BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

Cleaning Up The Environment: Progress Achieved But Major Unresolved Issues Remain

Volume 1 of two volumes

Since the 1970's, progress has been made in cleaning up the Nation's air, water, and land--the result of ambitious Federal environmental programs and the investment of hundreds of billions of dollars by Federal, State, and local governments and industry. However, a number of unresolved issues exist which may impede further progress.

The environmental laws of the 1970's reflected a single-purpose approach to pollution control that limited flexibility in decisionmaking. For example, pollution control laws not only increased the volume of wastes--like sewage sludge--but also prohibited or severely restricted available disposal options. The tradeoffs that must be made among the various environmental programs and the net environmental effect of pollution control actions must be recognized.

A companion volume to this study contains case studies of environmental programs in Cleveland, Dallas, and New York.

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COMPTROLLER GENERAL OF THE UNITED STATES
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To the President of the Senate and the
Speaker of the House of Representatives

Progress has been made toward meeting key environmental goals aimed at cleaning up the Nation's air, water, and land, but the job is far from complete. Deadlines for full compliance have been extended significantly and emerging environmental issues and unresolved problems--such as controlling acid precipitation and nonpoint sources of water pollution and coping with reduced Federal funding--will make attaining environmental standards more difficult.

We made this review to provide an overview of key environmental goals in terms of what was planned to be accomplished, what has been accomplished, and what issues have to be resolved before we can complete the job and sustain the cleanup over the long term. The report also contains case studies on environmental programs in Cleveland, Dallas, and New York.

We are sending copies of this report to the Director, Office of Management and Budget; the Administrator, Environmental Protection Agency; and other interested parties.

Charles A. Bowsher

Comptroller General
of the United States

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

CLEANING UP THE ENVIRONMENT: PROGRESS ACHIEVED BUT MAJOR UNRESOLVED ISSUES REMAIN

D I G E S T

Concerned over the erosion of environmental quality, the Nation committed itself in the 1970's to a series of ambitious programs to restore and maintain our air, water, and land resources and reduce noise pollution.

Billions of dollars have been spent by Federal, State, and local governments and industry to achieve environmental quality goals. It is estimated that $735 billion will be spent on pollution abatement between 1979 and 1988.

What have we accomplished? Overall, there has been progress toward meeting established goals. The air is significantly cleaner, more wastewater now receives the required level of treatment, and most drinking water meets national standards. The job, however, is still far from complete. Original deadlines for meeting most key goals have been extended significantly, and as yet unresolved issues--such as how to control acid precipitation and nonpoint (diffused) sources of water pollution and how to cope with reduced Federal funding--will make meeting those goals more difficult. In addition, the costs and benefits of environmental protection programs are not easily determined, further complicating the debate over the need for stringent Federal pollution control mandates.

GAO made this review to determine (1) the progress made toward meeting key environmental goals, (2) how specific cities coped with these mandates, and (3) what unresolved issues face the Nation in the future. This broad perspective can assist the Congress--in a period when environmental programs are undergoing careful scrutiny--to better understand where we stand with respect to cleaning up the environment and to make decisions on future actions.

PROGRESS MADE TOWARD MEETING GOALS

Air quality

Concentrations of the most widespread air pollutants have decreased significantly. Between 1973 and 1978, for example, nationwide average annual concentrations

of carbon monoxide decreased by 33 percent. Substantial portions of the Nation, however, have still not attained air quality standards for one or more of the seven monitored pollutants. The deadline for full compliance, originally expected by 1975, has been extended to 1982. Numerous cities with serious ozone and carbon monoxide problems have received extensions until 1987. (See pp. 11 to 16.)

Water quality

A major part of meeting the clean water goals involves controlling municipal and industrial sources of pollution. More municipal and industrial wastewater receives the required level of treatment now than when national standards were mandated in 1972. The Environmental Protection Agency (EPA) reported that, by the end of 1979, 93 percent of major nonmunicipal sources were in compliance with their permit requirements or on a schedule to meet them. On the other hand, only 37 percent of major municipal treatment facilities were in compliance with the July 1, 1977, deadline requiring secondary treatment. This deadline was extended to 1983 and then to 1988, under certain conditions. Reduced Federal funding for these projects, as well as the reduction in the Federal share from 75 to 55 percent beginning October 1, 1984, may necessitate further extensions of the deadline. (See pp. 16 to 18.)

The majority of water supply systems in the Nation meet national drinking water standards. Still, over 146,000 violations for either failing to test water or for not meeting the standards were recorded in fiscal year 1980. The deadline for granting exemptions to noncomplying systems has been extended to 1986. In addition to violating standards, many communities face monumental problems financing the capital costs of water supply development, treatment, and distribution. (See pp. 19 to 22.)

Solid waste disposal

The Resource Conservation and Recovery Act called for a nationwide inventory of solid waste disposal sites and the closing or upgrading of facilities that did not meet environmental standards. EPA published the inventory in May 1981. However, it was incomplete and was not the management tool intended to apprise the Congress and the public of the magnitude of solid waste disposal problems. Further, little progress has been made toward upgrading open dumps, and EPA has estimated that

14,000 of 20,000 municipal waste sites did not meet standards. (See pp. 22 to 25.)

Ocean dumping

The ocean dumping of industrial wastes decreased by 42 percent between 1973 and 1980. In 1980, no dumping occurred in the Pacific Ocean or the Gulf of Mexico. Some dumpers of harmful sewage sludge have discontinued the practice; however, the volume dumped still increased by 49 percent between 1973 and 1980. Further, about 92 million tons of dredged material were disposed of in the ocean in 1979. As a result of a court order, enforcement of the December 31, 1981, statutory prohibition against dumping harmful sewage sludge was delayed pending a determination whether sewage sludge unreasonably degrades the marine environment. (See pp. 25 to 28.)

Noise abatement

Federal noise control legislation was enacted to reduce environmental noise to levels most desirable to achieve health and welfare protection. There have been some indications of progress in reducing nonworkplace noise levels; for example, Federal noise regulations have been promulgated for railroads and motor carriers. EPA intends, however, to completely phase out its Noise Control Program in 1982. Without Federal assistance, many State programs will probably be terminated. Compliance deadlines for meeting aircraft noise standards established in 1976 were extended in 1980 to as late as 1988. (See pp. 28 to 31.)

MAJOR UNRESOLVED ISSUES REMAIN

Several issues will have to be resolved if key environmental goals are to be met nationwide and if progress achieved is to be sustained over the long term. These issues are not an exhaustive list of environmental problems demanding resolution but do represent a cross-section of significant issues that must be addressed if the impact of the Nation's investment in environmental protection is to be maximized.

Acid precipitation

Acid precipitation and the long-range transport of air pollutants pose serious air quality control problems. Acid precipitation has been alleged to damage crops, forests, lakes and fish population and human health. More research is

needed, however, to accurately define its causes and effects and the measures needed to control it.

The practice of dispersing pollutants through tall smoke stacks to avoid ground level concentrations has resulted in transporting pollutants hundreds of miles. Air pollution in one region, therefore, may be affected by emissions from sources well beyond the reach of the region's pollution control authorities. (See pp. 35 to 39.)

Nonpoint sources of water pollution

Little progress has been made toward controlling nonpoint pollution, although it can account for half the total pollution reaching many rivers and lakes. Agricultural activities and urban storm water runoff are the major sources of nonpoint pollution. Control programs are in their early stages and failure to implement them would jeopardize the attainment of the Nation's water quality goals.

Overflows from sewer systems carrying both sanitary sewage and storm water also severely degrade water quality and no area of the country escapes the problem. Such combined sewer systems serve more than 42 million people in an area totaling 2.7 million acres. Projects to correct combined sewer overflows have had a low priority at the Federal level, and estimates of the cost to correct this problem are $37 billion. This cost could be reduced through the use of nonstructural alternatives. (See pp. 39 to 43.)

Ground water contamination

Ground water contamination--which provides 25 percent of the fresh water used for all purposes and 50 percent of all drinking water--is a growing problem. EPA has identified industrial and solid wastes disposal sites as the most important contamination sources. Once contaminated, ground water can remain so for hundreds or thousands of years, and alternate water supplies may not be readily available. EPA proposed a national ground water strategy in 1980, but it has not been promulgated. (See pp. 44 to 45.)

Using the ocean for waste disposal

The National Advisory Committee on Oceans and Atmosphere recommended in 1981 that the ocean not be eliminated entirely as a waste disposal

option. Up to now, Federal policy has been to minimize or discontinue ocean disposal wherever possible. Decisions will now have to be made as to whether and to what extent the ocean should be available to coastal communities for waste disposal. (See pp. 45 to 47.)

Sustaining compliance with environmental requirements

Regardless of whether compliance with environmental requirements occurs slowly or quickly, it is important that initial compliance be sustained over the long term. This would assure that what is restored remains restored and the impacts from the investment in pollution control are maximized. Unfortunately, past studies have shown a high incidence of noncompliance with established pollution limits at municipal and industrial facilities built to provide cleaner air and water. (See pp. 48 to 51.)

Flexibility needed in making pollution control decisions

The environmental laws of the 1970's reflected a single-purpose approach to pollution control that did not always allow for flexibility in decisionmaking. As a result, pollution control laws not only increased the volume of sewage sludge and other residues that must be disposed of but also prohibited or severely restricted available disposal options. Because of these restrictions, government and industry may not be free to choose the most environmentally safe waste disposal option dictated by site-specific conditions. (See pp. 49 to 51.)

AGENCY COMMENTS

GAO sent a draft of this report to EPA on April 12, 1982, requesting comments within 30 days. EPA comments were not received in time to be included in this report. Comments were provided by EPA after the report was finalized; however, nothing in the comments called for material changes to the report.

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ABBREVIATIONS

CEQ	Council on Environmental Quality
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
GAO	General Accounting Office
NACOA	National Advisory Committee on Oceans and Atmosphere
SIP	State implementation plan

GLOSSARY

Aquifer	An underground bed or stratum of earth, gravel, or porous stone that contains water.
Decibel	A unit of sound measurement.
Dredging	Removing solids from the bottom of water bodies.
Effluent	The wastewater discharged by an industry or municipality.
Effluent limitations	Restrictions established by a State or EPA on quantities, rates, and concentrations of chemical, physical, biological, and other constituents discharged from point sources.
Estuaries	Areas where fresh water meets salt water and which provide shelter and food for marine life, birds, and wildlife.
Ground water	The supply of fresh water under the Earth's surface in an aquifer or soil that forms a natural reservoir.
Mobile source	A moving producer of air pollution, mainly forms of transportation.
Nonpoint sources	Diffused sources of pollution that are difficult to pinpoint and measure. Common examples include runoff from agriculture and forest lands and mining and construction and storm runoff from urban areas.
Ocean dumping	The transportation and discharge of waste materials into the ocean.
Open dump	A site used to dispose of solid wastes without environmental controls.
Point sources	Discernible, confined, and discrete conveyances of pollution, such as from a pipe, ditch, vessel, or rolling stock.
Primary waste treatment	Treatment usually involving screening and sedimentation for removal of the larger solids in wastewater. This process removes 55 percent of suspended solids.

Sanitary landfilling	Environmentally sound solid waste disposal. Waste is spread in thin layers, compacted by heavy machinery, and covered with soil daily.
Secondary waste treatment	Treatment using biological processes to accelerate the decomposition of sewage. The process removes 75 to 90 percent of suspended solids.
Sludge	The solid matter removed from wastewater through treatment. Sludge handling involves the processes that remove solids and make them ready for disposal.
Stationary source	A pollution emitter that is fixed rather than moving.

CHAPTER 1

INTRODUCTION

The 1970's have been referred to as the first environmental decade. During that period, public concern over existing and emerging environmental problems led the Congress to enact comprehensive legislation with ambitious goals to clean up our air, water, and land resources and to reduce noise pollution. The Environmental Protection Agency (EPA), created in December 1970, was designated the lead Federal agency for pollution control. EPA establishes and enforces environmental standards; conducts environmental research; and provides technical, financial, and managerial assistance to State, regional, and municipal pollution control agencies.

WHAT PROBLEMS PROMPTED THE MAJOR ENVIRONMENTAL LEGISLATION OF THE 1970's?

Man's ability to manipulate the environment has produced tremendous benefits, but too little thought was given to the consequences of our actions. We failed to anticipate that environmental modifications can affect human health and welfare in direct and indirect ways now and in generations to follow. By the 1970's, environmental pollution had reached significant proportions and continued economic growth was likely to compound the problem unless steps were taken to control and reduce pollution. The balance of this section describes the status of air, water, land, and noise pollution in the early 1970's.

Air pollution

Air pollution was a problem in all large cities and in many small towns, and each year over 200 million tons of manmade waste products were being released into the air. EPA estimated that 51 percent of these pollutants came from transportation sources, 16 percent from fuel combustion in stationary sources, 15 percent from industrial processes, 4 percent from solid waste disposal practices, and 14 percent from miscellaneous sources.

Air pollution has both health and environmental implications. It can cause severe illness, especially among infants, the elderly, and people with heart and lung problems. For example, studies have shown a direct relationship between prolonged exposure to air pollution and emphysema, bronchitis, asthma, and lung cancer. It can also affect the environment; for example, studies suggest air pollution has caused a decline in certain crop yields and significant damage to freshwater lakes, timber forests, and buildings.

Water pollution

Many of our rivers, lakes, streams, and estuaries were grossly polluted. Rivers from all parts of the continent were on the list of most polluted rivers. Certain pollutants had disturbed the

ecological balance of our lakes and accelerated the otherwise slow, natural aging process. Contamination of coastal waters were preventing the harvesting of fish and shellfish in many areas, and dredging and filling operations were threatening waters that nurture aquatic life. Water pollution came from millions of sources. For example, more than 1,300 communities were discharging their untreated sewage into waterways. An equal number employed only primary treatment, removing 30 to 40 percent of some pollutants. About 240,000 water-using industrial plants were generating the largest volume of waste water and the most toxic of pollutants. Other sources of water pollution included animal wastes from feedlots, fertilizer and pesticide runoff from fields and forests, acid and sediment drainage from mining operations, and urban runoff.

Drinking water problems

The results of a 1969-70 Department of Health, Education, and Welfare community water supply study indicated that about 5.4 percent of all Americans, or 8 million people, were drinking impure water from an estimated 5,000 of the Nation's community water systems. In addition, another 30 million persons were obtaining water from individual sources like wells and springs, many of which were unprotected against dangerous impurities. During the 1960's, 130 outbreaks of disease or poisoning caused by contaminated drinking water were reported. Twenty persons died and an estimated 46,000 became ill, many seriously. Some EPA water supply experts believe perhaps 10 times as many such outbreaks occurred but went unreported. In addition, new families of pollutants were degrading drinking water. Industry was using thousands of toxic chemical compounds, and many new chemicals were being developed each year. Most conventional treatment processes were not effective in removing increasing amounts and varieties of chemical contaminants, trace metals, and radioactive materials.

Solid waste disposal problems

At the outset of the 1970's, 4.3 billion tons of solid waste were being produced in the United States annually: 360 million tons were household, municipal, and industrial wastes; 2.3 billion tons were agricultural wastes; and 1.7 billion tons were mineral wastes. Most disposal methods were polluting either the land, air, or water. For example, three-fourths of the solid waste dumps contributed to air pollution and one-half were situated so that their drainage polluted rivers and streams. Ground water contamination was also a problem. A national survey had revealed that less than 6 percent of 12,000 land disposal sites met the minimum Federal standards for sanitary landfills and all over the country, cities, unable to find convenient space for land disposal, were seeking new sites--even distant sites--to which they could haul municipal wastes.

Marine pollution

The Council on Environmental Quality (CEQ) reported in 1970 that marine pollution had seriously damaged the environment and endangered human life in some areas. Pollution (1) caused at least one-fifth of the Nation's commercial shellfish beds and recreational beaches and bays to close, (2) created severely degraded areas in the marine environment, (3) killed fish and other organisms, and (4) changed identifiable portions of the marine ecosystem. The study concluded that ocean dumping of material clearly identified as harmful to the marine environment or man should be stopped.

Noise pollution

At the outset of the 1970's, we were also beginning to realize that man should not tolerate indefinitely the increasing noise that characterized a modern industrialized nation. Noise had increased dramatically in volume over the prior 30 years and was rising in urban areas at a rate estimated at 1 decibel per year. The effects of community noise on hearing were not yet known, but 20 percent of the Nation's population--in addition to those exposed to excessive occupational noise--were suffering measurable hearing impairment by their fifties, whereas people in nonindustrial societies experienced no such loss. In addition, hearing loss was not the only potential health problem associated with noise. Evidence was also growing that intense noise may affect other psychologic and physiologic functions of an individual.

WHAT KEY PROGRAMS WERE MANDATED TO CLEAN UP THE ENVIRONMENT?

The following sections discuss selected environmental legislation enacted during the 1970's, its goals, and the programs it mandated to meet those goals. The status of compliance with these programs is discussed in chapter 2.

Clean Air Act

The Clean Air Act Amendments of 1970 is the primary legislation dealing with the Nation's air pollution problems. It empowered EPA to establish and enforce national ambient air quality standards. The Nation was divided into 247 air quality control regions with each State being responsible for attaining the standards for the control regions within the State. The law required each State to submit to EPA a State implementation plan (SIP) specifying how the standards would be achieved and maintained. Once approved by EPA, the SIP was federally enforceable. EPA was responsible for setting emission standards for new pollution sources and for mobile sources, such as automobiles and trucks.

EPA established two sets of ambient air quality standards for air pollutants--primary standards and secondary standards. Primary standards were designed to protect human health, while secondary or welfare standards were to clean the air of visible

pollutants and prevent corrosion, crop damage, and any other effects of polluted air. EPA has established standards for seven pollutants--sulfur oxides, total suspended particulates, carbon monoxide, photochemical oxidants, hydrocarbons, nitrogen oxides, and lead--and was authorized to establish standards for additional pollutants when necessary.

The act originally intended that the air quality standards would be achieved by 1975 but this was not done. In August 1977, the Congress amended the act and required each State to (1) identify which of the air quality regions had not attained the primary standards as of August 7, 1977, and (2) submit a revised SIP by January 1, 1979, which provided for attainment of primary standards as expeditiously as practicable but no later than the end of 1982. For States with particularly difficult ozone or carbon monoxide problems, the deadline was extended to 1987. States needing until 1987 to meet the carbon monoxide and ozone standards were required to implement motor vehicle inspection and maintenance programs as a means of controlling emissions of these auto-related pollutants.

CEQ estimated that $25.4 billion was spent on air pollution abatement in 1979.

The Federal Water Pollution Control Act

The Federal Water Pollution Control Act, as amended, is the basis for the Nation's water cleanup program. The act sets two specific national goals. One goal, commonly referred to as the "swimmable-fishable" goal, is to restore polluted waters, wherever attainable, to a quality that allows for the protection and propagation of fish, shellfish, and wildlife and for recreation use by July 1983. The other goal is to eliminate all discharges of pollutants into the Nation's navigable waters by 1985. To achieve these goals, two basic control strategies are employed: required point source controls for municipal and industrial dischargers and largely voluntary controls for nonpoint sources of water pollution.

The 1972 amendments to the act established the National Pollutant Discharge Elimination System to regulate and control municipal and industrial point sources. The act required that, as a minimum, secondary treatment was to be used by all publicly owned wastewater treatment plants by July 1, 1977. The secondary treatment deadline was subsequently extended to July 1, 1983, when construction could not be completed in time or when Federal funds had not been made available. In 1981 the deadline was further extended to 1988, under certain conditions.

The 1972 amendments required industrial dischargers to achieve by July 1, 1977, discharge limitations by applying the best practicable control technology currently available. The 1977 amendments gave EPA the authority to extend the July 1, 1977, deadline until April 1, 1979, for noncomplying dischargers that acted in good faith.

Generally, a permit specifies (1) discharge limitations for specific pollutants or substances, (2) schedules setting forth the type of actions required and time frames necessary to comply with the discharge limitations, (3) requirements for self-monitoring, and (4) periodic reporting of plant compliance with discharge limitations. It is illegal for point source dischargers to discharge pollutants into the Nation's navigable waters without a permit.

The act considerably revised the Wastewater Treatment Construction Grants Program and authorized Federal financial assistance of 75 to 85 percent of the cost for planning, designing, and constructing municipal treatment and collection facilities. More than $52 billion in Federal funding had been authorized for the program as of fiscal year 1981. The act also required and funded comprehensive river basin and regional water quality planning for controlling both point and nonpoint sources of pollution--a provision which set in motion major planning initiatives in all States.

CEQ estimated that $20.4 billion was spent on water pollution abatement in 1979.

Safe Drinking Water Act

In December 1974, the Congress passed the Safe Drinking Water Act to ensure that public water supply systems throughout the Nation met minimum national health standards. It was the first national commitment to safeguard public drinking water supplies. To achieve its goals, the act provided for

--primary national drinking water standards, which set limits on some of the substances found in drinking water;

--monitoring frequencies for public drinking water systems;

--public notification for noncompliance with the drinking water regulations; and

--an underground injection control program to protect ground water.

The Congress recognized that some water systems, especially smaller ones, could not comply immediately with the national standards. Therefore, the act authorized variances and exemptions in select cases where no unreasonable health risks existed. Initially, a system receiving an exemption had to be in compliance by January 1981 or January 1, 1983, if the system planned to join a regional water system. In December 1980, the act was amended to extend compliance dates for systems with exemptions to January 1, 1984, and January 1, 1986, respectively.

The Congress intended that the States adopt and enforce drinking water regulations which apply to the estimated 250,000 public water systems throughout the Nation. The act thus provided

for States to assume primary enforcement responsibility, or "primacy," for monitoring the public water systems within their boundaries. It also provided for grants to States which apply for and receive EPA permission to operate their own drinking water programs.

CEQ estimated that $700 million was spent on pollution abatement expenditures relative to drinking water in 1979.

Resource Conservation and Recovery Act

In 1976, the Resource Conservation and Recovery Act authorized EPA to assist States develop and implement solid waste management plans. States were not required to participate, but only New Mexico elected not to.

The act required EPA to

--issue criteria for classifying all land disposal facilities as either environmentally acceptable or unacceptable;

--publish a list of open dumps;

--promulgate guidelines for State solid waste management plan development and implementation and make grants for those activities; and

--approve State plans if they, among other things, (1) prohibit the establishment of new open dumps, (2) require waste to be utilized for resource recovery or disposed of in sanitary landfills (or any other environmentally sound manner), and (3) provide for the closing or upgrading of all existing open dumps.

Open dumping was prohibited except as covered by an acceptable schedule for compliance under an EPA-approved State plan. Such a schedule must include an enforceable sequence of actions leading to full compliance within 5 years from the date of publication of the criteria, which was September 13, 1979.

CEQ estimated that $7.2 billion was spent on pollution abatement relative to solid waste in 1979.

Marine Protection, Research, and Sanctuaries Act of 1972

The purpose of this act was to regulate the dumping of all types of materials into ocean waters over which the United States has jurisdiction or over which it may exercise control. The act sought to prevent or strictly limit the dumping of any material which would adversely affect human health, welfare, or amenities, or the marine environment, ecological systems, or economic potential.

To accomplish these goals, the act banned dumping of high-level radioactive wastes and chemical, biological, and radiological warfare agents. No other materials could be dumped without a permit from EPA or the Corps of Engineers. EPA issues permits covering the dumping of municipal and industrial wastes and the Corps of Engineers issues permits, subject to EPA's review and approval, covering dredged material. The EPA Administrator was authorized to designate areas where ocean dumping may be permitted and any critical areas where dumping may be prohibited.

EPA has required municipal and industrial permittees that dump material which unreasonably degraded or endangered human health or the marine environment to investigate alternative disposal methods. EPA initially set 1981 as the date by which the ocean dumping of municipal and industrial wastes would be phased out. In 1977, the Congress amended the act to require that the ocean dumping of harmful sewage sludge be discontinued by December 31, 1981. A similar ban applicable to harmful industrial wastes was enacted in 1980.

Noise Control Act of 1972

Federal noise legislation first appeared in 1968 when the Congress directed the Federal Aviation Administration (FAA) to establish rules and regulations to control aircraft noise. The Clean Air Act Amendments of 1970 called for establishing of an Office of Noise Abatement and Control in EPA.

The Noise Control Act of 1972 represented the first major Federal attempt to eliminate excess noise at the design stage of a wide variety of products. The EPA Administrator was called upon to develop and publish information about permissible levels of noise and set noise standards for products identified as major sources of noise. Aircraft noise control remained under FAA's administration, but EPA was required to make a comprehensive study of aircraft noise and cumulative noise exposure around airports and to submit to FAA proposed regulations to control aircraft noise and sonic booms. EPA completed its study in 1973.

