidelines that outline conditions under which state governments can be authorized to carry out their own programs for hazardous waste management.

The second phase of the program entails a comprehensive effort to identify dangerous abandoned or uncontrolled dump sites. If danger to human health and the environment is deemed "imminent and substantial," the owner can be forced to clean up the site. Unfortunately, many of the owners cannot be found or are not financially able to correct the problem.

Hazardous Spills

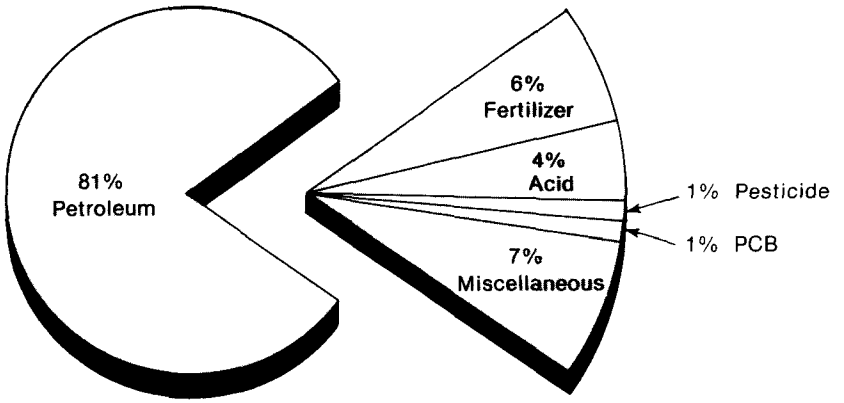
Most environmental problems do not require immediate action, but the accidental release of oil or some hazardous material can constitute an emergency condition. Such incidents necessitate immediate action to protect public health and to minimize damage to natural resources.

In the event of such emergencies, a response team must be prepared to travel to the area, identify the nature and source of the substance spilled, and take direct action to contain the spill. Cleanup of the spilled material can then begin, and if necessary, appropriate legal action can be taken.

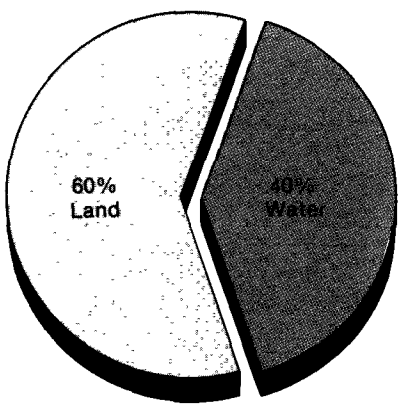
This type of response is complex and expensive. The workers must wear protective equipment and take the necessary precautionary measures until such time as the nature of the chemical involved has been determined. Few safe sites are readily available for disposal of hazardous materials, and such materials often must be transported a great distance for proper long-term disposal.

The charts show the number of spills by type of material and environment affected for the two-year period from October 1977 to September 1979.

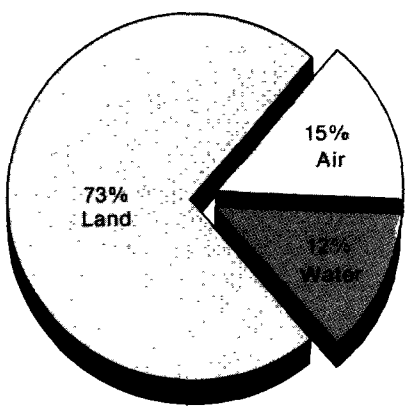
Percent of Total Number of Spills by Type* in Iowa