CEQ estimated that $100 million was spent on noise pollution abatement in 1979.

OBJECTIVE, SCOPE, AND METHODOLOGY

The objective of this review was to provide information on

--the problems that prompted the Congress to enact major environmental legislation in the 1970's and the goals and programs mandated by that legislation;

--the status of progress toward meeting key environmental goals aimed at cleaning up the air, water, and land and reducing noise pollution;

--how the cities of Cleveland, Ohio; Dallas, Texas; and New York, New York; have coped with mandated environmental programs; and

--some major unresolved environmental issues facing the Nation in the 1980's and beyond.

This report provides an overview of key environmental goals in terms of (1) what the Nation planned to accomplish and by when, (2) what has been accomplished to date, and (3) what issues have to be resolved before the job is completed and the cleanup sustained over the long term. This broad perspective can assist the Congress in better understanding where the Nation stands regarding environmental protection--on a national basis and for specific cities--and in making decisions on future actions.

The status of compliance with environmental mandates was determined based on information obtained for selected key goals for each of six environmental laws enacted or substantially strengthened during the 1970's, as follows:

Act	Key goal
Federal Water Pollution Control Act Amendments of 1972	Controlling municipal and industrial point sources of water pollution
Clean Air Act Amendments of 1970	Attaining of national ambient air quality standards
Safe Drinking Water Act of 1974	Achieving national primary drinking water standards
Marine Protection, Research, and Sanctuaries Act of 1972	Phasing out the ocean dumping of harmful wastes
Resource Conservation and Recovery Act of 1976	Closing open dumps or upgrading them to sanitary landfills
Noise Control Act of 1972	Reducing aircraft and other nonworkplace noise

The case studies on Cleveland, Dallas, and New York address the progress made toward achieving the above goals and identify obstacles and dilemmas faced by these cities in attempting to meet those goals. The chapter on unresolved environmental issues discusses factors that could preclude initial or sustained achievement of the selected environmental goals and environmental tradeoffs that may have to be made in the process.

Information for chapters 2 and 3 was developed from reports and studies prepared by EPA, CEQ, the National Commission on Air Quality, the Congressional Research Service, the National Advisory

Committee on Oceans and Atmosphere (NACOA), and other environmental organizations and public interest groups. We also discussed these areas with appropriate officials at EPA headquarters.

The information used to develop the case studies was obtained from appropriate local, regional, and State agencies, as well as from EPA regional offices in Chicago, Dallas, and New York City. A list of these agencies appears at the end of each respective case study.

This report is intentionally focused on a broad perspective of progress achieved in implementing environmental legislation enacted during the 1970's. We did not evaluate the effectiveness of the individual environmental programs discussed in the report; however, those programs have been the subject of prior GAO reports. Where appropriate we drew on those reports. A list of the broad range of our reports concerning environmental programs issued from 1978 to 1981 appears in appendix IV.

The specific goals and programs discussed in this report were selected for review because they are key components of major environmental legislation and provide good indicators of what overall progress has been made toward cleaning up the environment. The cities of Cleveland, Dallas, and New York were selected for case study presentations to demonstrate how cities coped with an array of environmental requirements and, also, to provide specific examples of trends demonstrated in the national perspectives. The three cities were selected at random and not because they were representative of all urban areas. The selection did, however, represent a mix of major metropolitan areas: large (New York) and small (Cleveland) urban areas and a city (Dallas) with a newer infrastructure than the other two cities.

The unresolved environmental issues discussed in chapter 3 by no means represent an exhaustive list. The issues presented are of concern because they could affect the Nation's ability to fully meet established environmental goals.

Our review was performed in accordance with our "Standards For Audits Of Governmental Organizations, Programs, Activities, And Functions."

GAO sent a draft of this report to EPA on April 12, 1982, requesting comments within 30 days. No response, however, was received as of May 26, 1982, when this report was finalized. EPA did provide preliminary views on the draft report. These comments were primarily technical in nature and suggested updating and clarifing various information contained in the report. These comments were incorporated, as appropriate, in the final report. EPA provided official comments after the report was finalized; however, nothing in the comments materially changed the report.

CHAPTER 2

PROGRESS HAS BEEN MADE TOWARD ACHIEVING THE NATION'S ENVIRONMENTAL GOALS

The enactment of major environmental legislation in the 1970's represented a necessary first step toward restoring and protecting the environment: recognition of the seriousness of the problem. Developing strategies to achieve the acts' goals was a necessary second step. Since then, progress has been made toward implementing these strategies to clean up the air, water, and land and reduce noise pollution. The extent of progress, however, has varied on a program-by-program basis. Air quality, for example, is considerably improved, but as of February 1980, less than one-half of municipal wastewater was receiving the required level of treatment. Further, while most of the Nation's drinking water meets national standards, the program to upgrade solid waste dumps to meet sanitary landfill criteria is far from complete.

This chapter discusses the status of efforts to achieve selected key environmental goals, including

--meeting ambient air quality standards,

--providing required levels of treatment to municipal and industrial wastewater,

--meeting national drinking water standards,

--upgrading solid waste dumps to meet sanitary landfill criteria,

--phasing out harmful ocean dumping, and

--reducing noise levels from aircraft and other sources.

This chapter also discusses some of the cost and benefit estimates related to pollution control but recognizes the continuing debate as to whether those benefits are less than or exceed the related costs.

THE AIR IS CLEANER NOW THAN IT WAS IN 1970

The national ambient air quality standards act as the framework for all other requirements of the Clean Air Act. The National Commission on Air Quality reported in March 1981 that since the passage of the Clean Air Act of 1970, the level of improvement for the most widespread air pollutants has been significant. However, substantial portions of the United States are still classified as "nonattainment" for one or more of the standards. Adding to the problem, the submission and approval of the SIPs to meet the

standards is behind schedule and the validity of some air quality monitoring data is questionable.

The act established air quality standards to define "threshold ambient pollutant levels" above which adverse effects to public health or welfare would occur. Primary standards are set at levels necessary to protect the public health, allowing for an adequate margin of safety. They are set to protect the most sensitive part of the population, such as infants, the elderly, and persons with heart and respiratory problems. Secondary standards specify a level of air quality necessary to protect the public welfare from any known or anticipated adverse effects. In practice, however, most primary and secondary standards are identical.

Some indication of improvements in air quality can be derived from studies made by CEQ and EPA. CEQ reported in 1980 that between 1974 and 1978, in the 23 largest metropolitan areas, an 18-percent reduction occurred in the number of days during which the air quality standards were violated and thus classified as "unhealthful." A 35-percent reduction occurred in the number of "very unhealthful" days, and a 55-percent reduction occurred in the number of "hazardous" days. The Nation as a whole showed similar improvement. For example, between 1973 and 1978 nationwide average annual concentrations of carbon monoxide decreased by 33 percent, sulfur dioxide by 20 percent, and suspended particulates by 7 percent.

EPA also reported progress in reducing levels of emissions of specific criteria pollutants. For example:

--Particulate emissions decreased 56 percent between 1970 and 1980.

--Sulfur dioxide emissions decreased 15 percent between 1970 and 1980.

--Carbon monoxide emissions decreased 7 percent between 1970 and 1980.

--Volatile organic compound emissions decreased 20 percent between 1970 and 1980.

--Lead consumed via gasoline decreased 68 percent between 1970 and 1980.

While monitoring data indicates that the national average annual concentrations of particulates, sulfur dioxide, and carbon monoxide dropped between 1973 and 1978, ozone levels remained constant. Ozone and carbon monoxide continued to be the pollutants most often in the unhealthy range. While air pollution levels are improving in cities like New York and Los Angeles, California, CEQ reported that these cities still experienced 174 and 206 days, respectively, of below standard air quality in 1978. In some cases, trends have even reversed. For example, Houston, Texas, had 94 unhealthful days in 1978, almost 3 times the number in 1974.

The National Commission on Air Quality reported in March 1981 that while there will be substantial progress in meeting air quality standards by 1982, with further improvements by 1987, at least eight metropolitan areas will not meet the standards for one or more pollutants by 1987. The following describes the status of five pollutants.

--Particulates. Portions of 211 counties are violating the primary particulate air quality standard. Portions of 27 major areas will not be in compliance with the standard by 1982.

--Sulfur dioxide. Although portions of 88 counties do not meet the primary sulfur dioxide air quality standard, very few areas are likely to violate the standard after 1982.

--Ozone. Portions of 506 counties are not now complying with the ozone standard, and many had 1979 air quality levels more than 50 percent higher than the standard. Only 32 counties probably will not meet the standard by 1987.

--Carbon monoxide. Portions of 145 counties do not meet the carbon monoxide standard, including 39 with carbon monoxide levels that are 100 percent above the standard. With the implementation of inspection and maintenance programs, most areas, except Denver, Colorado, and Los Angeles, are likely to meet or almost meet the standard by 1987.

--Nitrogen oxides. Only seven counties now violate the nitrogen dioxide standard.

EPA estimates that many of the areas not meeting the standard in 1980 probably will not attain the standard by the end of 1982.

A more negative projection was made in a 1981 Brookings Institution study. According to the study, the major reductions in pollution experienced from 1945 through the mid-1970's came primarily from switching from coal to natural gas rather than controls resulting from the Clean Air Act. Also contributing to improvements in air quality was that an increasing proportion of the coal mined in the 1970's had a low sulfur content. The study concluded that the increase in oil prices since 1974 has led to a resurgence in the demand for coal and wood, threatening to increase air pollution, especially since dramatic increases in coal use are projected for the 1980's. Proposed relaxation of auto emission standards, if adopted, would also make meeting ambient air quality standards more difficult.

The three cities we reviewed have made great strides in cleaning up their air, but problems remain. Cleveland is in a nonattainment status for four of six monitored pollutants: total suspended particulates, carbon monoxide, sulfur dioxide, and ozone. Cleveland officials estimated that particulates blown into the area from sources outside the city contribute 50 to 60 percent

of the annual allowable standard and, in addition, uncontrolled sources, such as unpaved parking lots, open fields, and streets needing cleaning, contribute additional particulates to the air. Because of these factors, they do not anticipate that attainment status will be reached during this decade. To reduce emissions of hydrocarbons (which lead to the formation of ozone), Cleveland required in July 1981 that gasoline service stations install vapor recovery systems. These systems capture hydrocarbon vapors which are emitted when gasoline is transferred from tank trucks to underground storage tanks.

Dallas meets the standards for all criteria pollutants except total suspended particulates and ozone. State officials will soon ask EPA to redesignate as attainment, however, the three areas currently designated as nonattainment for particulates. Dallas officials believe the city will meet the ozone standard by December 31, 1982, but the State believes the present standard may never be met because of natural contributors to the ozone that cannot be controlled. EPA projects that Dallas will not attain the ozone standard by 1982 but will attain it by the end of 1987.

New York City currently does not meet air quality standards for carbon monoxide and ozone. As a condition of having its compliance dates for these pollutants extended to 1987, New York City agreed to institute mobile source control strategies, including a vehicle inspection and maintenance program. These strategies are in addition to the passive strategy of vehicle replacement, which has accounted for most carbon monoxide reductions to date. The further reduction in levels of these pollutants has posed problems. For example, New York's attempt to limit single-rider cars to a few routes during morning rush hours met a court challenge and may never be implemented. With respect to ozone, State officials contend that the air blowing into New York City from neighboring States already exceeds the national standard. It is doubtful whether carbon monoxide or ozone standards will be met in New York City by 1987, although EPA projects that the city will meet the carbon monoxide standard by then.

Another factor present in New York that jeopardizes air pollution reductions already achieved relates to the inventory of stationary sources of air pollution. Without an accurate inventory, implementing strategies to control emissions and ultimately attaining air quality standards becomes extremely difficult. According to a November 1981 draft EPA report, thousands of air pollution sources in the city have never been identified on any source inventory, are operating without permits, and have never been inspected. A study by New York City personnel in a heavily industrialized area confirmed the inadequacy of their inventory: 37 percent of the sources they found were not in their inventory. Another 1981 EPA report quoted even more disturbing statistics. It estimated that there could be up to 62,000 stationary sources of air pollution in the city, but only 25,430 have permits.

SIPs have been significantly delayed

The SIP is a State's basic strategy for bringing the Nation into compliance with the air quality standards. These plans, as a result of the 1977 amendments to the act, were to be revised by January 1979 if air quality standards had not been met. The District of Columbia, Puerto Rico, and all States except North Dakota had areas in which one or more of the air quality standards were exceeded and were thus required to revise their plans. The process, however, is far behind schedule.

By the January 1979 deadline, only five complete plan revisions and two partial revisions had been submitted to EPA. Not until 1 year later were all revisions submitted. By the July 1979 statutory deadline, EPA had taken final action only on Wyoming's plan revision.

The status of implementation plans for the States, territories, and the District of Columbia, as of March 31, 1982, was as follows:

--Fully approved plans, 16.

--Conditionally approved plans, 13.

--Complete plan submitted but no final action by EPA, 7.

--Complete plan not submitted, 16.

--No requirement to submit a plan (no nonattainment areas), 4.

A total of 31 States requested and were granted extensions until 1987 for attaining carbon monoxide and ozone standards. The National Commission on Air Quality reported in March 1981 that EPA approved all the States' projections that they would meet the air quality standards even though Federal, State, and local officials acknowledged that the projections often were based on imprecise emission inventories and inadequate projection techniques and that they often were overly optimistic.

Some air quality monitoring data is of questionable validity

Reliable and comparable air quality data is essential to enforce and to determine attainment with the air quality standards. However, in a May 31, 1979, report--"Air Quality: Do We Really Know What It Is?" 1/--we noted that although improving, the reliability of air quality data was questionable. For example, of 243 monitoring stations we reviewed, 81 percent had siting and other problems. EPA has promulgated regulations to improve data

1/(CED-79-84.)

collection and standardization, but implementation of such a system will probably not be achieved until the mid-1980's.

CEQ commented on the monitoring problem in its December 1980 report. The report stated that no uniform procedure exists for siting air quality monitors in metropolitan regions. In some areas monitors are sited very near major sources of air pollution so that authorities can assess the efficiency of their control programs. In other areas, monitors are sited in very clean areas to detect background levels of pollution or to protect against degradation of these areas. The siting of monitors may make air quality in some areas appear better than in others when in fact air quality in the two areas could be similar.

EPA believes air quality monitoring has significantly improved since 1979, when new regulations were promulgated. It pointed out that uniform siting criteria have been established and monitors not meeting the criteria have been discontinued. Monitors are required to meet all of the criteria by January 1, 1983.

Cleveland and New York are experiencing various types of air quality monitoring problems. Because carbon monoxide is a highly localized pollutant, the single monitor used in Cleveland until April 1981 may not have provided a true picture of air quality violations. One additional monitor has been obtained, but local officials believe one more is needed. Efforts to place a monitor at a downtown site that conforms to Federal guidelines had been unsuccessful. A downtown site is needed to obtain a reading in a high density area with a canyon effect from the buildings, but the high cost of the monitor and rental space has prevented siting in this location.

Regarding carbon monoxide levels in New York City, the extent of nonattainment is not known, since it is possible that the city's skyscraper canyons and traffic patterns are creating "hot spots" where carbon monoxide concentrations exceed those in areas where traffic monitors are currently located. At the time of our review, the State was conducting a hot spot study to resolve this issue.

MORE MUNICIPAL AND INDUSTRIAL WASTEWATER NOW RECEIVES THE REQUIRED LEVEL OF TREATMENT

CEQ reported in December 1980 that, while water quality had substantially improved in some locations, the quality of surface waters nationally had not changed much in the last 5 years. Still, the fact that the surface waters nationally had not deteriorated despite a growing population and an increased gross national product was an accomplishment for control efforts. In addition, there are numerous examples of specific water cases which have been cleaned up to the point where they can be safely used for recreational activities. More municipal and industrial wastewater now receives the required level of treatment; however, the study pointed out that efforts to control toxic pollutants and nonpoint sources of water pollution were just beginning.

With respect to point sources, every public or private facility that discharges waste directly into U.S. waters must have a permit. These National Pollutant Discharge Elimination System permits state discharge limitations for specific pollutants, establish schedules for upgrading controls to meet such limits, and require monitoring and periodic reports on compliance. As of April 1982, about 70,000 permits had been issued: 16,000 to municipal (mostly sewage treatment) dischargers and 54,000 to nonmunicipal (mostly industrial) dischargers. EPA considered 7,650 permit holders major dischargers, and EPA and the States focused most monitoring and enforcement activities on them.

Originally, all municipal sewage treatment plants were to achieve secondary treatment by July 1, 1977. Subsequently, extensions were granted to 1983 and then to 1988, under certain conditions. To help municipalities meet this goal, the Congress had authorized $52 billion as of fiscal year 1981.

From 1972 through 1979, EPA funded about 18,200 planning, design, or construction projects, of which 6,800 have been completed. Most completions were designs. By December 1979, construction had begun on 5,623 projects, of which only 1,552 were in operation. In February 1980, EPA estimated that 37 percent of major municipal treatment facilities were in compliance with the original July 1, 1977, statutory deadline. The EPA Administrator said that by the end of 1979, 93 percent of major nonmunicipal dischargers were in compliance with their permit requirements or on a schedule to meet them.

As indicated above, progress has been made toward installing the required control technology at municipal and industrial point sources of water pollution. The job is far from complete, however, and progress varies considerably from city to city. We found during our review, for example, that three sewage treatment plants serving the Cleveland area are being expanded and upgraded using $320 million in Federal funds. Local officials anticipated that required treatment levels for those plants will be met by 1983. In Dallas, one treatment plant meets required standards, but the other plant does not because of design deficiencies and a shortage of trained and qualified personnel. The city plans to make all necessary improvements by 1987.

Required treatment levels will not be met as quickly, however, in New York, which has 12 operating sewage treatment plants and 2 more under construction. Nine of the operating plants are designed and constructed to provide secondary treatment and two of the plants are being upgraded to do so. In February 1981, city officials estimated that both plants would be upgraded by late 1985, but city officials now believe Federal budget cuts may delay completion. The city is seeking a waiver of the year-round secondary treatment requirement for the 12th operating plant.

The areas to be served by the two plants under construction--North River and Red Hook--have a combined estimated population of more than 750,000. Currently, no sewage treatment is provided to those areas, and as a result, 205 million gallons per day of raw sewage is discharged into area waters. This represents 13 percent of average dry weather flow in the city's sewer system. Both plants have been in the planning stages since the 1930's and are still far from complete. The North River plant will cost more than $1 billion and was originally scheduled to be completed in 1976. In 1979, New York City, the State of New York, and the U.S. Government entered into an amended consent order which set 1987 as the deadline for completing both the North River and Red Hook plants. As a result of cuts made in Clean Water Act funding, the city and State are planning to ask EPA to renegotiate the completion dates. City officials said that there is no way they can meet the 1987 deadline with available funding and are drawing up plans for slowing down all of their sewage treatment projects.

Reduced Federal funds available for sewage treatment construction grants

The Federal Water Pollution Control Act was amended in December 1981, and changes made could have a significant negative impact on meeting the goals of the act. Funding for sewage treatment grants was authorized at an annual level of $2.4 billion for fiscal years 1982-85, down from $5 billion in fiscal year 1981. The amendments also made the following major changes to the program, effective October 1, 1984:

--The Federal share of eligible project costs was reduced from 75 to 55 percent.

--Federal grant assistance will be limited to projects for secondary or more stringent treatment, new interceptor sewers and appurtenances, and for infiltration/inflow correction.

--Grant assistance for the construction of reserve capacity to meet future needs was also eliminated. The size and capacity of the treatment works eligible for a grant would be based on existing needs of the community.

EPA's 1980 Needs Survey estimated the total costs of municipal treatment works to meet the goals of the act to be $120 billion (1980 dollars), including $34.5 billion to achieve required treatment levels. Given the significant reduction in funding for fiscal years 1982-85 and the reduced portions of projects eligible for Federal funding, the 1988 deadline for implementing at least secondary treatment of municipal wastewater may have to be further extended.

Even municipalities with plants that have been designed and constructed to provide the required level of wastewater treatment may face future problems. In our December 2, 1981, report--"User

Charge Revenues For Wastewater Treatment Plants-Insufficient To Cover Operation And Maintenance" 1/--we pointed out that only 3 of 36 municipalities reviewed were setting aside funds to replace treatment plants when they reached the extent of their economical/ technological lives. Many municipalities indicated that they would return to the Federal Government for replacement funding.

MOST DRINKING WATER COMPLIES WITH NATIONAL STANDARDS

The purpose of the Safe Drinking Water Act of 1974 is to safeguard public drinking water supplies and to protect public health. The act mandates the promulgation of minimum national drinking water standards and compliance monitoring requirements for every public water supply source in the country serving 15 or more connections or 25 or more people. The majority of these systems are in compliance with the national primary drinking water standards although numerous violations of both standards and monitoring requirements continue to occur. Overall progress toward cleaner drinking water since the act was passed, however, is difficult to determine. Data inconsistencies and monitoring problems have contributed to this situation. In addition to shortfalls in meeting drinking water standards, some communities face problems funding the capital costs of water supply, treatment, and distribution facilities.

The act represented the first national commitment to safeguard public drinking water supplies. Before the act, Federal authority to regulate drinking water quality was restricted to water provided on interstate carriers and to bottled water sold interstate. The act authorized establishing a joint Federal-State program for ensuring compliance with EPA's national drinking water regulations; however, the intent of the Congress was that the States adopt and enforce these regulations. The act thus provides for States to assume primary enforcement responsibility--primacy--for monitoring the public water systems within their boundaries.

The national interim primary drinking water standards went into effect in June 1977 and set maximum allowable contamination levels for more than 20 chemicals or organics. Monitoring requirements for community systems became effective in June 1977 and for noncommunity systems in June 1979. Community systems serve year-round residents. Noncommunity systems serve transient populations in motels, restaurants, and campgrounds.

EPA received the first monitoring data--related only to microbiological contaminants--in 1978. It showed that some 10 to 20 percent of the community water supplies, serving about 3 percent

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1/(CED-82-1.)

of the population, failed to comply with the standards. In 1979, about 20 percent of the systems reported one or more violations. About 60 percent of the violations occurred in systems serving fewer than 500 persons, systems which often fail to provide an adequate amount of skilled labor for operations.

EPA statistics for fiscal year 1980 showed that over 146,000 violations for either failing to test or for not meeting the drinking water quality standards were recorded against 28,000 of the 65,000 community water systems in this country. Our March 3, 1982, report--"States' Compliance Lacking In Meeting Safe Drinking Water Regulations" 1/--examined 140 community and 70 noncommunity water systems and supported the national statistics. The report pointed out that in fiscal year 1980, 90 of the 140 community systems and 48 of the 70 noncommunity systems included in our sample failed to comply with the Federal testing requirements for one or more of the contaminant groups. Noncompliance ranged from missing a single monthly coliform bacteria sample to not testing an entire system for any contaminants for the 12 months.

EPA has undertaken a number of activities in cooperation with the States to direct State resources toward followup action of noncompliance cases constituting the most serious health risks.

Substantial capital funds needed for water supply, treatment, and distribution

Complying with national drinking water regulations will require significant capital outlays. In addition, many areas need expensive improvements to their water supply and distribution systems.

EPA reported that the estimated capital cost of complying with the interim primary drinking water standards was $1.26 billion for the 1980-83 period. For systems complying through adding one of the eight major treatment techniques, almost $220 million of the capital needs cannot be raised through traditional financing channels. The shortfall involves 3,290 water systems, 95 percent of which are small systems and the majority of which are privately owned. The very small systems account for $130 million, or almost 60 percent of the total shortfall.

We noted during our review that larger communities, like Cleveland and New York, also face significant capital costs for water treatment facilities. A 1979 Urban Institute study concluded that one of Cleveland's four water purification plants was in "very poor and hazardous condition and is in urgent need of replacement." Built in 1915 on unstable subsoil, the settling over the years has

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1/(CED-82-43.)

severely stressed its structural components, causing mechanical failures, leaks, and a partial roof collapse. In 1977, the city estimated a new plant would cost $141 million. The current estimate for a new plant built in the 1983-85 period is $264 million.

In New York City, water supplies from the oldest of the three systems need to be further treated to offset deteriorating water quality. This system provides 10 percent of the city's water and, at present, the water receives only limited treatment. In June 1979, consulting firms hired by the city estimated that, depending on the type of treatment selected, total capital costs to treat the supplies from this one system would range from $90 million to $148 million. Annual costs, including debt service and operation and maintenance, would range from $12 million to $17 million. The annual costs are probably understated, however, since debt service estimates assumed an annual interest rate of 6.5 percent.

Water supply and distribution systems also pose financial problems for cities. In June 1980, the President's Intergovernmental Water Policy Task Force reported that over the next 20 years 2 out of 10 urban water systems might experience water supply capital investment shortfalls. The most probable total urban shortfall is between $10 million to $13 billion. Of this amount, about one-half is attributed to distribution system needs and one-third to new source development needs. The report also noted that municipally owned water systems are four times as likely as privately owned systems to experience shortfalls.

During our review, we found that major distribution system improvements are needed in Cleveland and New York. Parts of Cleveland's system are over 100 years old. Many of the distribution pipelines are metal and contain heavy deposits which impair the system's ability to transport water. For example, in some areas pipe capacity is reduced to less than one-third of its original level and is a major cause of low water pressure. The system also has a leakage rate of 15 percent. In addition, a city water official believes that nearly 2,000 miles of water mains need to be cleaned. Not one was cleaned from 1973 to 1976 and only 25 miles were cleaned from 1977 to 1980.

Low water rates have precluded making major renovations to the system. In 1981 Cleveland proposed an 11-year capital improvements program costing $908 million, but current revenues are insufficient to pay for such a program. The success of the program now depends on the city's ability to increase system revenues and sell its obligations in the bond market. In August 1981, the city's bonds were given a minimal investment grade rating.

New York City's problem is somewhat different. At present, its water supply system delivers 1.5 billion gallons of water daily from as far as 125 miles away. New York's distribution system is unique in its dependence on deep-rock tunnels. Two tunnels are currently in operation. One, almost 18 miles long,

has been in service since 1917, and the second tunnel, about 20 miles long, has been in service since 1936.

Both tunnels show signs of deterioration, but their insides have never been inspected. Engineers are hesitant to close the giant valves which control the water flow because the valves are so old that once closed they may never reopen. A third tunnel is under construction to assure a reliable water supply. The total cost for completing the tunnel was estimated by New York City's comptroller at $3.5 billion (1981 dollars). The State Comptroller, however, issued a report in August 1981 with an estimate of $11 billion, and with completion sometime after the year 2000. The city comptroller believes outside aid is necessary to complete the tunnel, but attempts to obtain Federal assistance have been unsuccessful.

Some States have not assumed primacy for the drinking water program

The Congress encouraged the States to accept primary enforcement responsibility (primacy) for implementing the law, but some States have not yet assumed primacy. Primacy is attained by developing a program that (1) includes drinking water standards at least as strict as the national primary standards, (2) has adequate procedures for enforcing the standards, including such monitoring and inspection activities as EPA may require, (3) meets recordkeeping and reporting requirements, (4) issues variances and exemptions responsibly, and (5) has a plan for providing emergency water supplies.

To assist States in developing and implementing their drinking water programs, the act authorizes EPA to award annual public water system supervision grants to supplement existing State funds. These grants, which are based on population, land area, and number of public water systems, may cover up to 75 percent of a State's total program cost. To qualify for initial grants, States have to indicate an intent to assume primacy within 1 year of receiving the grants. The act extended the 1-year compliance requirement if the State was making a diligent effort and had made significant progress towarding attaining primacy.

As of December 31, 1981, 48 States had established drinking water programs and were granted primacy. The remaining 9 nonprimacy States--District of Columbia, Indiana, Iowa, Oregon, Pennsylvania, South Dakota, Wyoming, American Samoa, and the Northern Marianna Islands--have either declined or were not granted primacy. Iowa, granted primacy in September 1977, withdrew from the program effective July 1, 1981, because of insufficient State funding to properly operate it. EPA has assumed responsibility for operating a drinking water program and enforcing the regulations in these nonprimacy States.

The adequacy of EPA resources to carry out safe drinking water programs in nonprimacy States is a problem. In our April 23,

1981, report--"Adequacy of EPA Resources And Authority To Carry Out Drinking Water Program Activities" 1/--we stated that a comparison of resources available for program implementation and operation in primacy States versus nonprimacy States revealed a significant disparity. During fiscal year 1980 EPA granted an average of $633,000 to primacy States for drinking water programs but EPA spent about $225,000 on those programs in the nonprimacy States. We concluded that this resource disparity raises questions about equity and whether people living in nonprimacy States are as well protected as those living in primacy States.

STEPS HAVE BEEN TAKEN TO ENSURE SAFE DISPOSAL OF SOLID WASTE

The Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, authorizes EPA to assist States to develop and implement solid waste management plans to ensure that solid waste is disposed of in an environmentally safe manner. The act also called for conducting a nationwide inventory of open dumps and either closing them or upgrading them to meet EPA criteria. Only 21 State plans had been approved by EPA as of May 1982, and the open-dump inventory EPA published in May 1981 was incomplete. The inventory was not the management tool intended to apprise the Congress and the public of the overall magnitude of solid waste disposal problems throughout the Nation. Further, little progress has been made toward upgrading open dumps to meet sanitary landfill criteria.

Unsound disposal practices pose a major threat to the Nation's water supply. Our June 16,1978, report--"Waste Disposal Practices--A Threat To Health And The Nation's Water Supply" 2/--stated that past practices of disposing of waste on land had contaminated some ground water resources to the point of threatening public health. The report also found that the extent of damage done to this important resource had not been determined.

The Resource Conservation and Recovery Act of 1976 requires EPA to

- --promulgate guidelines for State solid waste management plan development and implementation;
- --approve State plans if the plans, among other things, (1) prohibit the establishment of new open dumps, (2) require waste to be utilized for resource recovery or disposed of in sanitary landfills or other environmentally sound manner, and (3) provide for the closing or upgrading of all existing open dumps;

1/(CED-81-58.)

2/(CED-78-100.)

--promulgate criteria for what constitutes a sanitary landfill and publish an inventory of all open dumps; and

--make grants to qualifying States for plan development and implementation.

The act required EPA to develop the guidelines for States to use in developing solid waste management plans not later than 18 months after its enactment. However, because of staffing constraints, multiple drafts, and time-consuming analyses of public comments, EPA did not promulgate the guidelines until July 31, 1979--over 15 months late.

A March 1981 EPA survey showed that no State plans had been approved or disapproved by EPA, although 27 States had adopted and submitted State plans for EPA approval and 17 had submitted draft or partial draft plans. Twelve States had not submitted any plans. As of July 1981, EPA projected that only half of the States will complete this process by the end of 1981--over 5 years after the act was passed. Some States have had problems in meeting the requirements for the plan, some due to legal restrictions in State laws. As of May 1982, only 21 State plans had been approved by EPA.

EPA published the criteria for classifying solid waste disposal facilities on September 13, 1979--almost 2 years after the required date. An open-dump inventory was to be published within 1 year. The open-dump inventory, conducted by the States, was published by EPA on May 29, 1981, 8 months late. We reported in July 1981--"Solid Waste Disposal Practices: Open Dumps Not Identified, States Face Funding Problems" 1/--that many facilities may not have been inventoried. For example, the list contained only 1,209 open dumps, with 41 in Louisiana. Louisiana estimated that there were 1,750 open dumps in the State but only wanted the ones listed that it could readily enforce upgrading or closing schedules against. In addition, we found that many facilities failed to meet the established criteria and should have been classified as open dumps. For example, of 94 facilities visited, 29 had been classified as sanitary landfills even though they did not meet the applicable criteria.

The effective date for participating States to prohibit new open dumps is the date the State plan is approved, but only 21 State plans had been approved as of May 1982. State plans are required to include a schedule of compliance for upgrading open dumps. Such a schedule must include an enforceable sequence of actions leading to full compliance within 5 years from the date of publication of EPA's sanitary landfill criteria, which was September 13, 1979. No information is readily available on the progress of the

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States to date, although EPA estimated that 14,000 of 20,000 municipal waste sites did not meet the standards.

Over $47 million was awarded to States from October 1977 to March 1981 to develop solid waste management plans and conduct an open-dump inventory. Funding for State grants was authorized through fiscal year 1982, but EPA requested no funds for fiscal year 1982 in this area. The States believe that if additional Federal funding is not provided, their solid waste efforts, including implementing the State solid waste management plans and continuing the open-dump inventory, will be significantly curtailed.

The solid waste situations differ in Cleveland, New York, and Dallas. In the Cleveland-Cuyahoga County area, the problem is diminishing capacity at nearby landfills. Most communities dispose of their solid waste at three landfills in the county and two landfills outside the county. The amount of waste disposed at sites outside the county increased from 11 percent in July 1979 to 39 percent in November 1979. Two of the three landfills used will reach their capacity by 1983. The potential for new landfill development within the county is limited, and transportation costs are making disposal outside the county less attractive.

To handle this growing problem, Cuyahoga County has undertaken a federally funded study to plan a resource recovery facility to convert waste into energy. The proposed 1,400 tons-per-day facility would reduce the amount of solid waste landfilled by 50 to 60 percent and could be operating by 1987. High interest rates in the taxexempt market and lack of investor confidence, however, will make project financing difficult. Investors may also be skeptical because of failures of resource recovery projects at other locations. Construction costs were estimated at $100 million in September 1981.

New York's problems include diminishing capacity at its landfills and the high cost of upgrading them. All four of New York City's solid waste landfills are considered open dumps and do not meet EPA or State criteria for sanitary landfills. Only the largest of the four--Fresh Kills--is expected to have some unused capacity after the year 2000. Fresh Kills covers 3,000 acres, receives 10,000 tons of solid waste each day (out of a citywide total of about 28,000 tons), and is the world's largest garbage dump. New York City officials estimate that it would cost as much as $208 million to upgrade its open dumps by 1985. No upgrading has begun to date. Like Cleveland, New York plans ultimately to dispose of its solid waste in resource recovery facilities. Bids have been received on one 3,000 tons-per-day facility, which will cost over $200 million to construct. Six or seven additional plants are planned to be built over the next two decades.

Dallas, on the other hand, has no major solid waste problems. Texas has classified Dallas' three solid waste disposal sites as sanitary landfills that comply with State and Federal standards.

Two sites have native impermeable clay linings and the third site has been lined with an impermeable clay substance. Periodic tests are performed at each site to determine the clay's thickness, cohesiveness of soil, and permeability characteristics. Neither the State nor the city has detected any leakage or seepage at any of the sites. Further, Dallas projects it will have unused landfill capacity beyond the year 2000.

A SIGNIFICANT REDUCTION IN OCEAN DUMPING OF INDUSTRIAL WASTES HAS OCCURRED

The Marine Protection, Research, and Sanctuaries Act of 1972 strictly limits ocean dumping of any material that would adversely affect human health, welfare, or amenities; the marine environment or ecological systems; or economic potential. Ocean dumping of some waste materials is prohibited, and ocean dumping of other materials requires a permit from EPA or the Corps of Engineers, for dredged material. Ocean dumping of waste materials EPA regulates decreased from 11.2 million tons in 1973 to 10.3 million tons in 1980. This reflected a significant decrease in the ocean dumping of industrial wastes; however, the dumping of sewage sludge increased during the same period. In 1979, 91.8 million tons of dredged material were dumped in the ocean.

EPA has issued various types of permits. Special permits not exceeding 3 years are issued to dump materials that meet EPA criteria, that is, such materials will not unreasonably degrade or endanger human health or the marine environment. EPA formerly issued interim permits not exceeding 1 year for the ocean dumping of harmful materials. However, EPA required those municipal and industrial permittees to investigate alternatives and have an implementation schedule providing for the phaseout of ocean dumping or compliance with the criteria on or before December 31, 1981. A 1977 amendment to the act required that the ocean dumping of harmful sewage sludge cease as soon as possible, not later than December 31, 1981. A 1980 amendment imposed the same phaseout deadline on ocean dumping of harmful industrial wastes.

EPA has been successful in phasing out the ocean dumping of some industrial wastes. For example, the volume of industrial wastes dumped decreased from 5.1 million tons in 1973 to 2.9 million tons in 1980, about 42 percent less than in 1973. The situation regarding sludge dumping, however, is different. Only one major dumper of sewage sludge--Philadelphia--has been phased out by EPA and the volume of sewage sludge dumped in 1980--7.3 million tons--exceeded the 1973 volume by 49 percent. The increased volume has come about as cities provide more of their sewage with the required levels of treatment. In 1980, no sewage sludge or industrial wastes were dumped into the Pacific Ocean or the Gulf of Mexico.

Currently, sludge dumping is confined to one site in the Atlantic Ocean, 12 miles off the coast of New Jersey and Long Island. The site has been used since 1924. Nine major

municipalities and sewage authorities in New York and New Jersey accounted for about 97 percent of all sludge dumped there, based on what was dumped in 1978. To assist in phasing out sludge dumping, EPA has conducted research and demonstrations of land-based municipal sludge treatment, disposal, and utilization alternatives and provided millions of dollars to existing sludge dumpers to assist in developing specific sludge management plans. Federal funds are also available under the Clean Water Act to design and construct facilities needed to implement these plans.

To comply with the December 31, 1981, deadline and to allow sufficient time to develop and implement long-term solutions to sludge management problems, dumpers in the New York City/northern New Jersey area considered adopting interim disposal measures, including

--landfilling dewatered sludge;

--composting dewatered sludge, followed by land application of the compost as a soil conditioner or solid waste landfill cover; or

--storing dewatered, dried sludge.

For long-term solutions, all nine major sludge dumpers in the densely populated New York City/northern New Jersey area are also considering various combustion processes.

Enforcing the December 31, 1981, deadline was held up by court order pending a determination as to whether sewage sludge unreasonably degrades the marine environment. Any relaxation of EPA criteria could provoke requests to ocean dump sludge from other communities in the 23 coastal States. The District of Columbia, for example, is currently seeking a permit to dump 740 tons of sludge a day in the Atlantic Ocean. In addition, other communities on the east coast are planning to apply for ocean dumping permits.

Ocean dumping of dredged material

During 1979, about 92 million tons of dredged material were discharged into the ocean: 57 percent in the Gulf of Mexico, 25 percent in the Atlantic, and 18 percent in the Pacific. This represented a 38-percent increase over 1978. The volume of dredged material dumped in the ocean is several times greater than the total of other waste materials. Dredged material in inner harbors frequently contains heavy metals, persistent organic chemicals, and other toxic chemicals, which can make disposal difficult. Although research by the Corps of Engineers and others into alternative disposal methods is continuing, ocean disposal will continue to be used for the great bulk of dredged material for the foreseeable future.

CEQ reported in 1980 that recent events suggest that a significant portion of dredged material is contaminated with toxic chemicals. It used New York Harbor as an example. In order for the Port of New York to remain open, 8.4 million cubic yards of silt had to be dredged in 1979. It was dumped 6 miles off of Sandy Hook, New Jersey. That autumn, EPA observed high levels of PCB's in test samples from the harbor, and approval of 15 permits was delayed pending further study. EPA subsequently decided that the concentration of PCB's was low enough for dumping to proceed, provided the contaminated dredged material was covered with clean material after it was dumped. PCB contamination in New York Harbor has raised questions about ocean disposal of dredged material in general, but had the Corps denied a permit to dump this material, the harbor would have been closed to ocean-going ships by summer 1980.

Dredged Material Research Program

In the early 1970's, the concern over the environmental impacts of dredging and the disposal of dredged materials reached the stage where Federal legislation was necessary. In 1973 the Corps undertook a comprehensive Dredged Material Research Program which, completed in 1978, cost $32.5 million. Long-term monitoring and verification studies, as well as regulatory research, have continued since then.

The research program covered ocean disposal and alternatives to ocean disposal. Four major field studies on the effects of dredged material disposal at open-water sites were completed, but the Corps concluded that an additional 3-year effort was needed to make better assessments of longer term effects. Alternative methods research covered confined dredged material disposal, wildlife habitat development, and strip mine reclamation.

Before the ocean disposal of dredged material, a number of other disposal alternatives are considered, but the Corps believes that, in many instances, no economically feasible or environmentally acceptable alternatives to ocean disposal exist. EPA has granted interim designation to 128 ocean disposal sites, and efforts are underway to conduct the necessary environmental studies for permanent designation of 50 of these sites.

NOISE CONTROL: LESS FEDERAL INVOLVEMENT AND EXTENDED COMPLIANCE DEADLINES

The Noise Control Act of 1972--administered by EPA--and the Aircraft Noise Abatement Act of 1968--administered by the Federal Aviation Administration--were geared toward reducing noise to levels which would help protect health and welfare. There have been some indications of progress in reducing noise levels; however, EPA has announced that it intends to completely phase out its Noise Control Program by the end of fiscal year 1982. The Congress extended compliance deadlines for meeting aircraft noise standards in 1980.

EPA's Noise Control Program

The Noise Control Act, as amended by the Quiet Communities Act, assigned EPA with the primary Federal responsibility for promoting an environment for all Americans free from noise that jeopardizes their health or welfare. EPA's stated goal was to reduce nonoccupational noise to an average day-night level of 75 decibels as soon as possible and to 55 decibels over the long term. Attaining the former level would essentially eliminate the risk of hearing loss due to environmental noise and reduce extreme annoyance and activity interference, while the latter level is considered most desirable to achieve health and welfare protection.

To reduce noise levels, EPA was authorized to

--identify products which are major sources of noise and to establish and enforce noise emission standards,

--propose aircraft noise control regulations to FAA,

--establish noise emission standards for railroads and interstate motor carriers,

--assist State and local governments financially and technically to establish noise control programs, and

--study the psychological and physiological effects of noise.

No readily available statistics exist which clearly indicate the progress made in reducing noise levels. Unlike the air and water quality programs, the Noise Control Program has no monitoring data on noise emissions. Further, noise is difficult to monitor because it tends to be localized and sporadic. Various indications of progress or lack of progress include the following:

--EPA's "Pilot National Environmental Profile 1977" reported that 53 percent of State populations and 69 percent of urban populations live under noise control laws.

--EPA has issued noise standards for several products, such as air compressors. A major problem has been in quantifying health effects and justifying added costs.

--Regulations which have been promulgated covering railroads and motor carriers will probably be retained, with enforcement assigned to the Department of Transportation.

--EPA was unsuccessful in getting FAA to adopt the aircraft noise standards it proposed and will no longer recommend such standards.

EPA intends to completely phase out its Noise Control Program by the end of fiscal year 1982, and Federal funding of State programs has been eliminated. EPA believes the phaseout will have a slight to minimal impact. The agency pointed out that EPA has been concentrating on strengthening State programs to better assist local governments having complex noise problems. EPA estimates that 16 of the 22 State noise programs receiving grant funds during fiscal year 1980 will continue operating after Federal support is dropped.

FAA Aircraft Noise Abatement Program

The Aircraft Noise Abatement Act of 1968 gave FAA the authority to regulate aircraft noise. Regulations were promulgated setting limits on noise levels for aircraft entering the civil fleet after December 1, 1969. Maximum allowable levels were specified for approach noise, takeoff noise, and for sideline noise. The maximum noise level specified for each of these points is 108 decibels for the heaviest aircraft. Aircraft certified after November 1975, or issued amended-type certificates after May 1, 1976, have to meet more rigorous requirements.

In December 1976, the Fleet Noise Rule went into effect. This rule requires that all civil jet aircraft currently in the fleet that do not meet FAA standards must either be brought into compliance through retrofitting or reengining or must be retired from the fleet by January 1, 1985. The rule required full compliance by January 1, 1983, for two- and three-engine aircraft, and by January 1, 1985, for four-engine aircraft. The Aviation Safety and Noise Abatement Act of 1979, signed into law in February 1980, eased the Fleet Noise Rule. Existing deadlines were postponed to 1985 for three-engine aircraft and 1986 for two-engine aircraft, if binding contracts are entered into for quiet replacements. Also, two-engine aircraft were exempted until 1985 for those seating more than 100 passengers and 1988 for those seating 100 passengers or less. No change from compliance dates was provided for four-engine aircraft.

Noise problems vary in Cleveland, Dallas, and New York

Noise abatement was receiving varying emphasis in each of these three cities. Cleveland drafted a noise abatement ordinance in 1978 to protect the public from excessive noise. The ordinance was not enacted because Federal funds were not available for enforcement, and the city does not plan to fund the program with local revenues. Cleveland officials did believe that noise levels had been lessened at Hopkins International Airport as a result of improved noise reduction technology and modified takeoff and landing procedures.

Dallas, which recently had a citywide environmental noise assessment conducted, believes its major sources of noise are aircraft and motor vehicles. Noise levels of 70 decibels have

been found in some areas near one of the city's two airports and during peak traffic hours along a major expressway. A separate study of noise in the vicinity of one airport--Love Field--was made. It was given to a task force reviewing potential noise abatement procedures, including a 9 p.m. to 7 a.m. curfew on arrivals and departures. Dallas has studied several proposals to alleviate traffic congestion along the North Central Expressway corridor and has found advantages and disadvantages to each proposal. Dallas also has a noise ordinance for new construction but does not have noise measuring instruments to determine compliance with the ordinance. EPA believed that the city could obtain the needed equipment on loan from the University of Texas, which had purchased it with Federal funds.

According to some environmentalists, New York City's noise code of 1972 is the most advanced in the Nation; however, enforcement of the code has been spotty. Personnel cutbacks resulting from the city's financial problems greatly reduced the number of inspectors. As a result, the number of summonses issued for noise violations declined from 3,604 in 1973 to 162 in 1977 and was 259 in 1981.

A major source of noise in New York City is the subway system. An April 1981 study issued by the Natural Resources Defense Council characterized the New York City subway system as twice as loud as systems of comparable age in Berlin, Germany; Paris, France; and London, England. The study pointed out that these high noise levels pose a hazard to public health and make subway use distasteful and less competitive. The study concluded that the New York City Transit Authority's Noise Abatement Program has had some success but more needs to be done, including developing noise objectives and standards for the system. Quieting a system that includes about 6,500 subway cars and 750 miles of track, 70 of which are elevated, would cost billions of dollars. For example, 58 miles of rail was replaced at a cost of about $52 million.

THE COSTS AND BENEFITS OF ENVIRONMENTAL PROGRAMS ARE DIFFICULT TO DETERMINE

The debate on the benefits and costs of environmental programs remains unresolved. Some individuals contend that environmental regulations are too stringent, their costs too high, and that they impede the growth of productivity and fuel inflation. Others contend that the benefits far exceed the costs.

The lack of agreement concerning a number of factors contributes to the inability of making conclusive determinations regarding the costs and benefits of environmental programs. This lack of agreement involves

--defining what constitutes costs and benefits of environmental programs,

--quantifying in dollars the benefits of environmental programs, and

--isolating the impact of environmental programs relative to the impact of other factors.

Also contributing to this lack of agreement on the net costs of environmental programs are data deficiencies, subjective valuations, and questionable assumptions involving specific studies. For example, in evaluating a study of the impact of pollution abatement costs on the productivity growth rate, CEQ questioned the study's underlying assumptions. One assumption was that all of the funds used for pollution control would have been spent on conventional production if not used for pollution control purposes.

Another factor complicating the cost/benefit issue is that the benefits of regulation usually do not accrue to the same groups that bear the costs. For example, pollution control equipment required to meet Federal standards may increase a firm's expenses, but the benefits are enjoyed by communities whose water and air purification capital and operating costs are lowered; individuals whose medical costs are reduced; owners of real estate whose property values rise as a result of cleaner air and water; and firms, workers, and others, who gain from sales of pollution control equipment.

The balance of this section discusses the results of several CEQ-sponsored cost/benefit studies.

Costs of environmental programs

CEQ estimated that the 1979 "incremental" annual costs of environmental programs--those costs resulting from Federal legislation--reached $36.9 billion and represented about 1.5 percent of the gross national product. Incremental expenditures were $22.3 billion for air pollution control and $12.7 billion for water pollution control. Total costs of environmental programs--incremental costs plus expenditures that would be made in the absence of Federal legislation--were estimated at $55.9 billion, or about 2.3 percent of the gross national product in 1979. Estimated incremental and total pollution abatement costs for 1979-88 are $519 billion and $735 billion, respectively.

CEQ and EPA estimates are based primarily on the cost of installing, maintaining, and operating an "end of the pipe" device that has no function other than pollution abatement. They do not, for example, include pollution abatement costs that are integrated in the production process, which may improve production efficiency as well as reduce pollution. Further, these estimates relate primarily to Federal legislation and to State and local regulations enacted to comply with the Federal laws. They do not include costs of meeting State and local standards when they are more stringent than the Federal standards.

Appendix I summarizes CEQ's estimated cumulative total pollution abatement expenditures for 1979-88.