Percent of Total Petroleum Spills by Environment Affected*



Percent of Total Nonpetroleum Spills by Environment Affected*



*** Based on Spill Investigation Reports by EPA's Surveillance and Analysis Division (October 1977-September 1979).**

Pesticides

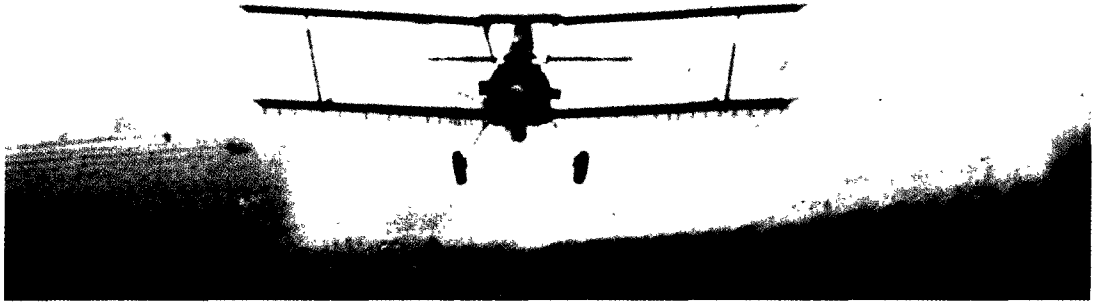
Use and Misuse

The use of insecticides and herbicides is common and beneficial on farms, in the home and garden, and in commercial and institutional establishments. Besides the increased crop production made possible by the extensive agricultural use of pesticides, another benefit derived from the use of pesticides is the control of such pests as flies, roaches, and other insects.

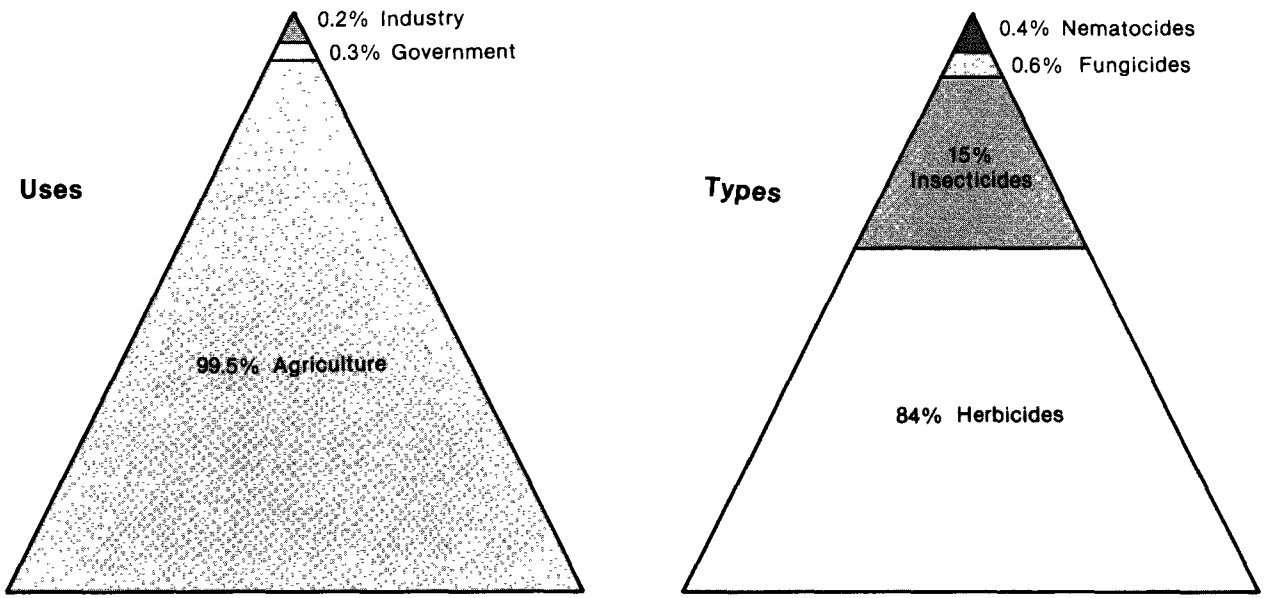
Because of the manner in which they provide these benefits, pesticides must be considered poisons, and as such, they can be dangerous not only to the people who apply them, but also to those who may be accidentally exposed. Harm can result from inhaling the pesticide or from absorbing it through the skin. Pesticides can also contaminate food crops and harm the people who consume them. Many pesticides kill plants, birds, animals, and such beneficial insects as honeybees, along with the intended pests. They can also become concentrated in fish and wildlife and pose a threat to those who eat them. For these reasons, the manufacture, sale, and use of these compounds are regulated by the government.