Benefits of environmental programs

The benefits of pollution control are more difficult to measure because they are less tangible than the costs of the programs. In addition, benefits are frequently spread among a larger population, with the direct benefit to each individual being relatively small. The aggregate benefit, however, may be substantial. The major challenge in benefit analysis, however, is to find the appropriate method of placing monetary values on such elements as economic stability; confidence in business; maintenance of rural areas, small towns, and urban residential areas; clean air and water; good health and reduction of pain and suffering; and a human life. Prior estimates of damage due to environmental factors have been wide ranging. For example, estimates of costs of illness due to oxidants have ranged from $1 to $50 per hour and to $1 to $10 per day. A National Academy of Science study in 1974 valued each death attributable to air pollution at $200,000, but in 1975 it valued each death at $30,000.

A report prepared for CEQ and issued in December 1979 presented a synthesis of recent estimates of benefits of air and water pollution control. It also presented "best judgment" estimates of benefits based on available studies. The report concluded that the national benefits realized from reductions in air pollution since 1970 lie in the range of $5 billion to $51 billion per year. The most reasonable estimate of the annual benefits of air quality improvement being enjoyed in 1978 was $21.4 billion. The lower and upper bounds of water pollution control benefits were $6.5 billion to almost $25 billion per year. The study concluded that the most reasonable point estimate of the benefits to be enjoyed by 1985 was $12.3 billion, over half of which was attributable to improved water-based recreation.

The report also pointed out that, in spite of recent advances, the estimation of certain kinds of environmental benefits is still in need of additional refinement and the development and acquisition of data in a number of important areas will be one key to this refinement.

Appendixes II and III summarize the air and water pollution control benefits data from the study.

CONCLUSIONS

In the 1970's a series of ambitious programs to restore and maintain our air, water, and land resources and reduce noise pollution was implemented. Since then, billions of dollars have been spent by government and industry, and it is estimated that $735 billion will be spent on pollution abatement between 1979 and 1988.

Nationwide progress has been made toward meeting key environmental goals, but the job is far from complete and original deadlines have had to be extended significantly. For example, the 1975 milestone for meeting national air quality standards was extended to 1987 and the requirement to provide municipal wastewater with secondary treatment was extended from 1977 to 1988, under certain conditions.

The absolute level of improvement for the most widespread air pollutants has been significant since the passage of the Clean Air Act. However, substantial portions of the Nation still do not meet air quality standards for one or more of the seven criteria pollutants. Projected increases in coal use during the 1980's and proposals to relax auto emission standards, if adopted, would put additional pressure on maintaining the air quality.

More municipal and industrial wastewater receives the required level of treatment now than when national standards were mandated in 1972. By the end of 1979, 93 percent of major industrial dischargers were in compliance with their permit requirements or on a schedule to meet them. On the other hand, only 37 percent of major municipal treatment facilities were in compliance with mandated treatment requirements as of February 1980.

The majority of water supply systems meet national drinking water standards. Nevertheless, 146,000 violations of the standards and monitoring requirements--by 28,000 of 65,000 community water systems--were reported in fiscal year 1980. Many rural and urban communities also face problems financing needed improvements to their water supply systems.

To ensure environmentally safe disposal of solid wastes, the Resource Conservation and Recovery Act of 1976 called for the preparation of State solid waste management plans, a nationwide inventory of disposal sites, and the closing or upgrading of open dumps. As of June 1981, no State plans had been approved by EPA. In addition, the nationwide inventory published in May 1981 was considered incomplete and inadequate and little progress has been made toward upgrading open dumps to environmentally sound facilities. The ocean dumping of industrial wastes decreased by 42 percent between 1973 and 1980, but the volume of municipal sewage sludge dumped increased by 49 percent during the same period. In addition, the ocean dumping of dredged material continues at high levels. Enforcement of the December 31, 1981, statutory prohibition against the dumping of harmful sewage sludge, however, was held up pending determination as to whether sewage sludge unreasonably pollutes the marine environment.

There have been some indications of progress in reducing nonworkplace noise levels; however, EPA plans to completely phase out its noise control program by the end of fiscal year 1982. Without Federal assistance, many State programs may also have to be terminated.

CHAPTER 3

MAJOR UNRESOLVED ISSUES MAY PREVENT ACHIEVING ENVIRONMENTAL GOALS

The Nation has made progress toward meeting the key environmental protection goals, but, as discussed in chapter 2, the job is still far from complete. Several major issues and problems continue to plague pollution control efforts, which, if left unresolved, could delay indefinitely fully attaining environmental goals and needed improvements in our air, water, and land resources. This chapter examines some of those unresolved issues and problems, including:

--The causes and impacts of acid precipitation and control measures needed.

--The significance of nonpoint sources of water pollution and how they can be alleviated.

--The enormous cost to correct the combined sewer overflow problem.

--The increasing seriousness of the ground water contamination problem.

--The continuing controversy over the use of the ocean as a waste disposal medium.

--The continuing effort needed to sustain compliance with pollution control requirements over the long term.

--Pollution control creates additional waste residue but restricts disposal options.

ACID PRECIPITATION POSES SERIOUS AIR QUALITY PROBLEMS

Precipitation can become acidified when sulfur dioxide and nitrogen oxides--emitted by fossil-fueled powerplants, vehicles, and other manmade or natural sources--are chemically transformed in the atmosphere and return to earth as acid compounds. Acid precipitation has been believed to damage crops, forests, soil fertility, lakes and fish populations, manmade materials, and human health. Still, controversy exists as to its exact causes and effects and what control measures are needed.

The National Academy of Sciences reported that as of 1978 acid rain caused $5 billion in damages annually. CEQ has identified acid rain as one of the two most serious global environmental problems associated with the combustion of fossil fuels. Increased use of coal to produce energy could make the problem worse. Extensive research into the acid rain problem is underway.

Under the Clean Air Act, ambient concentrations of the criteria pollutants within an air quality control region are to be brought within the national standards through controls imposed on the sources of those pollutants within that control region. If a particular region has a problem with sulfur dioxide, for example, the problem is to be addressed in the SIP by control measures imposed on those sources. This statutory arrangement creates two problems.

First, sulfur dioxide and nitrogen dioxide are not always reflected in ambient concentrations. For example, if those pollutants are emitted from tall smoke stacks, these gases often rise high into the atmosphere and are transformed into sulfuric acid or nitric acid. The acid may then fall to Earth as precipitation or as dry sulfate and nitrate particles. Because they are no longer in their gaseous forms, they do not show up on monitors of ambient air quality. As a result, control strategies based on ambient concentrations may miss pollutants that only briefly pass through ambient air on their way to Earth.

Second, the long-range transport of air pollutants also presents control problems. Thus air pollution in one region may be related not only to emissions in that region but also to emissions from sources well beyond the reach of the region's control authorities. The practice of achieving pollutant dispersal through tall stacks to avoid ground level concentrations has resulted in the transport of pollutants from one control region to another. The taller the stack, the higher the gases rise into the atmosphere. The resulting dispersion reduces ambient or ground-level concentrations of the pollutants and protects against some of the adverse health and welfare effects. Sooner or later, however, the problems may appear elsewhere. Some electric utility stacks are taller than 1,000 feet; the tallest is nearly a quarter mile high.

Effects of acid precipitation

Those who claim acid precipitation is a demonstrated environmental problem for the United States assert that significant damage already has occurred and that evidence indicates that far more damage will occur unless regulatory action is taken. Among the alleged effects of acid percipitation are

--acidification of lakes, streams, and ground waters, resulting in damage to fish and other aquatic life;

--reduced forest productivity and damage to crops;

--deterioration of manmade materials such as buildings, statues, finishes, and metal structures; and

--indirect effects on human health arising from contamination of drinking water.

In a September 11, 1981, report--"The Debate Over Acid Precipitation: Opposing Views, Status of Research" 1/--we noted that most experts agree aquatic ecosystems have been damaged. Environmental groups and others calling for immediate regulation cite a formidable body of scientific literature which documents the problem. Spokesmen for the utility and coal industries acknowledge that acidic conditions have damaged aquatic ecosystems in some areas, although they state that acid precipitation may be only one of several causes. Scientists also agree that lakes and streams in the Northeast United States and Southeast Canada are becoming increasingly acidic and that this acidification is already causing damage to some aquatic ecosystems. Most experts agree that acid precipitation is the primary cause of this condition.

Acid precipitation's effects on terrestrial ecosystems, manmade materials, and human health are less understood. Although these subjects have been and are presently being researched, the results are preliminary and not easily quantified. Advocates of regulation claim acid precipitation has affected forests, crops, and soils. Opponents of regulation state that the available evidence is too limited to make a determination and much more work remains to be done before we have concrete evidence on acid rain's effect on plant life. EPA contends that although these effects are possible, further research is needed to prove that they are happening.

Detailed assessments of the effects of acid rain on manmade materials, such as buildings and statues, separated from the effects of other pollutants, appear to be just getting underway. With respect to human health, there were few claims of direct effects in our literature survey. Two indirect hazards are often discussed, both involving the metals which can be dissolved by water of greater than usual acidity. These are contamination of edible fish with mercury and contamination of drinking water with heavy metals, such as lead, leached from water storage and distribution systems.

Causes of acid precipitation

Advocates of regulation claim that convincing evidence shows that manmade sources, particularly older coal-fired powerplants in the Midwest, cause acid precipitation in the Northeast and Canada. Opponents of regulation contend that there is insufficient proof that this is the cause. The status of the key issues follow:

--Experts agree that much of the Northeastern United States and Southeastern Canada are receiving acid deposits at rates many times in excess of those expected from a "pure" atmosphere. Most of this acid is sulfuric acid. In areas

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of the West experiencing acid precipitation, the majority of the acidity is nitric acid.

--Experts disagree on whether precipitation's acidity has been increasing.

--Most advocates agree that long-range transport and chemical transformations of sulfur dioxides and nitrogen oxides occur in the atomosphere. They disagree, however, on whether the evidence is sufficient enough to link emissions from the Midwest to acid deposition in the Northeast United States and Southeast Canada.

--Experts agee that sulfur compounds in the atmosphere of the Northeast United States and Southeast Canada come predominantly from manmade sources.

--Wide disagreement exists over the extent to which local versus distant sources are responsible for acid precipitation. Scientific work suggests that both coal-fired powerplants and local combustion of residual and home heating oil and fuel for motor vehicles contribute to acid precipitation but how much as not been established.

Measures to control acid precipitation

The Clean Air Act Amendments of 1977 require that EPA approve a SIP only if it prohibits stationary sources from emitting air pollutants in amounts which will prevent attainment or maintenance by any other State of an ambient air quality standard. EPA has also taken action to regulate allowable heights for smoke stacks. Many States still believe, however, that they are adversely affected by the interstate transport of pollutants.

The debate on whether additional regulatory measures are needed to control acid precipitation has centered around two questions: (1) Is current regulation of emissions under the Clean Air Act adequate, given our current state of knowledge about acid rain? and (2) How effective would additional regulatory measures be in alleviating acid precipitation and what would their economic, environmental, and other effects be?

Proposed strategies to deal with acid precipitation vary widely in their economic, energy, and environmental effects. Relatively inexpensive strategies, such as coal washing, have limited environmental benefits. Comprehensive strategies, such as installing scrubbers to remove pollutants from smoke stacks at existing powerplants, can significantly reduce sulfur dioxide emissions but are more costly. Furthermore, the extent of the environmental benefits is disputed.

EPA, the Department of Energy, and other organizations are studying the effects of intermediate strategies designed to abate acid precipitation. Most focus on reducing sulfur dioxide emissions

from electric utilities, with particular emphasis on coal-burning powerplants. The coal and utility industries, and even the Department of Energy, however, cite studies suggesting that targeting coal-fired powerplants in the Midwest may not be effective in reducing acid precipitation in the Northeast and that more attention needs to be paid to the effects of nitrogen oxide.

A U.S. decision on whether and how to implement control strategies could also have international implications. Canadian officials consider transboundary air pollution, which they assert causes acid precipitation in Eastern Canada, to be a serious issue.

NONPOINT SOURCES OF WATER POLLUTION ARE SIGNIFICANT BUT HAVE NOT BEEN CONTROLLED

Nonpoint pollution refers to pollutants which enter the water in diffused and diluted forms rather than from a specific discharge point. Agricultural activities and urban storm water runoff are the major sources of nonpoint pollution. Although estimates vary widely, the general consensus is that nonpoint pollution is often a significant problem and, unless it is solved, many rivers and lakes will not be able to meet our Nation's water quality goals. CEQ reported in December 1980 that, in contrast to the important progress made in controlling municipal and industrial point source discharges, progress with nonpoint sources has been negligible.

In addition to agriculture and urban storm water runoff, sources of nonpoint pollution include mining drainage, livestock and forestry operations, construction sites, and septic systems. In volume, the major nonpoint pollutant is sediment from soil erosion of agricultural land, which transports pollutants like pesticides and excess nutrients into waterways. Runoff from lands used to support livestock contributes large quantities of nitrogen and phosphorous. Urban runoff contains almost all types of pollutants, including toxic materials, oil and grease, and animal excrement.

A 1977 EPA report to the Congress indicated that of 246 river basins in the United States, 68 percent had nonpoint pollution from agriculture, 52 percent from urban runoff, 30 percent from mining, and 15 percent from forest activities. Nonpoint pollution can also be a significant part of total pollution in a waterway. For example, the North Central Texas Council of Governments reported that nonpoint sources of biochemical oxygen demand will be almost 3 times greater than that of point sources, when the major point sources discharging into the Trinity River attain their required treatment levels.

Pollution from nonpoint sources can also be highly concentrated. A study of Washington, D.C., found that in water from city streets the concentration of suspended solids was 104 times higher than in waste from a secondary treatment plant. The lead concentration was 1,015 times higher. In New York City urban runoff was

found to account for 49 percent of copper, 36 percent of chromium and nickel, 69 percent of zinc, and 44 percent of the cadmium loadings in the harbor area.

One Federal program which directly addresses nonpoint source pollution is the Water Quality Management Program of the Clean Water Act. The program calls for designating planning agencies to develop plans by examining waste management alternatives for continuing management of point and nonpoint source wastes on an areawide basis. The act also requires that, following approval of such a plan by the State and EPA, designated management agencies are to implement the plan. Federal funds under this program were provided for the planning process but not for implementing control strategies.

The program was not successful in controlling nonpoint pollution. Testimony at congressional hearings in July 1979 indicated that the Water Quality Management Program suffered from inadequate data on the nature of nonpoint pollution; discontinuity in funding levels; late EPA issuance of rules and guidance; and numerous conflicts between Federal, State, and local governments. Other testimony at the hearings suggested that nonpoint source pollution will play a large part in preventing attaining the "fishable-swimmable" goal of the Clean Water Act in many areas of the country. EPA believes that additional research is needed to accurately define the impacts caused by toxics from nonpoint sources.

Present EPA programs to control nonpoint pollution

EPA is currently supporting a series of demonstration projects to identify and develop control strategies for agricultural and urban problems, which EPA officials assert are the greatest contributors of nonpoint pollutants. The demonstration projects are designed to assess nonpoint pollution problems, their effects on water quality, and the cost-effectiveness of possible control measures.

EPA and the Department of Agriculture are supporting a Model Implementation Program to study agricultural nonpoint pollution and accelerate the installation of conservation practices to reduce agriculture and silvicultural runoff. The Clean Water Act of 1977 established a program--the Rural Clean Water Program--for implementing nonpoint pollution control measures in agricultural areas. Under the program, participants would enter into contracts for implementing measures consistent with an approved areawide plan. This program has not been funded, although a total of $70 million was made available in fiscal years 1980 and 1981 for an experimental program which was similar in nature.

Urban nonpoint control strategies are being developed under the Nationwide Urban Runoff Program. Under this program, EPA and the U.S. Geological Survey administer a series of prototype projects for data collection. This effort is designed to secure

information on possible solutions to urban runoff problems, including the effects on water quality and future use, as well as the cost-effectiveness of controls. Projects under this program will culminate in 1983 with a report to the Congress. Federal funds are not available to implement programs to control urban runoff. Rough estimates on the cost of such programs nationwide range from $70 billion to $500 billion.

EPA also stated that, with respect to construction runoff, 40 States have considered statutory controls on sediment resulting from construction projects. Sixteen States now have effective sediment and erosion control laws, which EPA believes have been generally successful in ameliorating the immediate water quality impacts of construction activities.

COMBINED SEWER OVERFLOW PROBLEMS MAY BE TOO COSTLY TO CORRECT

"Combined sewers" is a term given to a sewage system that carries both sanitary sewage and storm water through the same pipe to a treatment facility. Such systems are usually found in older communities, whereas newer communities generally have separate sewer systems. In a separate system, one pipe carries sanitary sewage to the treatment facility and another pipe carries storm water directly to the area waterways, bypassing the treatment facility.

Combined sewer overflows severely degrade the Nation's water quality. In addition, combined sewer systems in many communities are a major cause of flooding, including sewage backups into basements. Billions of dollars are needed to fund the pollution control portion of projects to correct combined sewer overflows. These projects have a low priority at the Federal level and also must compete with higher priority projects at the local level. As a result, a significant source of water pollution may go uncorrected indefinitely.

During dry weather, a combined system can handle the communities' sanitary sewage flow. However, when it rains, combined systems mix rainwater with the raw sewage already flowing in the pipes. The result is a mixture that includes human wastes, disease-causing organisms, toxic chemicals, heavy metals, oil, grease, and other contaminants. Whether the system overflows depends on the system's dry weather flow, its capacity, and the amount of rainfall. Once a system overloads, the water can overflow directly into rivers and streams or back up into homes, streets, and low-lying land. In contrast, overflows from separate storm water systems do not involve surface discharges of raw sewage although separate storm water systems also convey significant amounts of pollutants.

The magnitude of the combined sewer problem has been clearly documented in several major cities. For example, in Chicago, Illinois, overflows from hundreds of combined sewer outlets account for approximately 47 percent of the pollution in area rivers and

streams and also contribute to pollution in Lake Michigan. In San Francisco, California, every time it rains, the volume of combined rain runoff and sanitary sewage exceeds treatment plant capacity and the excess flows untreated into San Francisco Bay and the Pacific Ocean. Each year San Francisco suffers 80 such overflows and must close beaches an average of 125 days per year.

No area of the country escapes the combined sewer problem. According to EPA, more than 1,100 combined or partially combined sewer systems serve more than 42 million people in an area totaling 2.7 million acres. Combined sewer systems are found in 10 of 20 of the Nation's largest cities and in hundreds of smaller communities. They are most prevalent in the densely populated and highly industrialized areas of the Northeast and Midwest. EPA estimated in 1980 that it would cost $37 billion to correct the combined sewer overflow problem nationwide. The estimate covered funds needed to construct facilities to prevent and/or control periodic bypassing of untreated wastes from combined sewers to achieve water quality objectives and which are eligible for Federal funding.

Combined sewer overflow abatement has been given a low priority when compared with the construction of treatment plants. Based on the significant funding still needed for treatment plants and the reduced Federal funds available for the entire EPA Waste Water Treatment Plant Construction Grants Program, it appears that combined sewer overflows will continue to receive low priority. Our December 1979 report--"Large Construction Projects To Correct Combined Sewer Overflows Are Too Costly" 1/--concluded that the one essential reason for the slow progress in correcting combined sewer overflow was "not enough Federal money." It recommended implementing less costly solutions to the combined sewer overflow problem than the structural-intensive solutions generally accepted as necessary.

While no such technique alone provides the same degree of improvement offered by structural changes, a number of techniques together could minimize overflows and reduce the size of the construction project if one is eventually needed. Alternative techniques include

--measures to reduce the flow of rain into the system, such as storing water on roof tops or in parking lots;

--measures to reduce pollutants from entering the system, such as keeping streets clean;

--devices to increase the flow of sewage through the system, such as sewer inlet restrictors and remotely controlled regulators; and

--devices to regulate and treat sewage at overflow points.

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EPA believes that, given the limited available funding, the decision to approve combined sewer overflow projects should be based on beneficial use enhancements and whether the benefits are commensurate with the costs. This approach, EPA believes, would eliminate costly projects with insignificant enhancements.

Combined sewers a major problem in Cleveland and New York

During our review we found that Cleveland and New York City have combined sewers.

In the Cleveland area, the combined sewer system has more than 500 overflow points, 100 of which discharge directly into the receiving waters. Even during moderate rain storms, the rate of flow in the system is 40 to 50 times greater than in dry weather and is much more than the system can handle. For example, in the area served by one of the sewer district's three treatment plants, the estimated overflow would exceed 2,000 million gallons per day. The sewer district has been exploring projects to maximize insewer and offline storage of the overflow but believes significant progress toward controlling combined sewer overflows will not be made until the late 1980's--year 2000 time frame. The estimated cost is about $200 million, and a sewer district official said that a program of this magnitude would not be undertaken without Federal aid.

The majority of New York City's sewers are combined. As a result, area waterways may never achieve all of their potential beneficial uses. New York's waste treatment plants can accommodate twice the average dry weather sewage flow, but peak flows are as much as 50 times the normal flow. Therefore, when it rains, millions of gallons of untreated sewage are discharged to area waterways, bacteria levels rise precipitiously, and beaches have to be closed.

New York City's planners believe that, except for coliforms and aesthetics, the effect of overflows on harbor waters appears minimal. However, to meet State and city standards for bathing, many areas need to eliminate floating materials and reduce coliform bacteria. The Interstate Sanitation Commission and the city's Department of Health have stronger views. The Commission believes that the monies being spent currently on treatment plant upgrading and expansion will be wasted if ways to mitigate the effects of combined sewers are not found. The Department of Health has severe doubts about the planner's projection of open beaches near combined sewer overflows and statements that chlorination alone will make some other areas suitable for bathing.

The combined sewer problem in New York will probably not be eliminated soon. Both Commission and city officials said that it would cost billions of dollars to correct the problem; they even suggested studies of the problem could cost $200 million. At the same time, the city still needs about $1.75 billion more to provide

secondary treatment to all its dry weather wastewater flow. Federal budget cuts could slow down that process significantly.

GROUND WATER CONTAMINATION IS AN EMERGING PROBLEM OF MAJOR PROPORTION

Ground water is a vast natural resource. It supplies 25 percent of the fresh water used for all purposes in this country, and 50 percent of all residents rely on it as their primary source of drinking water. Recent information reveals that in many locations, ground water is contaminated by toxic organic and inorganic chemicals, many of which are known or suspected carcinogens. Once contaminated, ground water can remain so for hundreds or thousands of years. EPA has recognized the importance of protecting ground water and proposed a national ground water strategy in late 1980. No formal strategy had been promulgated, however, as of June 1982.

Ground water collects in formations under the ground called aquifers (underground reservoirs). Ground water flows, unlike rivers and streams, vary from a few feet a day to a few feet a decade. Depending on the soil composition of the area, ground water may be found from a few feet below the surface to several hundred or even 1,000 feet below the surface. In some parts of the country, ground water is being withdrawn faster than the aquifer is replenished, a fact which makes preserving the quality of remaining supplies even more important.

Contamination of ground water from human activities may come from surface impoundments, landfills, agriculture, leaks and spills, land disposal of waste waters, septic tanks, mining, petroleum and natural gas production, underground injection wells, and other sources. In the Northeast, Southeast, and Northwest--areas with substantial manufacturing activity and high population densities--industrial wastes and domestic sewage disposal have the biggest effect on ground water.

In 1977, EPA identified the disposal of industrial wastes and solid waste disposal sites as the most significant source of ground water contamination. For example, survey data compiled by EPA in 1980 on 26,000 industrial impoundments revealed that

- --35 percent, or about 9,100, of the total impoundments are unlined, which potentially allows contaminants to infiltrate, unimpeded, into the subsurface;
- --86 percent, or 7,800, of those unlined impoundments are located directly on top of ground water sources with no barrier reported between the wastes and the ground water; and
- --about 2,600 of the total impoundments are unlined, directly on top of ground water, and within 1 mile of a water supply well.

Because of a lack of data, it is difficult to generalize about ground water quality nationwide. However, reported incidents of contamination suggest how serious and widespread the problem is. For example, in 25 States, many private and public water supply wells have been capped as a result of contamination. In 1979, more than 300 contamination incidents were reported. In addition:

--Over 200 wells in California have been contaminated by toxic waste.

--On Long Island, New York, where 100 percent of the population depends on ground water, 36 public water supplies and dozens of private wells have been closed because of contamination. The water supplies for nearly 2 million residents have been affected.

--In early 1982, it was reported that contamination was only 900 feet from the well field that supplies Atlantic City, New Jersey.

An EPA official, testifying at congressional hearings in July 1980, stated that as the weeks and months and years go on, we are going to learn of thousands of other incidents of ground water contamination. The same official described the Federal Government's failure to address this problem adequately as the most grievous error in judgment we, as a Nation, have ever made.

EPA ground water strategy

EPA proposed a national ground water protection strategy in 1980 and held workshops and hearings on it in January 1981. The proposal emphasizes preventing future contamination. It did not propose new legislation but instead recommended coordination, followthrough, and implementation of existing Federal programs. The proposed strategy called for the following actions by 1985: initiate ground water protection strategies in all States; implement existing Federal regulatory programs; evaluate ground water quality, correct the most hazardous conditions, and manage areas of ground water contamination; and provide a process for States, local governments, and the public to set priorities among competing activities that may use or contaminate ground water. No final EPA policy on ground water had been issued by June 1982.

USING THE OCEAN AS A WASTE DISPOSAL MEDIUM IS STILL BEING DEBATED

Legislation passed in the early 1970's sought to halt indiscriminately using the oceans for waste disposal. In a January 1981 report, the National Advisory Committee on Oceans and Atmosphere reported that the Nation must manage wastes, not media, and since each region of this country has its own unique set of oceanographic, hydrologic, geological, and atmospheric properties, the right waste disposal method for one location is not necessarily right for

another. The committee concluded that ocean disposal must remain a viable option in searching for the safest waste disposal method.

A CEQ report issued in 1970 gave special urgency to the need to control waste disposal in the ocean. The report illustrated the rapid rise in recent decades of the quantity and variety of material that was being dumped in the ocean. Much of the testimony leading to the passage of present legislation controlling ocean-waste management emphasized the fragility of the environment and highlighted our lack of knowledge of the effects of ocean-waste disposal on the environment and human health. NACOA's January 1981 report stated that our scientific knowledge in these areas will probably always be incomplete but our understanding is better now than it was a decade ago.

Unregulated ocean-waste disposal has in the past, and probably will in the future, have adverse effects on human health and the environment. As currently practiced, however, NACOA reported that ocean-waste disposal results in little or no human health risks from disease transmission and the principal concern is with the possible effects of synthetic organics. The ecological effects of ocean-waste disposal are probably not as well understood as are the human health effects, one reason being the difficulty in measuring sublethal effects in natural ecosystems.

NACOA recommended that the Federal Government establish as a priority goal the reuse and recycling of wastes. It acknowledged, however, that we will continue to be faced with a disposal problem because:

--Dredged materials must be disposed of somewhere unless the Nation is prepared to cause significant economic hardship to its shipping and transportation industries.

--Sewage sludge and municipal wastes will continue to be produced no matter how successful we are in recycling or advancing the state of the art in waste treatment.

--Industrial wastes cannot always be completely recycled.

The NACOA report stated that the oceans must remain a viable disposal option for some of these materials. Since research indicates that some of the earlier concerns were overstated, we should consider the oceans as a waste disposal medium for certain wastes under certain circumstances, considering each waste management problem on its own merits. In the end, after a thorough comparative study, the ocean may in fact be the most attractive disposal medium. To maintain the oceans as a viable waste disposal option, NACOA recommended a number of actions, including:

--The EPA policy that no ocean dumping permit will be issued when any land-based alternative exists should be reversed.

--Ocean disposal of sewage sludge and industrial wastes should continue where no unreasonable degradation of the marine environment is indicated.

This change in philosophy was apparent in 1981, when New York City filed suit against EPA to allow it to continue ocean dumping beyond the December 31, 1981, deadline, claiming the ocean dumping regulations were too stringent. Subsequently, a ruling was handed down in the U.S. District Court for the Southern District of New York requiring that, before banning the ocean dumping of sewage sludge, a determination had to be made as to whether sewage sludge would unreasonably degrade the marine environment. EPA did not appeal the court's decision.

EFFECTIVE MONITORING AND ENFORCEMENT ARE NEEDED TO SUSTAIN POLLUTION CONTROL PROGRESS

Progress has been made toward constructing the facilities and installing the equipment needed to comply with environmental regulations. However, effective operation and maintenance of those facilities and equipment are needed to sustain that compliance over the long term. Unfortunately, past studies have shown a high incidence of noncompliance with established pollution limits on the part of both municipal and industrial sources. The following examples highlight the extent of noncompliance found in several programs, which indicates the need for continued strong monitoring and enforcement.

Municipal wastewater treatment plants

EPA's annual inspection surveys for 1976 and 1977 found that only 50 to 55 percent of the plants examined were operating at or near design specification for removal of biochemical oxygen demand. The general level of wastewater treatment plant performance, according to the study, was substantially unchanged from previous years; less than one-half the plants performed satisfactorily.

In a November 14, 1980, report--"Costly Wastewater Treatment Plants Fail To Perform as Expected" 1/--GAO reported on municipal treatment plant performance and reached a similar conclusion. A random sample of 242 major plants in 10 States revealed that 87 percent of the plants were in violation of their National Pollutant Discharge Elimination System Permits; 31 percent were in serious violation. We classified a plant as being in "serious violation" of its permit when the plant was found to be in noncompliance for 4 consecutive months and exceeded the permit discharge limits by more than 50 percent. EPA had not defined "serious violation," but agency officials said that our definition was conservative.

1/(CED-81-9.)

Why are the plants not working as intended? We found that usually not just one but a combination of problems limit a plant's ability to treat raw waste. These problems include design and equipment deficiencies, infiltration/inflow and industrial waste overloads, and operation and maintenance deficiencies. More importantly, identifying who is reponsible for correcting plant performance problems is often unclear.

Industrial wastewater treatment facilities

Industrial waste treatment facilities also experience a significant rate of noncompliance with their permit conditions. In an October 17, 1978, report--"More Effective Action By The Environmental Protection Agency Needed To Enforce Industrial Compliance With Water Pollution Control Discharge Permits" 1/--we reported that 55 percent of 165 industrial wastewater dischargers in EPA regions II and IV studied over a 15-month period committed serious violations of their permit provisions. As a result, higher than allowable levels of pollutants--including high concentrations of toxic substances--were discharged into area waterways. In addition, 23 percent of the industrial permittees studied failed to submit one or more discharge monitoring reports during the study period and, of that group, 65 percent failed to do so for 5 or more months.

The New Jersey Public Interest Research Group issued a report on this area in 1981. The study covered from January 1975 to January 1980 and 158 of 475 major industrial dischargers in EPA region 2 (New York, New Jersey, Puerto Rico, and the Virgin Islands). In examining the discharge monitoring reports submitted during this period by the 158 dischargers, the group found 4,327 violations of effluent limitations. The study also disclosed that EPA's overall enforcement response rate was only 13 percent, including 153 warning letters or telephone calls (first level of responses), 21 administrative orders, and 5 referrals to the Department of Justice. The group concluded that if its sample results were extrapolated nationwide there would be over 100,000 violations in all 10 EPA regions for major industrial dischargers alone.

Stationary sources of air pollution

Noncompliance with emission standards by stationary sources of air pollution is a problem. In a January 2, 1979, report--" "Improvements Needed In Controlling Major Air Pollution Sources" 2/--we reported on EPA's Compliance Monitoring Inspection Program,

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1/(CED-78-182.)

2/(CED-80-165.)

which was developed to verify State compliance determination efforts. Under this program, regional offices were to inspect 10 percent of the major sources the States reported in compliance. During 1977, EPA inspected 1,813 major sources for compliance monitoring. Of 921 inspections of sources supposedly in compliance, 200, or 22 percent, were found in violation. The range of sources found out of compliance in the various regions was 12 to 52 percent.

In EPA region 5, for example, it was EPA's policy to reinspect violating sources within 4 months. The region inspected 233 major sources in fiscal year 1977 and found 79, or 34 percent, in violation. At the time of our review, EPA had reinspected only 22 of the 79 violators. Fifteen sources, or 68 percent, were still in violation.

Treatment plant efficiency varied in Cleveland, Dallas, and New York

Of the three cities reviewed, New York was having the most problems with treatment plant efficiency. City officials stated that at least 4 of their 12 plants do not regularly meet the standards for removal of certain pollutants. During at least one-third of 1980, 4 of 12 plants violated the limits set in their discharge permits; one plant exceeded the limits in 8 months, another in 12 months. EPA, in a February 1981 status report, showed 5 of the city's plants out of compliance with their permits and 3 more of the 12 plants only marginally in compliance.

One means of ensuring permit compliance in New York is through the State's program of sharing local sewage treatment costs provided certain standards are met. Permit requirements are a major component of the standards. Only one New York City plant, as of April 1979, had qualified for State aid in every year since the program began in 1965.

According to State environmental officials in Ohio, the three treatment plants serving the Cleveland area have been in substantial compliance with interim standards during plant upgrading since July 1980. Prior to that, problems had been experienced. For example, the State has filed a $100 million action for permit violations at one plant during a 20-month period ending in July 1980. About 50 percent of the time during that period the plant failed to remove sufficient solids from the discharges.

In Dallas, the newer and smaller wastewater treatment plant is meeting the State's effluent limitations, but the larger and older plant is not. In addition, heavy rain and system breakdowns at the older plant have caused discharges of raw sewage. For example, from May 15, 1980, to June 8, 1981, there were six instances of raw sewage discharge lasting from 1 to 10 days. City officials attribute the problem to design deficiencies and operating problems. They said that necessary improvements to the plant should be made by about 1987. Consultants have recommended that

the city provide plant operating personnel with additional training and higher salaries.

POLLUTION CONTROL CREATES ADDITIONAL POLLUTION

The environmental laws of the 1970's created a single-purpose approach to pollution control. Sometimes this meant that complying with one law or regulation would cause a conflict with another law. Pollution control laws have not only increased the volume of wastes that must be disposed of but, in addition, have prohibited or severely restricted available disposal options. This approach has caused communities and industry to select or consider disposal methods that may not be the most environmentally safe.

The requirement of the Federal Water Pollution Control Act Amendments of 1972 that publicly owned treatment works provide secondary treatment has and will continue to increase the amount of sewage sludge that has to be disposed of. EPA reported in 1980 that these plants were producing 6 million dry metric tons annually and this volume was projected to increase to about 10 million dry metric tons by 1990. Due to the increased volumes and the planned elimination of ocean dumping, some communities have adopted or considered environmentally questionable methods of sludge disposal.

For example, in a May 1979 report to the Administrator of EPA, we noted that sewage sludge products having high levels of cadmium were being sold or given away to the public for uncontrolled use. We characterized the practice as representing a potential health hazard, while acknowledging the difficulties communities were experiencing in disposing of the increased volume of sludge. In planning for the cessation of ocean dumping, various alternatives were considered by communities in the New York City-Northern New Jersey area. Nassau County, New York, for example, proposed composting as an interim alternative. When the proposal was made, however, the county health department registered serious reservations because of the potential for ground water pollution. Nassau County's population depends entirely on ground water as a potable water source and the county has been designated a sole source aquifer zone, a process that mandates additional protection for its underground water supplies.

The phaseout of ocean dumping of industrial wastes has also resulted in the adoption of environmentally questionable alternative disposal methods. Our prior report on ocean dumping noted that many former industrial waste dumpers had adopted landfilling. In fact, of the 45 companies EPA surveyed which previously ocean dumped their wastes, 29 were landfilling the wastes. Of these 29 companies, 21 were using the same landfill. The EPA survey indicated that this landfill site was of questionable adequacy for accepting large volumes of industrial liquids. For example, it was located on the west bank of the Raritan River and the entire area was nearly at sea level, with ground water generally little

more than a few feet from the surface. During periods of high rainfall, parts of the landfill are submerged and seepage from the landfill was a recurring problem. The survey concluded that it was also possible that harmful materials were moving directly into the river by means of the ground water and created the likelihood that material diverted initially from the ocean was being carried back into it by the river. Subsequently, the landfill was ordered to stop accepting liquid chemical and hazardous wastes.

Other communities--in view of disappearing or more restricted disposal options or in an attempt to recover resources from the processes--plan to burn their solid waste and/or sewage sludge. At the same time, numerous powerplants are planning to convert from burning oil to burning coal to reduce dependence on foreign petroleum. Whereas any one such facility in an area may not pose a significant air pollution problem, several such facilities concentrated in one area could present significant health risks. For example, in 1980, New Jersey's environmental conservation commissioner asked EPA to assess the health effects of trace toxic metals emitted from 32 facilities planned for the New York City-Northeast New Jersey area. These facilities included 8 sewage sludge incinerators, 14 solid waste incinerators, 9 oil to coal powerplant conversions, and 1 coal and refuse powerplant. Many of these facilities would have multiple units and stacks.

EPA's evaluation--admittedly preliminary in nature--involved 10 substances: cadmium, arsenic, mercury, chromium, particulates, zinc, selenium, nickel, copper, and lead. EPA's Carcinogen Assessment Group reported that:

--In Jersey City, New Jersey, where the maximum concencentration from trace metal emissions exists, the added risk from emissions from the planned facilities is about 10 times higher than the background risk, a level which cannot be ignored.

--The lifetime risk to individuals living in the study area due to emissions of chromium is almost 10 times higher than each of the other metals, and the total risk from chromium, cadmium, arsenic, and nickel is not considered negligible.

EPA's Environmental Criteria and Assessment Office also evaluated the potential health effects of emissions of trace metals from the planned facilities. The report concluded that some of the trace metals evaluated posed carcinogenic and/or noncarcinogenic health problems to residents of the study area. The report also pointed out that in analyzing the effects of these emissions on humans, indirect exposure--for example, from ingestion--could also pose a health threat along with direct exposure from inhalation.

CONCLUSIONS

Several major issues, if left unresolved, could delay or prevent achieving the Nation's key environmental goals.

Acid precipitation and the long-range transport of air pollutants pose serious problems. Acid precipitation has been alleged to damage crops, forests, soil fertility, lakes and fish population, manmade materials, and human health. More research is needed, however, to accurately define the causes and effects of acid precipitation and the measures needed to control it.

Nonpoint sources of water pollution--including runoff from agricultural and urban areas--and combined sewer overflows contribute significant levels of pollutants to waterways nationwide. Little progress, however, has been made toward controlling these sources of pollution. To do so would be an expensive undertaking since estimates of the cost to correct just the combined sewer problem are more than $37 billion. EPA believes more research is needed on the impacts of toxics from nonpoint sources.

Ground water contamination is also a growing problem. This fragile resource provides 25 percent of the fresh water used for all purposes and 50 percent of all drinking water. Once contaminated, however, ground water can remain so for hundreds or thousands of years. EPA proposed a national ground water strategy in 1980 but it has not yet been promulgated.

Regardless of whether compliance with environmental mandates occurs slowly or quickly, initial compliance must be sustained over the long term. Unfortunately, past studies have shown a high incidence of noncompliance with pollution control requirements at municipal and industrial facilities built to provide cleaner air and water.

The environmental laws of the 1970's reflected a single-purpose approach to pollution control that limited flexibility in decision-making. Pollution control laws not only increased the volume of wastes--like sewage sludge--requiring disposal but also prohibited or severely restricted available disposal options. Because of these restrictions, government and industry may not be free to choose the most environmentally safe waste disposal option. To provide increased flexibility, serious consideration is being given to continuing the use of the ocean as a waste disposal option.

We believe the tradeoffs that must be made among the various environmental programs and the net environmental effect of pollution control actions must be recognized. The strict requirements of single-purpose environmental protection legislation do not provide industry and government administrators with the flexibility to choose pollution control alternatives that are the most environmentally sound.

ESTIMATED TOTAL POLLUTION ABATEMENT

EXPENDITURES 1979-88
(in billions of 1979 dollars)

	Operation and maintenance	Capital costs 1/	Total annual costs 2/
Air Pollution			
Public	$ 22.5	$ 5.3	$ 27.8
Private			
Mobile	32.1	83.7	115.8
Industrial	32.5	41.5	74.0
Electric Utilities	71.1	50.1	121.2
Subtotal	$158.2	$180.6	$338.8
Water Pollution			
Public	$ 45.4	$ 99.7	$145.1
Private			
Industrial	52.4	41.1	93.5
Electric Utilities	3.6	7.8	11.4
Subtotal	$101.4	$148.6	$250.0
Solid Wastes			
Public	$ 21.8	$ 5.3	$ 27.1
Private	61.3	12.5	73.8
Subtotal	$ 83.1	$ 17.8	$100.9
Toxic Substances	$ 3.6	$ 4.6	$ 8.2
Drinking Water	5.3	5.2	10.5
Noise	2.6	4.3	6.9
Pesticides	1.6	.1	1.7
Land Reclamation	4.5	13.5	18.0
Total	$360.3	$374.7	$735.0

1/Interest and depreciation.

2/Operation and maintenance plus capital costs.

Source: Council on Environmental Quality

AIR POLLUTION CONTROL BENEFITS BEING ENJOYED IN 1978

(in billions of 1978 dollars)

Category	Realized benefits: Range	Realized benefits: Most reasonable point estimate
1. Health		
A. Stationary Source		
Mortality	$2.8 -- 27.8	$13.9
Morbidity	.29 - 11.5	2.9
Total	$3.1 -- 39.3	$16.8
B. Mobile Source	0 -- .4	.2
Total Health	$3.1 -- 39.7	$17.0
2. Soiling and Cleaning	.5 -- 5.0	$ 2.0
3. Vegetation		
A. Stationary Source	0	$ 0
B. Mobile Source	$ .2 -- 2.4	$ .7
Total Vegetation	$ .2 -- 2.4	$ .7
4. Materials		
A. Stationary Source	$ .4 -- 1.1	$ .7
B. Mobile Source	.1 -- .3	.2
Total	$ .5 -- 1.4	$ .9
5. Property Values		
A. Stationary Source	$ .9 -- 6.9	$ 2.3
B. Mobile	$ .2 -- 2.0	$ .4
Total	$1.1 -- 8.9	$ 2.7
GRAND TOTAL 1/	$4.6 -- 51.2	$21.4

1/Because of overlap, only 30% of property value benefits are added to other categories.

Source: Council on Environmental Quality

BENEFITS IN 1985 FROM REMOVAL OF CONVENTIONAL WATER POLLUTANTS

(in billions of 1978 dollars)

	Range	Most likely point estimate
Recreation	$4.1 -- $14.1	$ 6.7
Non-User Benefits: aesthetics, ecology, property values	1.0 -- 5.0	2.0
Diversion Uses		
Drinking Water - Health	0.0 -- 2.0	1.0
Municipal Treatment	0.6 -- 1.2	0.9
Households	0.1 -- 0.5	0.3
Industrial Supplies	0.4 -- 0.8	0.6
Commercial Fisheries	0.4 -- 1.2	0.8
Total	$6.6 -- $24.8	$12.3

Source: Council on Environmental Quality

GAO REPORTS ON SELECTED EPA PROGRAMS 1978-81

WATER POLLUTION

"Environmental Protection Agency's Construction Grant Program--Stronger Financial Controls Needed" (CED-78-24, April 3, 1978)

"Agency's Implementation Of The Industrial Cost Recovery Provisions Of Public Law 92-500" (CED-78-102, April 11, 1978)

"Secondary Treatment Of Municipal Wastewater In The St. Louis Area--Minimal Impact Expected" (CED-78-76, May 12, 1978)

"Questions Continue As To Prices In Contracting For Architectual-Engineering Services Under The EPA Construction Grants Program" (CED-78-94, June 6, 1978)

"Sewage Sludge--How Do We Cope With It?" (CED-78-152, September 25, 1978)

"More Effective Action By The Environmental Protection Agency Needed To Enforce Industrial Compliance With Water Pollution Control Discharge Permits" (CED-78-182, October 17, 1978)

"Community-Managed Septic Systems--A Viable Alternative To Sewage Treatment Plants" (CED-78-168, November 3, 1978)

"Water Quality Management Planning Is Not Comprehensive And May Not Be Effective For Many Years" (CED-78-167, December 11, 1978)

"Analysis Of Future Coast Guard's Resource Needs For Responding To Oil Spills" (CED-79-32, January 12, 1979)

"Review of the Cost To Homeowner To Construct And Operate Waste Treatment Facilities" (CED-79-35, February 13, 1979)

"Eastsound, Washington Sewage Treatment Project" (CED-79-80, April 30, 1979)

"Combined Sewer Flooding And Pollution--A National Problem. The Search For Solution In Chicago" (CED-79-77, May 15, 1979)

"Some Communities May Not Be Able To Meet The December 31, 1981, Ocean Dumping Phaseout Deadline For Municipal Sewage Sludge" (CED-79-119, August 28, 1979)

"Large Construction Projects To Correct Combined Sewer Overflows Are Too Costly" (CED-80-40, December 28, 1979)

"Many Water Quality Standard Violations May Not Be Significant Enough To Justify Costly Preventive Actions" (CED-80-86, July 2, 1980)

"Information On Questions About The Brush Creek (PA) Sewage Project" (CED-80-112, August 8, 1980)

"Costly Wastewater Treatment Plants Fail To Perform As Expected" (CED-81-9, November 14, 1980)

"Chicago's Tunnel And Reservoir Plan--Costs Continue To Rise And Completion Of Phase I Is Unlikely" (CED-81-51, January 21, 1981)

"EPA Actions Against The Hopewell, Virginia, Wastewater Treatment Facility" (CED-81-47, March 3, 1981)

"Better Monitoring Techniques Are Needed To Assess The Quality Of Rivers And Streams" (CED-81-30, April 30, 1981)

"Billions Could Be Saved Through Waivers For Coastal Wastewater Treatment Plants" (CED-81-68, May 22, 1981)

"Wyoming Wastewater Treatment Facility Proves Unsuccessful" (CED-81-94, June 15, 1981)

"User Charge Revenues For Wastewater Treatment Plants--Insufficient To Cover Operation And Maintenance" (CED-82-1, December 2, 1981)

"Use of Federal Grant Funds For A Sewage Treatment Project In Portage County, Ohio" (CED-82-19, December 16, 1981)

AIR POLLUTION

"Improvements Needed In Controlling Major Air Pollution Sources" (CED-78-165, January 2, 1979)

"Better Enforcement Of Car Emission Standards--A Way To Improve Air Quality" (CED-78-180, January 23, 1979)

"Review Of EPA's Unleaded Fuels And Tampering Program" (CED-79-47, March 1, 1979)

"Air Quality: Do We Really Know What It Is?" (CED-79-84, May 31, 1979)

"Policy Conflict--Energy, Environmental, And Materials: Automotive Fuel-Economy Standards' Implications For Materials" (EMD-80-22, February 5, 1980)

"Indoor Air Pollution: An Emerging Health Problem" (CED-80-111, September 24, 1980)

"Clean Air Act: Summary Of GAO Reports (October 1977 Through January 1981) And Ongoing Reviews" (CED-81-84, April 1, 1981)

"Consumers Need More Reliable Automobile Fuel Economy Data" (CED-81-133, July 28, 1981)

"The Debate Over Acid Precipitation: --Opposing Views --Status Of Research" (EMD-81-131, September 11, 1981)

SOLID WASTE

"Waste Disposal Practices--A Threat To Health And The Nation's Water Supply" (CED-78-120, June 16, 1978)

"Conversion Of Urban Waste To Energy: Developing And Introducing Alternate Fuels From Municipal Solid Waste" (EMD-79-7, February 28, 1979)

"Solid Waste Disposal Practices: --Open Dumps Not Identified-- States Face Funding Problems" (CED-81-131, July 23, 1981)

DRINKING WATER

"Serious Resource Problems In The Environmental Protection Agency's Safe Drinking Water Program" (CED-79-19, August 8, 1979)

"EPA Needs To Improve The Navajo Indian Safe Drinking Water Program" (CED-80-124, September 10, 1980)

"Adequacy Of EPA Resources and Authority To Carry Out Drinking Water Program Activities" (CED-81-58, April 23, 1981)

NOISE POLLUTION

"Concorde Rulemaking Proposal And Related Documents" (CED-78-52, January 31, 1978)

MULTIPROGRAM

"Congressional Guidance Needed On The Environmental Protection Agency's Responsibilities For Preparing Environmental Impact Statements" (CED-78-104, September 13, 1978)

"An Executive Summary: Sixteen Air And Water Pollution Issues Facing The Nation" (CED-78-148, October 11, 1978)

"Environmental Problems At Overseas Military Activities" (CED-78-175, October 16, 1978)

"Environmental Protection Issues Facing The Nation" (CED-79-63, March 15, 1979)

"Codisposal Of Garbage And Sewage Sludge--A Promising Solution To Two Problems" (CED-79-59, May 31, 1979)

"EPA Should Help Small Communities Cope With Federal Pollution Control Requirements" (CED-80-92, May 30, 1980)

"Federal-State Environmental Programs--The State Perspective" (CED-80-106 and CED-80-106A, August 22, 1980)

"Environmental Protection Issues In The 1980s" (CED-81-38, December 30, 1980)

"Millions Of Dollars Could Be Saved By Implementing GAO Recommendations On Environmental Protection Agency Programs" (CED-81-92, May 5, 1981)

"Coal And Nuclear Wastes--Both Potential Contributors To Environmental And Health Problems" (EMD-81-132, September 21, 1981)

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Cleaning Up The Environment: Progress Achieved But Major Unresolved Issues Remain

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Contents

ABBREVIATIONS

COG	Council of Governments
CSO	combined sewer overflow
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
GAO	General Accounting Office
MGD	million gallons per day
PSI	Pollutant Standard Index

CLEVELAND, OHIO--

ASSESSMENT OF ENVIRONMENTAL PROGRAMS

Cleveland, Ohio's largest city and the county seat of Cuyahoga County, extends approximately 15 miles along Lake Erie. Cuyahoga County includes and is situated around Cleveland. Within the county's boundaries are more than 60 communities with a total population of about 1.5 million.