More than 1,400 chemicals are included in the approximately 40,000 pesticide products registered with the EPA. As of 1980, 49 of these chemicals (involving about 1,700 products) have been restricted to certain uses, and the use of 44 pesticides has been limited, suspended, or banned. Persons who wish to apply restricted-use products must become certified as applicators and, in some cases, are required to attend training courses prior to certification. The Iowa Department of Agriculture has certified 66,876 private and 4,290 commercial applicators.

The charts show the uses and types of pesticides in Iowa, based on a 1974 survey.



Pesticide Usage in Iowa
(1974)



Total 1974 Pesticide Usage = 58,773,000 pounds

Radiation

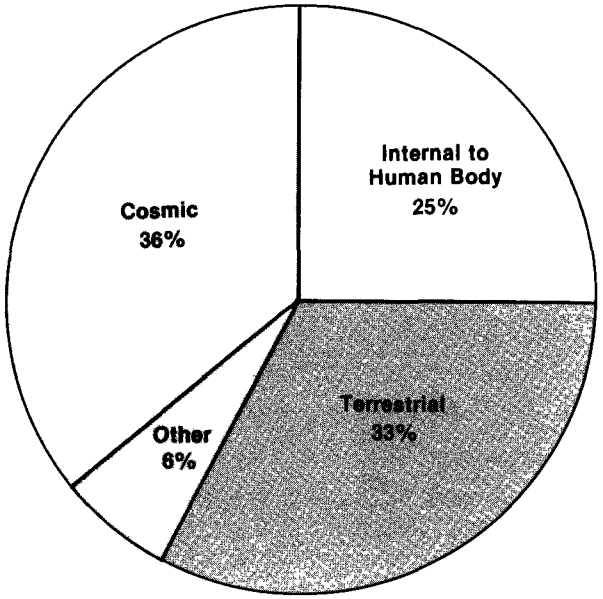
Environmental Exposure

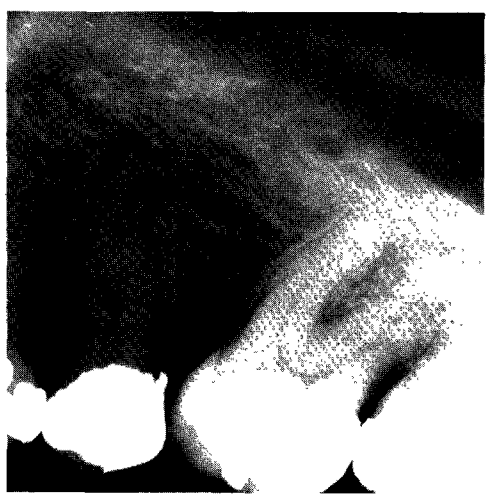
Radiation results from the breakup of an atomic nucleus. Two types are emitted during the breakup: ionizing radiation (a stream of nuclear fragments) and nonionizing radiation (a high-energy burst of X rays). When radiation passes through living cells, it disturbs essential chemical molecules. Such disturbance can result in death of the cell, cancer, or a genetic defect. Scientists are currently unsure whether or not there is a safe level of radiation — one at which these effects are not produced.

Some radiation in the environment is due to natural causes; some results from human activities. Natural radioactivity (known as cosmic rays) continuously bombards Earth from space, and the planet itself contains radioactive uranium, thorium, and potassium. Because this natural radioactivity is in the air we breathe, the water we drink, and the foods we eat, we all have some amount of radioactivity within us.