The population trend in Cleveland and Cuyahoga County is shown below.

Year	Cleveland	Cuyahoga County
1960	876,050	1,647,895
1970	750,879	1,720,835
1980	573,822	1,498,295

SUMMARY OBSERVATIONS

A court order in 1972 made Cleveland's sewer system a part of the Northeast Ohio Regional Sewer District. The three sewage treatment plants, disposal facilities, and main interceptors, formerly owned and operated by the city, were transferred to the district. Cleveland's sewage collection system remained under the city's jurisdiction. Since 1972 the district has used $320 million in Federal funds to substantially improve its three sewage treatment plants. However, only $14 million in Federal funds has been applied to the combined sewer overflow (CSO) problem, which is estimated to require about $200 million to correct.

Cleveland's Division of Water, created in 1853, is responsible for collecting, treating, and distributing potable water to customers within the city and 74 other communities. The division has consistently provided water of excellent quality. The service area covers over 545 square miles and serves about 2 million people. With insufficient revenues and an inability to raise sufficient capital for improvements, the water system has deteriorated over the years. The deterioration raises major concerns about the continued delivery of water to all parts of the system.

Cleveland's Division of Waste Collection and Disposal provides a once a week curbside collection of residential waste from approximately 200,000 dwelling units. Since there are no landfills within the city, the solid waste is transported to sites outside the city. Because of an areawide shortage of landfills, the county is considering alternative methods for disposing of its solid waste.

Legislation first addressing air pollution in Cleveland was passed in 1910. Continued city interest in air pollution abatement resulted in establishing the present Cleveland Division of Air Pollution Control in 1947. Through division and industry efforts,

the air quality has steadily improved since 1975. The division serves as the State of Ohio's representative in both Cleveland and the county and received about $648,000 in Federal funds in 1981.

Through cooperative efforts of the city, the Federal Aviation Administration (FAA), and the airlines, the size of the area with unacceptable residential noise levels around Cleveland's main airport has decreased by about 23 percent since 1976. A local noise abatement program has not been established because neither Federal nor local funds have been available.

SEWER SYSTEM IMPROVEMENTS DEPEND ON FEDERAL FUNDS

The availability of Federal funds has been the major factor influencing the extent of sewer system improvements in the Northeast Ohio Regional Sewer District, which includes Cleveland. Through the use of 75-percent Federal financing, totaling $320 million, the district's three sewage treatment plants have been significantly expanded and upgraded since 1972. According to the State's Environmental Protection Agency (EPA) district officials, the treatment plants have been in substantial compliance with permit standards established for the period of upgrading since July 1980. On the other hand, only $14 million of Federal funds have been spent in correcting CSO problems, which the district estimates will require about $200 million to resolve. CSOs result from the collection system's inability to handle storm water runoff, causing untreated raw sewage to overflow into area waters.

The city, responsible for sewer collection lines within the city, has made almost no progress in upgrading sewers, which are too small to prevent basement flooding. The cost of such improvements is estimated at over $300 million, and the Clean Water Act provides no funds for this purpose.

Formation of a regional sewer district

In September 1970, the Ohio Water Pollution Control Board (predecessor of the Ohio EPA) filed a court action against Cleveland claiming the city was inadequately treating and disposing of sewage. The Board also charged the city with failing to comply with orders regarding the treatment facilities and a ban on new sewer construction. In 1971 the city entered into a consent agreement with the State and Federal governments and agreed to significantly improve the quality of the discharges from the treatment plants.

A June 1972 court ruling provided that the creation of a regional sewer district is necessary and is "* * * conducive to the public health, safety, convenience and welfare * * *." The court ruling provided for the transfer of Cleveland's three sewage treatment and disposal facilities and the system's interceptor mains to the district. The district became responsible for CSO control and inherited the agreement to upgrade the treatment

plants. The district includes Cleveland and all or portions of 42 suburban communities with a 1981 total service population of 1.2 million. The city retained jurisdiction of the sewage collection system.

Federal funds improve sewage treatment plants

The Clean Water Act requires facility improvements and an inherited commitment to plant upgrading. Therefore, according to a district official, Federal aid received since 1972 has been directed toward improving and expanding the treatment plants. Facility planning for this upgrading was underway prior to the creation of a seven-county, areawide planning agency in 1975. Because the water quality plan focused on facilities not receiving attention, the plan had very limited impact on district planning.

The plant upgrading and expansion process is nearly complete, with $320 million in Federal funds having been used to increase treatment capacity and quality. According to Ohio EPA officials, the three plants have been in substantial compliance with interim standards since July 1980. During the upgrading, two of the plants have been close to, and at times exceeded, secondary treatment standards. The third plant is a primary plant. A district administration official estimated that $86 million in Federal funds is needed to complete the process by 1983. A description of the status at the three plants follows.

Southerly treatment plant

The Southerly plant, as of October 1981, was providing secondary treatment to about 125 million gallons of wastewater per day. The facility has been undergoing a complete redesign to increase treatment capacity and quality. About $200 million in Federal funds have been used to upgrade the facility to meet stringent discharge limits. In 1983, the plant is expected to have the capacity to provide advanced wastewater treatment to about 200 million gallons per day (MGD).

The State has filed a $100 million action for permit violations at Southerly during an approximate 20-month period that ended in July 1980. The plant was in violation because about 50 percent of the time it failed to remove sufficient solids from the discharges. However, Southerly has been in compliance since July 1980, when a new operating process was completed.

The plant includes four incinerators designed to dispose of sludge produced at Southerly and the sludge pumped from the Easterly treatment plant. The incineration process also produces steam for the plant. From August 1980 to February 1981, technical difficulties required the four incinerators to be taken out of service. Temporary repairs in June 1981 returned two incinerators to operation. The district estimates that each operating incinerator reduces daily sludge disposal and steam purchase costs by $3,000 to $4,000. According to a district official, unresolved technical

issues have prevented them from proceeding with an estimated $1 million in permanent repairs to the incinerators.

Westerly treatment plant

Westerly, built as a primary treatment plant in 1922, was the city's first treatment plant. Although it treats the lowest amount of water (40 MGD) of the three plants, it receives most of the area's industrial wastes. As a result, this plant uses a chemical rather than biological process to treat waste. According to the Ohio EPA, this plant has been in substantial compliance with primary treatment permit standards during upgrading since February 1980.

The upgrading of the Westerly plant is nearing completion and involves more than $80 million in Federal funds. The plant is being designed to use preozonation and pressurized sand filters ahead of a granular activated carbon column absorption system. When the plant begins operation, it will have the first operating full-scale granular activated carbon unit in the country and will be able to handle 50 million gallons of sewage per day.

Easterly treatment plant

In 1938 the Easterly plant was one of the first Lake Erie sewage treatment plants to provide secondary wastewater treatment. Upgrading to advanced secondary status is expected to be completed in 1983 and will use about $35 million in Federal funds. According to Ohio EPA officials, the plant has been in compliance with interim standards during the period of upgrading since mid-1979.

An unusual feature of the plant is the use of waste "pickle liquor" (diluted sulfuric acid) from the local steel industry as part of the phosphorus treatment process. The pickle liquor replaces commercial ferric chloride at a savings of about $500,000. At the same time, the steel companies are saved the expense of treating and disposing of the pickle liquor generated in the steelmaking process.

Limited progress to control CSOs

One of the most difficult problems is the sewer system's inability to handle storm water runoff. The system has over 500 overflow points, and over 100 of these discharge directly into and pollute receiving waters. Even during moderate rain storms, the rate of flow in the system is 40 to 50 times greater than in dry weather. This flow is more than the system can handle. For example, in the Easterly treatment plant district, the estimated overflow exceeds 2,000 MGD.

Although CSO projects are eligible for 75-percent Federal financing, a district official said the district has given these projects a low priority compared to treatment plant upgrading. According to the official, the district was required by regulatory

agencies to consider plant upgrading the most pressing need. EPA region V officials agreed with the district's decision to place a priority on upgrading the treatment plants. As a result of this decision, only about $14 million of Federal funds have been used for CSO--primarily to explore solutions to the problem.

The district has been directing its efforts toward maximizing in-sewer and off-line storage of the overflow. Small projects using inflatable dams, hydraulic gates, and hydrobrakes are in process. However, the district estimates significant progress to control CSO will not take place until between the late 1980's to the year 2000 and will require about $200 million. Further, a district official said the district could not undertake a program of this magnitude without Federal aid.

Inadequate sewage collection system

Cleveland's sewer system is showing its age. Some sections were built in the 1880's; about 75 percent of the sewer lines exceed the 50-year life expectancy; and about 45 percent of the 4,300 miles of sewer lines are inadequate in size, causing flooding in basements. Over 30 percent of the average dry weather flow in the Westerly treatment plant area comes from seepage. A city official described the collection system as being in "very bad shape." This official noted that from 1972 to 1979 no funds were available for routine sewer construction and rehabilitation. The official said that the city division handling sewers had only 17 employees during parts of 1979 compared to 172 employees in 1974.

With a March 1980 increase in Cleveland sewer charges, the city sewer division increased employment to 114 and budgeted about $2 million per year for the next 5 years for improvements. However, these funds will be insufficient to tackle the system's problem of basement flooding. According to a 1979 Urban Institute study, over $300 million is needed to alleviate the basement flooding problem.

DRINKING WATER QUALITY GOOD BUT CAPABILITY TO CONTINUE WATER DISTRIBUTION UNCERTAIN

Deterioration of Cleveland's drinking water system has increased the potential for breakdowns, which would result in water shortages for its customers. Although the city has an abundant source of untreated water and consistently has delivered excellent quality water, its distribution system has serious deficiencies caused by age and lack of money for adequate maintenance, replacement, and improvements. In addition, inadequate sludge disposal practices allow untreated sludge to be discharged directly into receiving waters. Many of the problems can be attributed to the unwillingness in past years to raise the revenues essential to sustain the system.

Legal agreements reached in June 1981 are the first step toward obtaining the substantial capital investment needed to ensure that the water supply is properly processed, protected, and distributed. Implementation of the agreements depends on the city's financing ability. The Safe Drinking Water Act does not authorize capital funds for improving water supply systems.

Uncertainty regarding continued water distribution

Although the city has an abundant source of untreated water (Lake Erie), major system deficiencies may prevent distribution of water to parts of the system. The water system has deteriorated over the years and requires significant capital investment for improvements in the purification plant and the distribution system. A discussion of the problems affecting the system's capability to continue delivery of excellent quality water follows.

Deficiencies at a major purification plant

A 1979 Urban Institute study concluded that three of the city's four purification plants functioned fairly well. The study concluded, however, that the Division Avenue Purification Plant was in "very poor and hazardous condition and is in urgent need of replacement." The plant was built in 1915 on unstable subsoil, and the settling over the years has placed stress on its structural components, causing mechanical failures, leaks, and a partial roof collapse.

Although Lake Erie can provide 100,000 billion gallons of water, shutdown of the Division Avenue Plant would cause parts of Cleveland's near westside and southwest suburbs to be without water and water pressure would decrease in most parts of the remaining system. The Division Avenue Plant provides over 30 percent of the system's water treatment capacity. If it were completely shut down, the three remaining plants could not meet the total demand.

An EPA region V official expressed surprise when told the Division Avenue Plant was still operating. A city water purification official told us the plant has been kept operational on a "band-aid and bubble gum" maintenance approach because of insufficient funds. Water division officials are uncertain how long this approach can keep the plant in operation.

In 1977, the city estimated a new Division Avenue Purification Plant would cost $141 million. In February 1981, estimates for a new plant built between 1983 and 1985 increased to $264 million.

Deterioration of the distribution system

Parts of the water distribution system are over 100 years old. Many of the distribution pipelines laid before 1955 are metal and

contain heavy deposits which impair the system's ability to transport water. In some areas of the system, pipe capacity is reduced to less than one-third of its original level and is a major cause of low water pressure. Low water pressure is also caused by some water mains being too small and by pumping deficiencies.

Other deficiencies in the water distribution system also need correction. For example, a city water distribution official told us that about 15 percent of the purified water is lost through pipeline leaks and another 10 percent is consumed without being metered. The official also believes that nearly 2,000 miles of mains need to be cleaned. Yet, not one was cleaned from 1973 to 1976, and only 24.6 miles were cleaned during 1977-80. In addition, water main deterioration has caused pipes to burst. On three occasions in 1981, water main breaks caused flooding and damage to downtown stores.

Several water department officials indicated they have known what needs to be done, but the funds are not available. Improvements and repairs have generally been made only when emergencies occurred or when critically necessary.

Water rates insufficient to maintain the system

The city's failure to raise the revenue essential to sustain the system has been the primary cause for failing to act on deterioration in the system. Surveys of water rates in 1970, 1972, and 1977 showed that water rates in Cleveland were among the Nation's lowest. EPA region V concluded in 1977 that it is "* * * apparent that additional revenues are needed to renovate and improve major parts of the system."

The city has also been hampered for 9 years in raising water rates because of legal challenges to general rate increases by some suburbs. These court actions were settled in June 1981. The suburbs agreed not to challenge rate increases, and the city agreed to a $908 million 11-year capital improvements program.

The projects in the capital improvements program will produce major improvements in the system. However, the system presently generates insufficient revenues to finance a major program. For example, the average annual operating income of $7.2 million for the last 4 years would not support a $908 million improvements program.

Improvements dependent on financing ability

The city has been unable to enter the bond market for its financing needs because its bonds lacked an "investment grade" rating. In August 1981 an investment service gave the city a minimal investment grade rating. This rating increase at least unlocks the door to enter the financial market.

Despite this improved bond rating, the city is faced with additional financing concerns. According to a State official involved in municipal financing, the financial community wants public utilities to operate on a pay-as-you-go basis. Because current revenues are insufficient to support issuance of bonds, the city will have to raise its water rates to enter the bond market.

Inadequate sludge disposal practices

About 35,000 pounds per day of wash water and settled sludge from the water purification plants are discharged directly into Lake Erie or streams that flow into the lake. The city has discharged untreated water treatment plant sludge since 1915 without a permit. The Ohio EPA and the city have agreed to a compliance schedule for three purification plants to achieve "zero discharge" in 1987. For a proposed Division Avenue Purification Plant, the agreement is to achieve zero discharge in 1989.

Approximately $20 million is included in the capital improvements program to achieve these goals. A city water purification official told us if the city cannot obtain financing for its improvements program, it will be impossible to eliminate these sludge discharges.

NEW SOLID WASTE DISPOSAL SITES OR ALTERNATIVE DISPOSAL METHODS NEEDED

Solid waste disposal may become a problem if additional sanitary landfill sites are not found or alternative methods of disposal are not implemented. The landfills in Cuyahoga County, that Cleveland and other communities use, have a projected life expectancy of 10 years. Landfill use outside the county is increasing but transportation costs make this option less attractive. The potential for developing new or expanded landfills is limited and the county is considering developing a resource recovery facility to convert solid waste into usable energy.

Limited potential for additional landfills

The potential for new or expanded landfills in the county is limited because of three constraints in developing new landfills. First, the county is urban with a small amount of land available for this type of development. Second, public opinion and social pressures make obtaining agreement on a site for new or expanded landfills extremely difficult. For example, landfills are not wanted in residential areas because of potential odor or water contamination problems. Third, health and environmental regulations restrict landfill development.

Most communities in the county dispose of their solid waste at three landfills in Cuyahoga County and two landfills outside the county. The amount of waste disposed at sites outside the county

is increasing. For example, 39 percent of the municipal waste collected in the county during November 1979 was hauled outside the county compared to 11 percent in July 1979. According to a county official, two of the five landfills used will reach their capacity by 1983.

Historically, disposal at landfills has been inexpensive. In recent years, however, disposal fees have escalated because of the banning of open dumping and burning, the decreasing capacity of the few remaining area landfills, and the Federal requirements for maintaining landfills. The average landfill disposal cost (excluding transportation) in the county has risen from $3 a ton in 1973 to $9 in 1981. The county has projected an increase to $27 a ton by 1987. Increased transportation costs are making disposal outside the county less attractive.

Landfill use increased by Clean Air Act requirements

At one time Cleveland used incinerators to burn approximately 30 percent of the 5,000 tons of solid waste collected each week. These incinerators were closed in 1974 because they could not meet Federal air pollution standards. According to a city official, the city currently uses landfills exclusively to dispose of its solid waste because repairing the incinerators would be too costly. Two other communities in the county also discontinued incineration because of violations of air pollution standards. Another community in the county continued to burn municipal waste after investing substantial capital to comply with air pollution standards.

Factors to consider in developing an alternative disposal method

One alternative to landfill disposal of solid waste is to convert the waste to energy. Cuyahoga County has received about $1 million in Federal funds for planning such a resource recovery facility. The proposed facility will "mass burn" solid waste to generate steam or electricity. This mass burn technology has proved successful in Europe and currently four major projects in this country are successfully using this technology. The proposed 1,400-ton-per-day facility is expected to reduce the total amount of solid waste landfilled by 50 to 60 percent. If project implementation were to start in 1981, the facility would be operating by 1987. Operating such a facility requires considering the following factors.

Impact on the environment

The resource recovery facility will emit various pollutants as byproducts of the combustion process. According to county and city air pollution officials, however, the facility will meet air pollution standards. Facility operations will also produce wastewater. The wastewater will either be discharged into the sanitary sewer system or, if required, into a pretreatment plant

built on the site. In either case, it is anticipated there will be no adverse impact on water quality in Lake Erie when the wastewater is ultimately discharged.

Most of the noise produced at the facility will be from trucks entering and leaving the site and discharging their loads. It is expected that vehicle noise in and around the facility will not severely affect the surrounding area. Odors are expected to be minimal because the receiving, storage, and combustion areas would be enclosed. Also, the facility design provides that the odors will be drawn into the incinerators and burned.

Community and final customer participation needed

Cleveland administration officials support, subject to City Council approval, the location of the facility on city-owned land. According to a county official, 36 additional communities have submitted nonbinding letters of intent indicating a preliminary interest in the facility. Cleveland and these communities collect about 1,800 tons of solid waste per day.

Communities may be reluctant to finalize the letter of intent because disposal fees at the facility initially will exceed landfill costs. For example, disposal fees estimated for 1987 are $41 a ton at the facility and $27 a ton at landfills. However, the county estimated that by 1991 disposal fees at the facility and at landfills will be the same, about $60 a ton.

The proposed facility site is on city-owned land across from the Cleveland Municipal Light Plant. The city-owned utility has agreed to be the customer for the generated electricity.

Resource recovery facility dependent on financing availability

High interest rates in the tax-exempt market and lack of investor confidence could make the project financing difficult. According to a State official involved in municipal financing, investors feel the project would not produce sufficient revenues to repay the debt at current interest rates. The official also thought investors would be skeptical because of failure of resource recovery projects at other locations. The State official believes these conditions would make it impossible to finance a project at this time.

To overcome these financing obstacles, the county and the participating municipalities may need to guarantee the payment of bond principal and interest. According to the project director, delays in implementing the project and an increase in interest rates increased estimated construction costs from $90 million in June 1981 to $100 million in September 1981.

AIR QUALITY IMPROVED

Although Cleveland presently is not meeting the National Ambient Air Quality Standards for four of the six monitored pollutants, the area's air quality has steadily improved since 1975. For two of the pollutants not meeting the standards, the data collected on pollution levels may be questionable because of insufficient monitoring. However, the trend toward improvement appears valid. Much of the improvement can be attributed to the combined efforts of the city's Division of Air Pollution Control and industry.

The division is responsible for implementing Ohio EPA's program within the city and Cuyahoga County. To carry out the 1981 program, Cleveland received about $648,000 in Federal funds, $654,000 from the city, and $367,000 from the State.

Combined city and industry effort improved air quality

According to environmental officials and various public interest groups, the area's air quality improved because of enforcement efforts by Cleveland's Division of Air Pollution Control and expenditures by industry on pollution abatement equipment.

Cleveland's air pollution control officials said that most industries are in compliance with, or on a compliance schedule with a plan of corrective action to achieve air quality standards. As a result, the division has switched its primary effort from identification of pollutant sources and enforcement actions to assuring that industry maintains its air pollution control equipment and adheres to its compliance schedules.

Reduction in days air quality standards were not achieved

The number of days the National Ambient Air Quality Standards have been exceeded in the Cleveland area has increased steadily since 1975. EPA's Pollutant Standard Index (PSI) converts the pollutant concentrations to a number on a scale of 0 to 500, with 100 representing the air quality standard for five major pollutants (total suspended particulates, carbon monoxide, sulfur dioxide, ozone, and nitrogen dioxide).

The terms describing air quality and the respective PSI intervals follow:

Good	0 to 50
Moderate	51 to 100
Unhealthful	101 to 199
Very unhealthful	200 to 299
Hazardous	300 and above

The following table shows that air quality has improved--the 100 PSI standard was violated on 65 days in 1975 and only on 4 days in 1980.

PSI scale	1975	1976	1977	1978	1979	1980
0-100	290	318	343	354	361	362
101-199	45	38	19	11	4	4
200 and above	20	10	3	0	0	0
Total	1/ 355	366	365	365	365	366

1/Ten days readings were not available.

Improved individual pollutant levels

Although Cleveland is in a nonattainment status (did not meet the National Ambient Air Quality Standards) for four of the six monitored pollutants--total suspended particulates, carbon monoxide, sulfur dioxide, and ozone--the levels of these pollutants have decreased since 1975. The city is in attainment status for nitrogen dioxide and lead.

The improvement trend with a brief description of the four nonattainment pollutants follows:

Total suspended particulates

--In 1975 the 100 PSI level was exceeded in 10 months, but in 1980 it was exceeded in only 3 months.

--May 1977 was the last time the reading reached the 200-alert level.

--Readings have not exceeded 150 since May 1978.

The reduction in ambient particulate levels has resulted from industry compliance with air pollution regulations. According to officials at the Division of Air Pollution Control, almost all the industries within Cuyahoga County are in compliance or on a compliance schedule. The Ohio EPA estimated that industry in Cuyahoga County captured or controlled more than 96 percent of the particulates produced in 1979.

Despite these facts, the area is in a nonattainment status for the particulate standard. Officials at the division estimate that the amount of particulates blown into the area make up from 50 to 60 percent of the annual allowable standard. In addition, uncontrolled sources, such as unpaved parking lots, uncovered storage piles, open fields, and streets needing cleaning, add to air

pollution. Because of these factors, the officials do not anticipate that the county will reach attainment status during this decade.

Carbon Monoxide

The number of high monthly carbon monoxide readings has declined significantly. The 200 alert level has not been reached since 1975, and readings have not exceeded the 100 standard since April 1979. However, as discussed later, the number of monitors for measuring carbon monoxide is insufficient to assure that carbon monoxide emissions are accurately measured.

Sulfur Dioxide

Sulfur dioxide exceeded the 100 standard in 4 months from January 1975 through September 1978. This standard has not been violated since then. Cleveland has not been classified as in attainment status, however, because 1 of the 21 monitoring locations slightly violated the annual average national ambient air quality standard in 1979.

Ozone

Except for a slight violation in 1980, the ozone air quality standard has not been violated in Cleveland since August 1976. Most of the highest monthly readings since then have been in the "good" range. Since ozone is transported by wind, the area has been designated as nonattainment because the adjoining downwind county has recorded one violation during the last 2 years. As discussed later, the number of monitors is insufficient to ensure ozone levels in the area are adequately measured.

To reduce emission of hydrocarbons (which lead to formation of ozone), the division in July 1981 required gasoline service stations to install vapor recovery systems. These controls are part of the Ohio EPA's requirement to reduce hydrocarbon emissions. The systems capture vapors, which are ordinarily emitted when gasoline is transferred from tank trucks to underground storage tanks.

Additional air quality monitors needed

To obtain better measurements of air pollution levels, the Division of Air Pollution Control needs additional carbon monoxide and ozone monitors.

Carbon monoxide is a highly localized pollutant, and the one monitor the division used until April 1981 may not have provided a true picture of carbon monoxide violations. One additional monitor was obtained that month and placed in a residential area. Division officials believe that at least a third monitor at a downtown site is needed. A downtown site is needed to obtain a reading in a high density area with a canyon effect from the buildings.

The high cost of the monitor and rental space and Federal guidelines have prevented the division from placing a carbon monoxide monitor downtown.

Because ozone is a pollutant transported by winds, monitors are needed in Cleveland and surrounding areas. Although the division added two monitors in 1979, an additional monitor is needed southeast of the city. This monitor would measure ozone levels transported in a corridor from southwest Ohio. Division officials agreed this monitor is needed, but because of decreased State funding, one has not been procured.

Impact of reduced Federal aid

Officials of the Division of Air Pollution Control told us that their monitoring and enforcement efforts could not be maintained at the present level if Federal funds were reduced. They believed that any reduction in Federal funding would not be replaced with State or city funds. As a result their staffing would be reduced, thereby seriously affecting their ability to enforce the air quality standards.

NO NOISE CONTROL PROGRAM ESTABLISHED

The Cleveland Division of Air Pollution Control favors a noise abatement program; however, none has been established. A comprehensive noise abatement ordinance for the city was drafted in 1978 to protect the public health and welfare from excessive noise. The division's public information officer stated that the ordinance was not enacted because Federal funds were not available to establish an effective enforcement program. In addition, he advised us that the city did not plan to provide funds to initiate a program.

EPA stated that it awarded $132,700 in noise program grant funds to the Ohio Department of Health for fiscal years 1979 to 1981. Through a concerted technical assistance program, a number of major cities in Ohio initiated active noise control programs. EPA stated further that equipment purchased through this grant program is available on loan for local noise abatement programs.

Despite the lack of a noise abatement ordinance, we were informed by the city's airport environmental officer that noise levels at Cleveland's Hopkins International Airport have decreased through the cooperative efforts of the city, FAA, and the airlines. According to the official, the area exceeding residential compatible noise levels has decreased from 5,700 acres in 1976 to 4,400 in 1980. In addition, the official attributes some of the approximately 23-percent acreage decrease to aircraft noise reduction technology and the employment of noise abatement takeoff and landing procedures.

ORGANIZATIONS CONTACTED

State, county, and regional

Ohio Environmental Protection Agency

Ohio Water Development Authority

Cuyahoga County Resource Recovery Office

Cuyahoga County Sanitary Engineering Department

Northeast Ohio Areawide Coordinating Agency

Northeast Ohio Regional Sewer District

Municipal

Cleveland Department of Port Control

Cleveland Department of Public Health and Welfare
  Division of Air Pollution Control
  Division of Water Pollution Control

Cleveland Department of Public Utilities

Cleveland Department of Public Service
  Division of Waste Collection and Disposal

DALLAS, TEXAS--

ASSESSMENT OF ENVIRONMENTAL PROGRAMS

Dallas was founded in 1841. Its population and the population of the area covered by the North Central Texas Council of Governments (COG) is shown below, including projected totals for the year 2000.

Year	Dallas	COG area
	(thousands)	(millions)
1960	680	1.9
1970	840	2.5
1980	910	3.2
2000 (est.)	1,065	4.2

The COG serves 132 cities in 16 counties and was established in January 1966 after city planners realized the need to work together on mutual problems.

SUMMARY OBSERVATIONS

From 1960 through 1980 the Federal Government provided about $58 million to Dallas for environmental projects. About $56.8 million was for construction and improvements to sewage treatment plants and to the sewage collection system. Dallas provides drinking water to 18 other communities and treats sewage for 7 other communities.

Dallas considers its most pressing environmental need to be an increase in capacity of the Central Wastewater Treatment Plant so that it can treat 150 million gallons of sewage a day at the level specified by the State. At present, it does not provide the required level of treatment. The city estimates these and other necessary improvements will cost about $63 million and has requested about $47 million in Federal funding. The improvements are scheduled to be completed by about 1987.

With respect to other environmental programs, Dallas

--is classified as in attainment for all air quality standards, except for total suspended particulates and ozone;

--meets national drinking water standards;

--disposes of its solid waste in sanitary landfills; and

--has not put much emphasis on noise abatement, since it does not consider it a major problem.

PROBLEMS WITH SEWAGE TREATMENT PLANTS BEING RESOLVED

Two wastewater treatment plants serve Dallas. The larger and older Central Wastewater Treatment Plant is currently violating the effluent limitations established by the State. Dallas estimates that needed improvements will be completed by 1987. The newer and smaller Southside Wastewater Treatment Plant is presently meeting the State's effluent limitations.

The initial effluent limitations established by the State and EPA expired in June 1977. Since then, the State and EPA have not formally agreed on what the final effluent limitations should be to meet the revised water quality standard for the Trinity River, into which both treatment plants discharge. Additional stream studies are needed before making a final determination.

Since the enactment of the Clean Water Act, Dallas has spent $60 million to construct the Southside plant and to improve the Central plant. The Federal Government funded $45 million of the cost.

Central plant is not meeting tertiary treatment standards

The Central Wastewater Treatment Plant does not comply with the effluent limitations established by the State. The plant is capable of meeting effluent limitations of 10 milligrams per liter of biochemical oxygen demand and 15 milligrams per liter of total suspended solids but only if average flows do not exceed 115 million gallons a day. The plant is currently receiving an average flow of 136 million gallons a day, and the effluent discharged contains 13 milligrams per liter of biochemical oxygen demand and 23 milligrams per liter of total suspended solids.

Design deficiencies and a shortage of trained personnel are reported to be causing the problem. The plant began operating in May 1977 when three plants were combined. The $38 million cost was funded by the city, State, and Federal governments. Dallas plans to make the necessary improvements by about 1987. Dallas estimates the improvements will cost $63 million and has requested about $47 million in Federal funds. Consultants have also recommended that the city alleviate its operating problems by providing additional training and higher salaries.

In addition to the failure to meet effluent limitations, heavy rains produce flows that cannot be handled by the plants. As a result, some sewage bypasses the treatment plant and is discharged untreated to the Trinity River. This, along with system breakdowns, accounted for six instances of raw sewage discharge from May 15, 1980, to June 8, 1981, lasting from 1 to 10 days. Because of both the frequency and magnitude of the bypasses, the State has requested Dallas to specifically address bypassing. The State asked that a water quality determination be made on the

bypasses and also asked how the city planned to address bypasses in its long-range sewerage planning. The city indicated that by 1987-88 it plans to improve its sewer system to the point that it can treat projected peak flows associated with a 3.25 inch rain.

Southside plant meets State standards for wastewater treatment and sludge disposal

The Southside plant currently has the capacity to treat 30 million gallons of wastewater per day in accordance with State standards. The plant will be upgraded as needed in 30-million gallon increments until it reaches a capacity of 300 million gallons a day.

Lagoons located at the Central plant were used for the disposal of sludge prior to January 1973. In January 1973, the Southside plant started processing sludge from both treatment plants. The Central plant dilutes its undigested sludge to a 99-percent liquid form and then pumps it through a force main over a distance of 13 miles to the Southside plant. The sludge is combined with Southside's and then is (1) thickened in gravity thickeners, (2) aerobically digested, and (3) stored in two 10-acre lagoons prior to disposal. The lagoons are then dredged and the sludge is pumped to the sludge disposal site.

Sludge disposal involves injecting the sludge into the soil at a 200-acre site located at the Southside plant and dedicated to sludge disposal. The site is surrounded by natural impermeable clay, which prevents any seepage. A monitoring system is located at the site and is checked weekly for ground water contamination. The State believes Dallas is in compliance with the requirements of applicable permits regarding sludge disposal. The city's consultants pointed out in a November 1980 report, however, that the 200-acre site is well below its projected immediate requirements of up to 573 acres. The city plans to acquire more land near the Southside plant.

Effluent limitations not finalized

The EPA permits for the two Dallas sewage treatment plants expired in June 1977 and have not been renewed. Although the State has established effluent limitations it considers necessary for meeting the Trinity River's main stem water quality standard, EPA will not issue final permits to the Dallas plants until they and the State agree on the necessary effluent limitations. Additional water quality studies are necessary, however, before these limitations can be established.

Under the Federal Clean Water Act, sewage treatment facilities are required to meet effluent limitations of 30 milligrams per liter of both biochemical oxygen demand and total suspended solids. The Texas Department of Water Resources had promulgated a State

treatment standard of 20 milligrams per liter of both biochemical oxygen demand and total suspended solids prior to passage of the Clean Water Act. It changed the standard because it believed this limitation could be met with conventional secondary treatment facilities and would maintain the water quality and protect the public health.

To meet the 1973 water quality standards the department promulgated even more stringent effluent limitations for the Dallas treatment plants--5 milligrams per liter for both biochemical oxygen demand and total suspended solids and 3 milligrams per liter of ammonia nitrogen. The State believed these limitations were necessary to make the Trinity River main stem desirable for noncontact recreation and propagation of fish and wildlife. The State and EPA formally agreed to these effluent limitations and standards in 1974.

Thereafter, Dallas and other cities objected to the effluent limitations as being too costly for the benefits received. Consequently, in August 1977, the State changed the limitation in State permits to 10 milligrams per liter of both biochemical oxygen demand and total suspended solids. The limitation for ammonia nitrogen was deleted entirely, pending completion of more studies.

By 1981 the State concluded the water quality standard for the Trinity main stem was not attainable because of pollution from both nonpoint sources and sewage treatment facilities entering the main stem and its tributaries. Consequently, it removed the main stem's desired use of propagation of fish and wildlife.

The Central plant's effluent limitations are 10 milligrams per liter for both biochemical oxygen demand and total suspended solids. It is not meeting these limitations. The State plans to relax the plant's effluent limitations for suspended solids when its upgrading is completed and its capacity is determined. The Southside plant is meeting the effluent limitations of its State permit.

Extent of nonpoint source pollution being studied

In 1976, the North Central Texas COG started conducting studies to assess the intensity and causes of nonpoint source pollution in the upper reaches of the Trinity River and its tributaries. In its "Clean Water 81" report, COG reported that

--local governments now recognize that nonpoint sources of pollution are a problem,

--nonpoint sources of pollution become more significant as point source pollution is reduced,

--nonpoint source pollution and point souce pollution usually occur at different times of the year, and

--more data is needed on the problem.

COG's report states that nonpoint sources of biochemical oxygen demand will be almost 3 times greater than that of point sources--wastewater treatment plants--when the major point sources discharging into the Trinity attain their required treatment levels. COG considered urban and rural runoff, overflowing sewers, and resuspension of bottom sediments as primary nonpoint sources of pollution.

Improvements at sewage treatment plants have significantly reduced the amount of point source pollution. From May 1975 to April 1980 the quantity of biochemical oxygen demand was reduced from 18.4 to 12.2 million kilograms a year. This reduced the average monthly flow weighted concentration per liter from 47 to 26 milligrams--a reduction of 45 percent. COG estimated that by 1980 the quantity of biochemical oxygen demand from nonpoint sources represented 53 percent of the total.

Nonpoint source pollution is most significant during the spring and fall rainy seasons. This pollution consists of petroleum products, lead, pesticides, and other materials. Point source pollution problems peak during periods of hot, dry weather when the Trinity River has little natural stream flow. During those periods the river consists almost entirely of effluent from sewage treatment plants located along the river and its tributaries.

The effect of nonpoint source biochemical oxygen demand on the river quality is not clearly understood at this time. However, recent data shows a general trend of lowered dissolved oxygen concentration during wet weather peak flows. COG has not determined the extent of the pollution from various sources, such as urban or rural runoff, overflowing sewers, or resuspension of bottom sediment.

COG recognizes that more data is needed. In 1981 it initiated a study on the necessity and cost/benefit of treating nonpoint sources of pollution. The study is scheduled for completion in 1983.

MOST AMBIENT AIR QUALITY STANDARDS ARE BEING MET

Dallas is classified as in attainment for air quality standards for all criteria pollutants except total suspended particulates and ozone. It has met the primary standards for carbon monoxide, sulfur dioxide, nitrogen dioxide, and lead since they were promulgated. It now also meets the standard for total suspended particulates, although a slight violation of the standard occurred in 1980. Dallas believes it will meet the ozone standard by December 31, 1982, but State officials disagree. Interstate

transportation of air pollution has not been a major factor with respect to air quality in Dallas or the State of Texas.

On some days overall air quality standard not met

Since May 1981, when the city started reporting the PSI on a daily basis, Dallas has had 13 unhealthful air quality days. The unhealthful conditions were related to high ozone levels which are present during late spring and summer. The PSI is a report and forecast of air pollution levels based on the measurement of five pollutants (using the EPA index as a guide). The PSI indicates the pollutant that reached the highest level in the preceeding 24 hours and provides a forecast for the current day.

The index is scaled as follows:

Good	0 to 50
Moderate	51 to 100
Unhealthful	101 to 199
Very unhealthful	200 to 299
Hazardous	300 and above

Normally, the Dallas index exceeds 100 once a month during the summer. However, exceeding moderate levels for more than a few consecutive days is considered unusual.

Pollutant emissions have been reduced

Pollutant emissions have been reduced over the past 10 years as shown in the following table.

Estimated Pollutant Emissions

Year	Particulates and lead	Sulfur dioxide	Nitrogen dioxide	Hydro-carbons	Carbon monoxide
	(thousands of tons)				
1971	44.0	15.1	83.8	172.6	1008.1
1972	25.9	8.2	97.1	176.6	976.6
1973	23.0	9.0	104.3	202.1	824.3
1974	18.6	4.8	67.2	126.6	655.4
1975	20.6	7.8	83.6	175.4	964.2
1976	19.3	7.2	78.7	131.2	722.8
1977	21.3	12.4	85.5	129.7	668.0
1978	21.2	10.3	76.5	109.3	535.3
1979	19.6	13.8	75.2	105.7	467.7
1980	19.1	13.0	67.9	94.4	389.5

Most clean air standards being met

Dallas has met the clean air standards for carbon monoxide, sulfur dioxide, nitrogen dioxide, and lead since EPA promulgated them. The standards for total suspended paticulates at three areas initially designated as nonattainment have now been met for the required eight consecutive quarters, qualifying them for redesignation as attainment areas. The State will soon ask EPA to redesignate these three areas. The city plans to meet the ozone standard by December 31, 1982, but the State does not think the present standard will ever be met. EPA believes the ozone standard will be met by 1987.

While Dallas records show it is meeting the ambient air quality standard for lead, it plans to monitor a point source of lead emissions suspected of exceeding the standard. Also, soil samples taken in the vicinity of three lead smelters show high levels of lead concentration.

Ozone

Dallas did not meet the ozone standard set in April 1971, which permitted a maximum allowable ozone level of 0.08 parts per million cubic feet (1 hour maximum) of ambient air to be exceeded no more than once per year. Dallas also has not met the relaxed standard set in January 1979 that permits a maximum level of 0.12 parts per million cubic feet to be exceeded for 1 day per year averaged over a 3-year period.

The following schedule shows the number of days on which the standard was exceeded since 1975:

Year	Standard	Second highest daily concentration (note a)	Number of days standard exceeded
1975	.08	.16	13
1976	.08	.16	20
1977	.08	.19	13
1978	.08	.13	2
1979	.12	.17	11
1980	.12	.18	10

a/The second highest daily concentration is reported instead of the highest because an area can exceed the standard one time in a year (that being the highest daily concentration) before it is considered in violation of the standard.

Ozone in the Earth's lower atmosphere is a colorless, pungent gas formed by the reaction of sunlight on several gaseous chemicals derived from manmade and natural sources. Manmade gases are in the form of hydrocarbons emitted from automobile exhaust and industrial powerplants. EPA's primary strategy for meeting the ozone standard is to control manmade volatile organic compounds (hydrocarbons)--

one of the principal constituents of the photochemical process which produces ozone.

The State disagrees with this strategy because changes in hydrocarbon emissions are having little if any significant effect on ambient ozone concentrations. Furthermore, the State said in some areas of Texas the ozone standard might be violated even if emissions from human activities were reduced to zero. The State believes that the EPA ozone standard may not be met, because ozone is ubiquitous to the Earth's atmosphere, i.e., perhaps as much as half the levels measured are constantly present, possibly due to naturally occurring atmospheric phenomena and the production of hydrocarbon compounds from natural sources. Dallas plans to meet the ozone standard by December 31, 1982, but State officials are skeptical. EPA projects that Dallas will not attain the ozone standard by 1982 but will attain by the end of 1987.

Mobile source hydrocarbon emissions have been reduced from 143,000 tons in 1971 to 80,000 tons in 1980, in spite of increased vehicle miles traveled. Vehicles are the biggest single contributor to manmade hydrocarbons. The increasingly stringent emission requirements placed on automobile emissions have contributed significantly to reducing vehicle emissions. A citizens group in Dallas believes it is absolutely essential that planned Federal vehicle emissions standards not be relaxed if Dallas and other cities are to hold their own or make gains in reducing ozone levels.

Dallas has taken steps to reduce mobile source hydrocarbon emissions by encouraging car and van pools and public transportation. Since October 1977, the Dallas Transit System has offered discounted monthly bus passes to riders, for which employers contribute a portion of the fare. There were 340 employers participating in this program in June 1981, and over 12,000 monthly bus passes were sold under the program in April 1981. The city closes some freeway entrances and places traffic controls on access ramps during peak traffic periods to keep traffic moving, since moving vehicles produce fewer hydrocarbons than idling or slow-moving vehicles.

In 1980, the voters of the Dallas-Fort Worth metropolitan area rejected a proposal to set up a combined and coordinated public transportation system. A modified proposal is expected to go to the voters in 1983.

Major stationary source hydrocarbon emissions were reduced from 29,000 to 15,000 tons annually from 1971 to 1980. Dallas has 67 major stationary sources of hydrocarbon emissions. (A major stationary source is one that can potentially emit over 100 tons annually.) A stationary source inventory is kept updated by the State, and emissions are controlled through enforcement of State regulations and city ordinances. Some fines have been assessed in the past, but all sources were in compliance at the time of our review. Violations generally were of a temporary

nature (one that can be corrected within 30 days), and EPA follow-up inspections confirmed findings of State and/or city inspectors.

Total suspended particulates

Three of 15 areas measured for particulates in 1976 and 1977 were designated as nonattainment areas because two did not meet the primary standard and one did not meet the secondary standard. Area designations are subject to revision whenever the area meets the standard for eight consecutive quarters. The three nonattainment areas have now met the standards for the required time, and EPA has indicated preliminary approval of one of the areas for redesignation. The State has completed verifying data for the other nonattainment areas and will soon ask EPA to redesignate them.

Suspended particulates include airborne dust, pollen, fly ash, metals, smoke, mist, and other solid or liquid particles. The level of particulates at any site can be influenced by local sources, such as cement plants, smelting plants, and automobile traffic, as well as by regional sources, such as wind-blown soil from agriculture land.

The State claims that high volumes of particulates often reflect only temporary or localized conditions. In addition, high volumes in some cases may be more of a nuisance than an actual health problem. The standards do not take into account the relationship between particle size and health and visibility effects. Smaller particles have less impact on measurements and are not characterized adequately in total measured values. However, the State believes these smaller particles probably have the most potential as health hazards because they are small enough to be inhaled into the lungs.

For several years, the State has conducted an analysis program to monitor 32 heavy elements in each particulate sample and recently began a respirable particulate monitoring program. Analysis of the data has shown that most high concentrations measured are composed primarily of soil elements and contain little or no toxic material.

Lead

According to the city, the ambient air quality standard for lead has been met since it was promulgated in October 1978; however, the dispersion model in the State implementation plan shows that one point source of lead emissions may cause the standard to be exceeded. The city plans to monitor this location to determine if the plant is exceeding the standard. However, Dallas does not believe it has authority to enforce the Federal lead standard because the State implementation plan has not been approved.

EPA region VI has not approved the plan because of differences of opinion about what should be done when a dispersion model indicates a violation of the standard. The State believes that the source of the emissions should have the option of (1) monitoring the ambient air to determine if there is actually a violation or (2) submitting a control plan. EPA believes that the company should be required to submit a control plan. The EPA regional office and the State are negotiating a resolution to this question.

Soil samples taken around lead smelters in Dallas showed that the soil is contaminated by high amounts of lead. The high level of contamination accumulated over many years before pollution regulations and controls were required. There are presently no standards regarding the levels of lead in soil. The city is conducting an extensive testing program to determine the blood lead levels of people living in the area. Results of the city's effort were not available because the testing program has not been completed.

SOLID WASTE LANDFILLS MEET FEDERAL STANDARDS

The State has classified and approved the Dallas solid waste landfill sites currently in use as sanitary landfills. These sites are being operated in accordance with Federal and State standards. Dallas also has 22 closed landfill sites, 1 of which contains industrial waste. Neither the State nor the city, however, has observed any leaching or contamination at this site.

Dallas has three operating sanitary landfills, as follows:

Name of landfill	Date operation began	Life expectancy
Dahlstrom	April 1976	November 1981
Second Avenue	December 1956	January 1984
McCommas Bluff	October 1981	Beyond 2000

In 1967 Dallas stopped the open burning of trash, started covering its solid waste landfills, and started keeping records of the types and amounts of solid waste being disposed of at the landfill sites. In 1967 the State classified the city's solid waste sites as sanitary landfills according to State standards. The landfills also comply with the Federal standards enacted in 1979.

Landfill linings prohibit seepage

Solid waste disposal regulations require sanitary landfills to have natural or manmade impermeable linings that prevent leakage or seepage. The Dahlstrom and Second Avenue sites have native, impermeable clay linings. The city has lined the bottom and sides

of the McCommas Bluff site with an impermeable clay substance. Periodic tests are performed at each site to determine the clay's thickness, the cohesiveness of soil, and the permeability characteristics. Neither the State nor the city has detected any leakage or seepage at any of the existing monitoring wells and there are plans to install three more wells.

One closed landfill contains industrial waste of a questionable nature

Dallas has 22 closed landfill sites. The Linfield Landfill is the only closed site known to contain industrial waste of a questionable nature. This waste was disposed of at the site before the Federal Resource Conservation and Recovery Act of 1976 was promulgated. The Linfield site was covered and closed in June 1975. Both the State and the city are monitoring the site.

DRINKING WATER QUALITY GOOD AND SUPPLY ADEQUATE

Dallas' three drinking water treatment plants produce drinking water that consistently meets Federal standards. The city has a 50-year master plan for acquiring a supply of untreated water and a 10-year capital improvement program for the water supply treatment and distribution system.

The three water treatment plants have continuously produced water that meets Federal drinking water standards since standards were promulgated. The plants have a total capacity of 550 million gallons a day. In 1980, average daily demand was 240 million gallons and peak daily demand was 508 million gallons. The master plan includes increasing the daily capacity at the newer Eastside plant from 250 to 400 million gallons by 1985.

Dallas receives water from four reservoirs. It has water rights to three others--one is being held in reserve, one is under construction, and one is under negotiation. These reservoirs should provide an adequate water supply well beyond the year 2000.

The Water Utilities Department is self-sustaining through user charge revenues. These revenues must support operating expenses, such as construction and maintenance costs of reservoirs, distribution lines, and treatment plants and cost of utilities department personnel. The distribution lines within the city are replaced as they deteriorate.

NOISE REGULATIONS ARE NOT EFFECTIVE

The major sources of noise in Dallas are aircraft and motor vehicles. Dallas has noise performance standards for new construction and a noise nuisance ordinance, but neither is effective in dealing with day-to-day noise problems. About $250,000 was recently spent on a citywide environmental noise assessment;

one of the objectives of the study was to develop an effective noise emission ordinance.

Excessive aircraft noise is being evaluated

Dallas has two major, general-purpose airports within its city limits--Dallas' Love Field and Red Bird Airport. The Dallas-Fort Worth Regional Airport is used by most commercial airlines serving Dallas, but it is not located within the city limits. There are no local standards for aircraft noise, but Department of Housing and Urban Development guidelines state that noise is not compatible with residential areas when it exceeds a day/night average of 65 decibels. When that level of noise is reached, the Department requires the installation of additional soundproofing materials.

A study by a consulting team hired by the city shows that some areas near Love Field have noise levels of 70 decibels. The consultant's report, one phase of an overall assessment of noise around Love Field, was issued to the city in December 1981. The EPA regional noise coordinator believes that nonscheduled flights should also be addressed in this study because there are no restrictions on the hours that nonscheduled flights can use the runway and because some private jets have higher noise levels than commercial aircraft. Thus, speech and sleep interference can occur during nighttime hours.

Residents around Love Field have organized the Love Field Citizens Action Committee to push for a 9 p.m. to 7 a.m. curfew on airport operations and a limit on the noise level for aircraft using the airport. Love Field presently has 29 scheduled flights between 10 p.m. and 6 a.m.