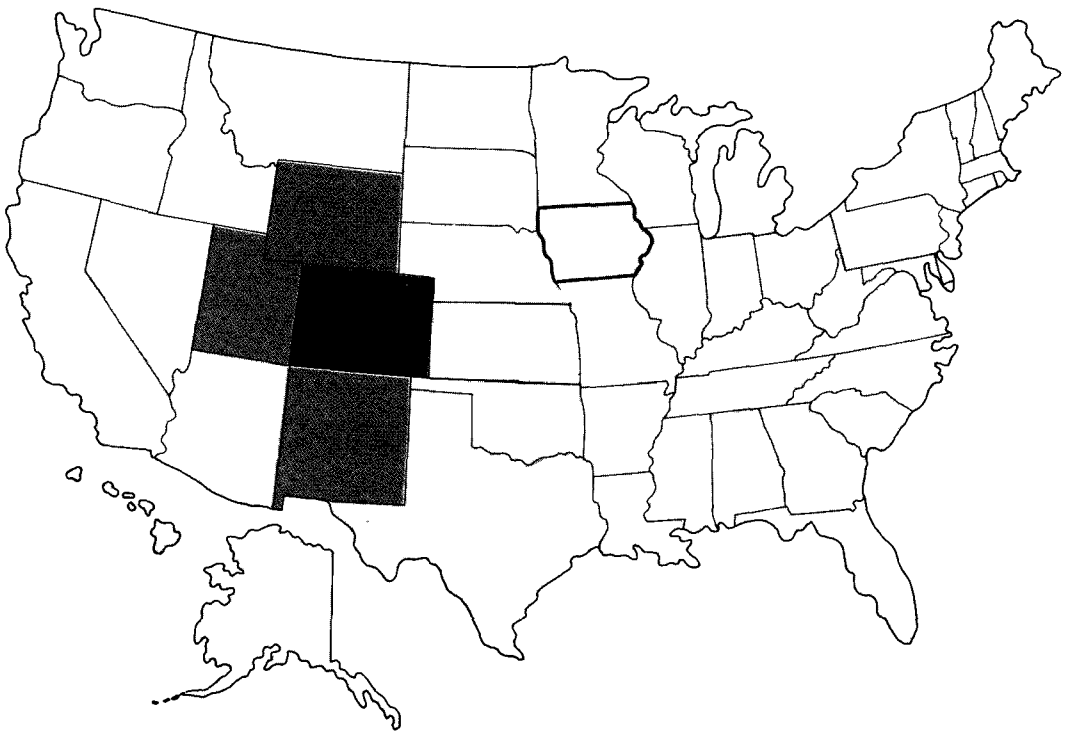
Man adds to this radiation exposure in various ways: by medical and dental X rays, by jet flights, by television viewing, by mining natural deposits of radioactive ore, by the production of fallout through atmospheric tests of nuclear weapons, by the combustion of coal (which contains several radioactive elements), and by the creation of radioactive materials during nuclear energy production.

Radiation Exposure From Environmental Sources





Combined Terrestrial and Cosmic Radiation Exposure by State



☐ 40-50 Millirems* Per Year

☐ 51-60 Millirems Per Year

▩ 61-70 Millirems Per Year

▩ 71-80 Millirems Per Year

■ 81-90 Millirems Per Year

*Note A millirem is one-thousandth of a rem, which is a unit of radiation exposure to the human body For example, a chest Xray equals about 50 millirems per hour, a dental Xray about 20 millirems per hour, and viewing color television about 2 millirems per hour *The lethal dosage is about 500,000 millirems.*

Noise

Effects and Controls

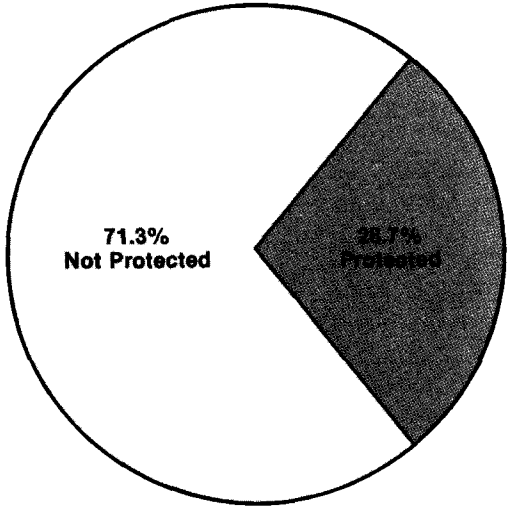
Everyone is exposed to noise of varying intensities and from many different sources every day. Constant exposure to loud noise can be harmful.

Noise-induced hearing loss is particularly recognized in employees of highly mechanized industries and other occupations involving exposure to loud noise. Excessive levels of noise appear to cause stress, which may in turn increase susceptibility to disease and infection, notably heart disease and ulcers. An estimated 14.7 million workers are exposed to an 8-hour average sound level of 75 decibels, at which there is risk of hearing damage.

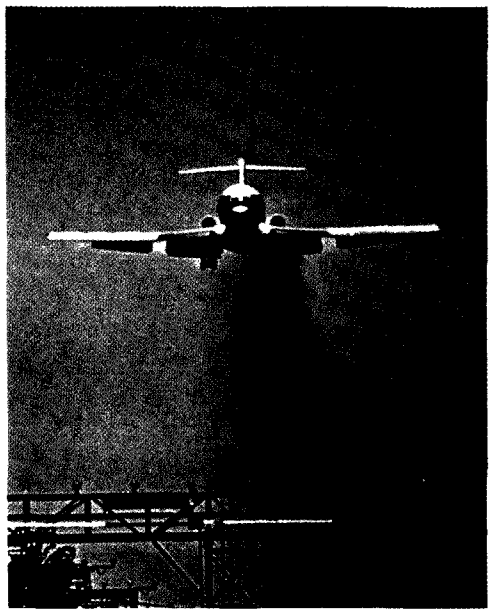
The EPA is in the process of establishing standards that require the reduction of noise in new production of portable air compressors, medium- and heavy-duty trucks, earth-moving machinery, buses, truck-mounted solid waste compactors, motorcycles, jackhammers, and lawnmowers. As older equipment is replaced with products conforming with the standards, a gradual reduction in environmental noise levels will occur. Other EPA activity centers around the development of regulations requiring equipment to be labeled so that prospective buyers are aware of the level of noise the product emits.

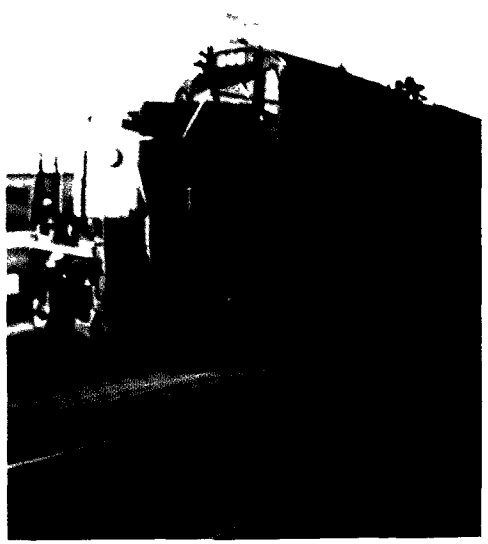
Most noise ordinances are not based on actual measurements; rather, they consider sound a problem only when it is a "nuisance." The State of Iowa has established a maximum objective noise level for snowmobiles and requires an "effective" muffler on other vehicles. A Technical Assistance Center, one of ten in the Nation, has been established at the University of Iowa to assist State and local governments in Region VII in noise-related problems and needs.

Iowa Population Protected by Enforceable Noise Ordinances

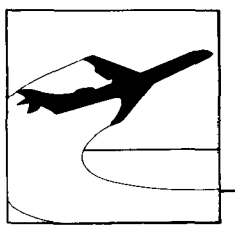


Total State Population: 2,824,376

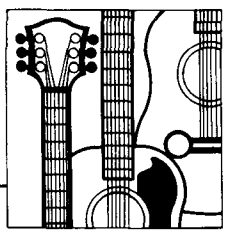




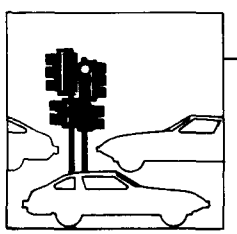
Typical Exposure Levels
(in decibels)



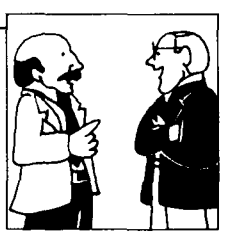
Jet Takeoff
(100 m away)



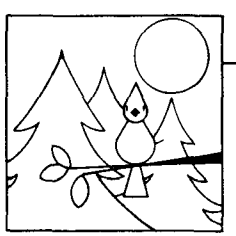
Live Concert



Street
Traffic



Conversation



Woods

140
130
120
110
100
90
80
75
70
60
50
40
30
20
10

Possibility of noise-induced hearing damage (after 8-hour exposure)

Threshold of Hearing

The measure of energy per area is presented in decibels. An increase from 20 to 30 or 90 to 100 represents a tenfold increase in energy.

The EPA Mission

The Environmental Protection Agency serves as the advocate for a liveable environment in a number of ways. First and foremost, it is a regulatory agency responsible for setting and enforcing standards. The EPA is currently engaged in a massive effort to restore America's waters, to reduce air pollution, and to find a comprehensive approach to other environmental problems associated with pesticides use, radiation, solid and hazardous waste disposal, mechanically generated noise, and toxic substances. As a research body, the EPA monitors and analyzes the environment and conducts scientific studies. The agency furnishes technical and scientific information to the public, provides training to develop the environmental skills that the Nation needs, and offers technical and financial assistance for environmental protection efforts at all levels of government.

Iowa Environmental Agencies

The Iowa Department of Environmental Quality is an independent State agency responsible for environmental planning and enforcement. Its responsibilities cover air quality; water quality and supply; the disposal of solid, hazardous, and toxic wastes; and radiation.

The Iowa Department of Agriculture is an independent State agency responsible for the registration of pesticides, the certification of applicators, and an enforcement program.

For Further Information

If you would like additional information about specific environmental programs in which EPA is involved, please contact EPA Region VII, Public Affairs Office, 324 E. 11th St., Kansas City, MO 64106, or call (800) 821-3714. This office maintains a supply of EPA publications that relate to the various programs mentioned in this document, operates an informal speaker's bureau, and coordinates distribution of environmental films (all free of charge to the public). If you encounter an environmental problem, report it first to your *local and then to your state pollution control agency.*

EPA Region VII program numbers:

Action Line ..... **(800) 821-3714**
Air Pollution Programs ..... (816) 374-3791
Hazardous Wastes Program ..... (816) 374-3307
Oil and Chemical Spills
  Region VII Emergency Response Center ... (816) 374-3778
  National Emergency Response Center .... (800) 424-8802
Pesticides Program ..... (816) 374-3036
  Pesticides Poisoning Emergency ..... (800) 424-9300
Radiation Program ..... (816) 374-6621
Resource Recovery Program ..... (816) 374-6532
Solid Wastes Program ..... (816) 374-6532
Toxic Substances Program ..... (816) 374-3036
Wastewater Treatment ..... (816) 374-2725
Water Supply ..... (816) 374-5429
Wetlands ..... (816) 374-2921

In addition to the U.S. EPA, State agencies assist residents with their environmental questions and problems. In Iowa, these agencies are:

Department of Environmental Quality ..... (515) 281-8854
  Air Quality
  Water Quality
  Water Supply
  Solid Wastes
  Chemical Technology
  Radiation

Department of Agriculture ..... (515) 281-5321
  Pesticides