The noise level at Red Bird Airport is not currently a problem because most air traffic is propeller driven, which is considered compatible with residential areas. If the runway is lengthened, however, more jet aircraft will use the airport, thus raising the noise levels. Red Bird has a self-imposed curfew on nighttime flights from 10 p.m. to 6 a.m.

The Dallas-Fort Worth Regional Airport needs additional runway capability. For a 60-day test period, it scheduled flights on a seldom used diagonal runway. The City of Irving filed suit to enjoin the airport from using the runway because some departures put aircraft over a residential area. A Federal judge allowed the tests to be completed but ruled that, if the airport wanted to continue using the diagonal runway for south departures after the 60-day test period, a revision to the master plan environmental impact statement must be filed.

Freeway noise a continuing problem

During the peak traffic hours of 5 p.m. to 6 p.m., the North Central Expressway noise level is about 70 decibels, as measured along the frontage roads. EPA maximum levels to protect against hearing loss is 70 decibels and 55 decibels to protect against outdoor activity interference, with a 5 decibel margin, i.e., 75 and 60 decibels, respectively.

Dallas has studied several proposals to alleviate traffic congestion along the North Central Expressway corridor and has found advantages and disadvantages to each proposal. Traffic on elevated roads makes more noise than ground level traffic, particularly at night when the truck mix increases. Traffic on subsurface roads makes less noise because the walls buffer the noise. Excessive traffic noise in residential areas tends to decrease the value of homes, and it is more difficult to sell a home in a heavily traveled area. The increased noise level has had an adverse impact on people living close to the freeway, interfering with both sleep and speech.

Dallas has no effective noise ordinance

Noise standards are written into the building code, and Dallas relies on its inspectors to enforce these standards, particularly in industrial areas close to residential property. The noise levels for residential areas are also addressed in a nuisance ordinance, but the ordinance is difficult to enforce. Further, the city may spend a lot of money answering a nuisance call and still be unable to solve the problem since they may have to investigate a noise complaint two or three times before the problem is solved.

The following table shows the number of noise complaints, excluding airport noise, received from 1979 to June 1981:

Year	Complaints
1979	29
1980	34
1981 (through June)	43

The noise ordinance for new construction was implemented in 1965, but the city does not have noise-measuring instruments to determine compliance with the ordinance. The manager of the city's Environmental Assessment Program said that the Building Inspection Division is responsible for enforcing the noise ordinance for new construction but that it did not know the ordinance existed until about 1980. EPA stated that the University of Texas at Dallas received Federal funds for the purchase of noise-measuring equipment and it is available on loan to local governments.

ORGANIZATIONS CONTACTED

State, county, and regional

Texas Air Control Board

Texas Department of Environemental and Consumer Health Protection

Texas Department of Water Resources

Municipal

Dallas Street and Sanitation Service Department

Dallas water utilities

NEW YORK CITY, NEW YORK--

ASSESSMENT OF ENVIRONMENTAL PROGRAMS

The New York City Department of Environmental Protection is responsible for administering most of the pollution abatement programs in the city. The one exception in the areas we covered involved solid waste, which is handled by the Department of Sanitation. Thus, the Department of Environmental Protection has the primary responsibility of ensuring clean air, clean water, environmentally sound sludge disposal, and noise levels which do not adversely affect the people who live in New York City.

New York City is composed of five boroughs: Brooklyn, the Bronx, Manhattan, Queens, and Staten Island. Its current population exceeds 7 million persons.

SUMMARY OBSERVATIONS

With respect to air quality, New York City's current status is a marked improvement over what it was in 1970. At that time, the city was in nonattainment of primary standards for all criteria pollutants. Since then, the city has experienced reductions in levels of all criteria pollutants, with the most significant reductions occurring in the levels of sulfur dioxide and total suspended particulates. Still, air quality standards for ozone and carbon monoxide have not been achieved and may not be achieved by the 1987 deadline.

Regarding water, we must distinguish between drinking water quality and pollutants affecting waters in and around the city. Drinking water is of excellent quality and well within national primary drinking water standards. However, multibillion dollar improvements need to be made to the water supply distribution system. Waterways in and around the city are cleaner than they were 10 years ago. Most existing sewage treatment plants have been upgraded and two additional plants are currently under construction. This treatment plant upgrading and expansion program is also a multibillion dollar program and is not scheduled to be completed until about 1990. Even then, the significant amounts of pollution emanating from combined sewer overflows will continue to put pressure on area water quality.

Solid waste disposal is a major problem. The city generates a massive amount of solid waste daily. This, combined with the relatively small amount of unused landfill space left and anticipated environmental problems associated with a planned change to incineration, makes solid waste disposal a priority issue. Sewage sludge disposal is also a problem. The city has been ocean dumping its sewage sludge for about 50 years. It was ordered by EPA to stop this practice by December 31, 1981, and, while contesting the order, developed an interim alternative sludge disposal plan. Enforcement of the ban has been held up, but the city continues to ocean dump its sewage sludge.

Finally, there is the city's noise pollution problem. While the city is recognized as having one of the most advanced noise codes in the Nation, staffing of noise abatement programs has been reduced significantly since the mid-1970's. Some progress has been made toward quieting the subway system--a major source of noise in New York--but much more remains to be done.

AIR SIGNIFICANTLY CLEANER, BUT SOME TARGETS MAY NOT BE REACHED AND SOME GAINS JEOPARDIZED

Overall air quality in New York City has improved greatly over the past 10 years. However, the 1987 deadline for meeting the ozone air quality standard will not be achieved, and the 1987 deadline for meeting the carbon monoxide standard may not be achieved. Further, gains achieved through stationary source controls may be jeopardized if the permitting and enforcement functions are not improved.

New York City's air is cleaner, but some standards are violated

In 1970, New York violated Federal standards for all criteria pollutants but in 1981 the city was in attainment status for primary standards for two of five criteria pollutants--total suspended particulates and nitrogen oxide--and sulfur dioxide levels were believed to be very close to the primary standard. Attainment status for the lead standard could not be determined because there was inadequate data. The city has yet to achieve national standards for carbon monoxide and ozone. Carbon monoxide levels have shown improvement. For example, the number of carbon monoxide violations recorded has decreased 55 percent since 1975. Ozone, however, has not shown an overall trend toward improvement, although several monitoring sites recorded fewer violations of the standard in 1979 and 1980 than in 1976.

The number of days during which the city's overall air quality was classified as unhealthful has also decreased. For example, in 1978, the city's air quality was classified as unhealthful on 17 percent of the days, but this figure decreased to 6 percent in 1979. It rose to 10 percent in 1980, however, due to an increase in the number of days during which the city experienced unhealthful concentrations of ozone.

With the exception of a portion of Staten Island, the city does not meet the national primary standard for carbon monoxide. No parts of the city meet the primary standard for ozone. While all parts of the city have air quality that is better than national standards for nitrogen oxides, all of the city violates the national standard for the other contributor to ozone, volatile organic compounds (hydrocarbons). EPA no longer classifies areas as in an attainment or nonattainment status for hydrocarbons, but control of hydrocarbons is the primary strategy for reducing ozone levels.

All areas of the city meet the primary standard for total suspended particulates. Large portions of the city cannot be classified as to attainment of the sulfur dioxide standard. However, EPA and State officials agree that levels in the unclassified areas are probably very close to the primary standard. Data for 1980 shows annual averages for sulfur dioxide at all monitoring sites that are less than the primary standard. However, results of the State's quality assurance program indicate that one Manhattan site's average is above the standard. EPA's designation of unclassified is based not on statistical probabilities but on what EPA sees as inappropriate monitoring locations and inaccurate monitoring methods. Similar to the sulfur dioxide situation, the portion of Staten Island which is unclassifed for total suspended particulates results from insufficient and ambiguous monitoring data, although air quality models and what data has been collected convince EPA that Staten Island meets the primary particulates standard.

New National Air Monitoring Station and State and Local Air Monitoring Station systems in the city should resolve EPA's reservations about monitoring data. The systems' sites did not begin operation until 1981, and EPA requires 2 years of data (both showing attainment) before granting attainment status. The State and Local Air Monitoring Station system sites do not have to meet all criteria until January 1, 1983.

The 1981 designation of a portion of Staten Island as in attainment of the carbon monoxide standard is a result of two air quality models which showed that because of the small amount of traffic in that part of the island, it is not possible for the standard to be violated.

Neither State nor Federal officials can predict what the city's attainment status will be for the national lead standard. Although all State monitors in the New York City Metropolitan Air Quality Control Region show values well in compliance with the proposed standard, no monitors for lead are located in the city. Because of traffic congestion and stationary sources of lead, it is possible that the planned lead monitors in the city will show a different status.

New York City will not attain the national ozone standard by 1987 deadline

The city will not achieve the national standard for ozone by 1987. Ozone is a problem of long-range, interstate transport, and planners lack adequate models and inventories to design strategies to combat it. Further, the magnitude of hydrocarbon reduction necessary for the city to achieve the standard, even if strategies were available, could not be reached by 1987.

Ozone is the major pollutant in New York City subject to interstate transport. State officials contend that the air blowing into the city already exceeds the national standard. The highest

ozone concentrations in the Nation have been measured downwind of New York City in Derby, Connecticut.

Simply stated, ozone is the product of hydrocarbons and nitrogen oxides in the presence of sunlight. It is generally agreed that most of the city's ozone comes from pollutants that are produced elsewhere and that the city's emissions add to the ozone that is found over Connecticut and beyond, causing ozone levels downwind to be higher than in the city. Another factor making the city's ozone level lower than Derby's is the interaction between nitrogen oxide and ozone that causes nitrogen oxides to actually deplete ozone. Thus, although the city's nitrogen oxide reacts photochemically with hydrocarbons to form ozone enroute to Connecticut, this same production of nitrogen oxide has the effect of lowering the city's own ozone levels.

Motor vehicles produce a large percentage of the ozone precursors: half the hydrocarbons and one-third the nitrogen oxides emitted in the city come from vehicles. The other major sources of hydrocarbons are industrial and other uses of solvents as well as evaporation from gasoline storage and marketing facilities. Major nonvehicular sources of nitrogen oxides include building heating plants (about one-fourth of total emissions) and Consolidated Edison, Inc.'s, power-generating facilities (about one-third of total emissions).

Federal and State officials agree that New York City will not achieve the national ambient air quality standard for ozone by 1987. Environmental planners lack adequate models to simulate the long-range transport of ozone and draw precise connections between locally produced nitrogen oxides and hydrocarbons and ozone appearing hundreds of miles downwind. Because of the modeling shortcoming as well as an inadequate inventory of hydrocarbon sources, planners have not been able to design control strategies that will achieve the ozone standard before the 1987 deadline. Another problem, according to EPA, is finding control measures that are reasonable. This results from the fact that controls on sources often are not politically, economically, or socially feasible, or because where feasible, controls are already generally in place and additional measures are only modestly effective.

It is known that the city will have to greatly reduce hydrocarbon emissions to achieve the ozone standard, and this is the other reason the standard will not be achieved by 1987. Compliance with the standard is determined by ozone levels immediately downwind of the city. A crude model, the results of which EPA issued in July 1981, predicted the New York City metropolitan area would have to reduce hydrocarbon emissions by 64 percent to achieve the standard. The State implementation plan at present only provides for a 32-percent reduction in hydrocarbon emissions. Short of severe measures, such as banning automobile use or shutting down

industries which produce hydrocarbons, the magnitude of hydrocarbon reduction necessary will remain a barrier to achieving the ozone standard by 1987.

Stationary source enforcement program inadequate, some sources not in compliance

The stationary source permitting and enforcement program is administered jointly by the State and city. Through contractual agreement with the State, the city is responsible for permitting about 90 percent of the sources, which accounts for 70 percent of the stationary source emissions within the city.

EPA studies show the enforcement and permitting program run by the city to be in poor shape. According to a November 1981 draft staff report, there are thousands of air pollution sources in the city which have never been identified on any source inventory, are operating without permits, and which have never been inspected. Other sources, which have applied for permits, do not now have valid permits. Either the applications were never acted upon, the permits have lapsed, the companies have not reapplied, or the renewals have not been acted on.

A study by the city's Division of Air Resources, which is responsible for the stationary source permitting and enforcement program, confirms the inadequacy of its source inventory. As part of this study, a door-to-door sweep of heavily industrialized areas was conducted, and 37 percent of the sources found were not in the inventory. Of the sources that had been known previously, 30 percent had not renewed their certificates to operate as required. An EPA report produced early in 1981 quotes even more disturbing statistics. That report estimated there could be up to 62,000 stationary sources of air pollution in the city but only 25,430 have permits. Furthermore, the report stated that known sources are being recertified on a 9-1/2-year cycle while the State implementation plan and local regulations require a 3-year cycle.

An incomplete stationary source inventory makes implementation of control strategies extremely difficult. For example, how can percentage reductions for types of sources be enforced when individual sources are not identified or brought into compliance when identified? Furthermore, it is difficult to develop additional control strategies. The State's 1979 implementation plan notes with regard to the secondary total suspended particulates standard that the lack of an accurate emission inventory has precluded a determination of the causes of violations existing at several monitoring stations. Because of this shortcoming, it has not been possible to suggest measures that would result in attainment of the secondary standard.

In addition to an incomplete inventory and infrequent inspections, the stationary source enforcement program suffers from a low fine schedule. EPA officials told us that violators are routinely fined $50 to $100 for an infraction lasting 6 months.

Fines become a license to pollute because it is more cost effective for the polluter not to comply with the standard. This contrasts with potential $25,000-per-day fines from EPA.

EPA officials believe the poor status of the city's inventory and enforcement program jeopardizes the pollution control gains made to date. If potential emission sources know they can pollute without adverse consequences, they may stop complying with environmental regulations by, for example, shutting off control devices and not maintaining equipment properly.

Shortfalls in city's inventory involve major sources

The shortfalls in the source inventory are not limited to minor sources. EPA cites as an example of a major source not being permitted the case of Non-Ferrous Processing Corporation of Brooklyn. On a routine inspection of another plant in November 1979, two EPA inspectors noted visible emissions from two stacks at Non-Ferrous. EPA's investigation disclosed that Non-Ferrous was emitting over 100 tons of particulates per year although the city did not report it to EPA.

The city's files contained correspondence with Non-Ferrous dating back to 1976, but the company was never issued a permit and the city never inspected the plant. EPA data indicated that Non-Ferrous was also emitting over 20,000 pounds of lead per year near a densely populated area of the city. EPA's actions caused Non-Ferrous to install equipment which removes about 80 to 90 percent of the pollutants. Also, Non-Ferrous and EPA are negotiating a consent decree which will contain a schedule for Non-Ferrous to arrive at full compliance.

City taking corrective action but EPA believes problem will remain

The city is taking steps to insure the accuracy of its inventory and the effectiveness of its stationary source enforcement program. It is following up on the unpermitted sources disclosed in file reviews as well as the door-to-door survey and extending the survey to other areas. The city is also replacing the antiquated file system that contributed to inaction in the Non-Ferrous case. The Division of Air Resources is also planning to propose to the City Council a revised fine schedule which will contain much higher penalties than the current schedule. EPA will help in this regard by taking its own enforcement actions (with the threat of $25,000/day fines) against major violators identified by the city.

Regional EPA staff do not believe the measures discussed above will be sufficient to prevent deterioration of air quality in the long run. EPA and the city believe the city's enforcement program is understaffed, compounding what EPA sees as problems of low productivity, inadequate training, and poor communication among city

staff. According to EPA, until the city can achieve a 3-year recertification cycle, keep permits current, and ensure that sources comply with permit provisions, its continuing attainment of ambient air quality standards and improvement toward standards not yet reached will be in jeopardy.

Mobile source control strategies may not achieve carbon monoxide standard by 1987

Improvement in carbon monoxide levels to date has come primarily from Federal vehicle emission standards. It is unclear whether these standards, plus the city's mobile source control strategies, will achieve the national ambient air quality standard for carbon monoxide by 1987 because the magnitude of the problem in the canyon-like areas of the city with heavy traffic is not known. Further, some mobile source control strategies have encountered legal problems and New York State's decision not to impose intracity bridge tolls sparked a mass transit controversy. EPA, however, projects that the city will meet the carbon monoxide standard by 1987.

Carbon monoxide levels have been declining, but magnitude of problem unknown

Although the city still violates the national carbon monoxide standard, the trend has shown improvement. In 1976, the 8-hour carbon monoxide standard was exceeded on 233 days; in 1980, the standard was only exceeded on 95 days. Carbon monoxide levels at the two traffic sites dropped an average of 41 percent from 1975 through 1980, while levels at the nontraffic site in operation from 1971 through 1980 declined 65 percent. However, the city still has a way to go--the highest 8-hour average carbon monoxide level recorded in 1980 was 71 percent above the national standard. The second highest concentration in 1980 was 67 percent above the standard.

The primary mobile source pollution control strategy is the vehicle emission standards mandated by the Clean Air Act. EPA and State officials agree that vehicle turnover, which causes newer cars manufactured under more stringent standards to become an increasing percentage of the cars on city streets, is the most important factor in reducing mobile source pollution. According to the State implementation plan, by 1987 vehicle turnover alone will reduce carbon monoxide in midtown Manhattan by 69 percent of 1977 level. If accurate, this projection means that the city would achieve the national ambient air quality standard for carbon monoxide in 1987.

The city has other mobile source control strategies, such as an inspection and maintenance program and traffic improvements, but even with these measures, it is possible the 1987 target will be missed. The true magnitude of the city's carbon monoxide problem is not known, however. It is possible that skyscraper canyons and

traffic patterns are causing "hot spots" where carbon monoxide concentrations exceed those in areas where traffic monitors are currently located. The State is conducting a hot spot study in the city with EPA funding. Until the results are in, it is unclear whether current plans will achieve the 1987 goal, whether additional measures are needed, and whether the national carbon monoxide standard is, in fact, attainable everywhere in New York City.

Secondary mobile source control strategies

EPA has granted the city an extension until the end of 1987 to meet the national carbon monoxide and ozone standards. As a consequence, the city must implement all reasonably available transportation control measures, including a vehicle inspection and maintenance program. The 1979 implementation plan revision rejected four measures as not being effective or available for implementation in the area: extreme cold start emission control, alternate fuels, control of extended vehicle idling, and road and bridge user charges. The city implemented a light vehicle (under 8,500 lbs.) annual inspection and maintenance program in January 1981.

Over 2 years before the inspection program began, a taxi inspection program was begun. Taxis have been inspected three times a year since September 1977. Additionally, taxis are subject to surprise field inspections and several hundred taxicabs are stopped on the streets each month. This extra emphasis on taxicab emissions is warranted because taxis comprise about 34 percent of the daytime traffic in midtown Manhattan.

Other transportation control measures being considered for the area include exclusive bus and carpool lanes, parking controls, park and ride lots, bicycle lanes, and traffic flow improvements.

The city has tried or considered several mobile source controls which have encountered problems. In the summer of 1980, it announced a plan to prohibit single passenger cars from using four toll-free bridges during morning rush hours. In May 1981, however, a State court ruled that the city had exceeded its authority under State law in proposing such a ban. Also, New York State is still considering, but as yet has been unable to implement, a program to inspect heavy trucks' emission systems. The problem is that New York cannot prevent heavy trucks from simply registering in neighboring States to avoid the inspection.

Several years ago, the city also attempted to control the cruising of taxis on congested midtown and downtown streets. The cruising rules proved impractical to enforce, and EPA believes political considerations, i.e., the taxi lobby, make it doubtful the strategy would ever be successful.

Decision not to impose bridge tolls sparks mass transit controversy

New York State's 1973 State implementation plan included a provision for imposing tolls on bridges within the city over the East and Harlem Rivers. This provision was not implemented and in 1975 EPA ordered its implementation. Implementation still didn't occur, and environmental groups obtained a Federal court order requiring the State and the city to institute bridge tolls by August 1978. A 1977 amendment to the Clean Air Act allowed cities to drop plan provisions for intracity bridge tolls upon request by the Governor. EPA approved such a request from New York's Governor in 1977 and thus began a mass transit controversy that has continued since then.

The controversy began because, as part of eliminating the provision for bridge tolls, New York was required to come up with a plan for meeting basic transportation needs and achieving emission reductions equivalent to the reduction expected from the tolls. To achieve basic transportation needs and the emission reductions, the States must utilize all available Federal, State, and local funds for mass transit improvements. EPA proposed rejecting New York's plan twice, before finally approving it in September 1981.

Many citizens suggested that New York State take the Federal funds for Westway, a proposed highway in Manhattan, and trade them in for mass transit aid. EPA's proposed rejection of the city's plan was seen as evidence of EPA's desire for New York State to trade in the Westway funds. Westway never became a formal issue, however, because New York State never conceded it wasn't providing sufficient funds for mass transit. Thus, the issue was one of dollars, not sources, and unless it was resolved that the planned dollars were insufficient to meet basic transportation needs, EPA could not require the State to use a specific source of funds.

EPA was under much pressure to make a final decision on the State's plan. EPA's nonapproval of the mass transit portions of the plan had caused a moratorium on the construction or modification of major stationary sources of carbon monoxide and volatile organic compounds in the city from July 1979 to September 1981. Loss of Federal funds was threatened and New York State was anxious for EPA to make a decision on its plan. The most pressure on EPA, however, continued to come from the Federal court order that originally required the implementation of the toll strategy. This order had been changed to require compliance with the 1977 Clean Air Act amendments and was still in effect.

In July 1981, the New York State Legislature authorized taxes expected to raise up to $400 million annually for 2 years to enable the city's transit system to make up its operating deficits and to fund a $5 billion, 5-year capital improvements program.

WATER USE IMPAIRED, BUT IMPROVEMENTS HAVE BEEN ACHIEVED

The waters in the New York City metropolitan area receive the wastes generated either directly or indirectly from 12 to 20 million people and a substantial number of industries. Consequently, water usage in many sections of New York Harbor is impaired. Bacterial contamination results in the closing of bathing beaches in Staten Island, Coney Island, the Bronx, and Jamaica Bay. Oyster beds in Raritan Bay, once the center of a multimillion dollar industry, are unusable. Most of the waters classified for shellfishing in the area are not presently capable of supporting that activity. Commercial and recreational finfish catches have steadily declined over the last 20 years. This situation has resulted from overfishing as well as pollution.

In spite of the problems, however, hopeful signs exist. City officials believe area waters are cleaner than they were 10 years ago, and two beaches that were closed in the early 1970's are now open. The State is also considering upgrading the potential highest uses for area waters. The city's 12 sewage treatment plants treat 85 percent of the city's dry weather sewage, and, during the 1970's, 9 of the city's sewage treatment plants were upgraded to provide full secondary treatment. The city's wastewater management plan projects major benefits from ultimately achieving modified and full secondary treatment citywide and from sewer and regulator improvements. For example, these improvements will allow 35,000 acres of shellfish beds worth potentially $10.6 million annually to open and beach-related services worth potentially $58 million annually will accrue. It should be noted, however, that the City Department of Health questions some of these open beach predictions.

As of the summer of 1981, New York City had been awarded 61 Federal grants to plan, design, and construct its wastewater treatment plants. These project costs have totaled almost $2 billion, including the State and local share.

Area water pollution comes from many sources

The major sources of water pollution in the metropolitan area include: untreated or inadequately treated sewage (the city accounts for about 60 percent of the more than 2 billion gallons of wastewater discharged to New York Harbor daily), industrial discharges reaching area waters via the city sewer system, storm water runoff resulting in raw sewage entering the waterways after storms through combined sewer overflows, liquid contaminants from landfills, and high temperature discharges of cooling water from powerplants and similar facilities.

Nonpoint sources of pollution are a serious problem. In addition to causing diluted raw sewage to enter the waterways, street runoff carries with it high volumes of sediment, residues

of toxic materials, oil and grease, chemicals, metals, and organic matter. Heavy metal pollutants occur in concentrations potentially toxic to local finfish and shellfish. According to city officials, large percentages (e.g., 69 percent of all zinc) of the heavy metals in New York Harbor come from urban runoff. Heavy metals also originate from other nonpoint sources. For example, 10 percent of all heavy metals enter the harbor from the atmosphere. Data from 1979 shows air pollution contributing 57 percent of the lead entering the harbor. EPA officials stated, however, that there is a growing consensus among public health officials that as more and more vehicles on the road use unleaded fuel, lead levels in the atmosphere will be significantly reduced.

Just as air pollution can become water pollution, the reverse may occur as well. A planned coal and solid waste burning facility on Staten Island will use polluted water from a nearby waterway to cool its smoke stacks. Polluted water will be sprayed into the air and harmful bacteria may be released over populated areas. In addition, a portion of the contaminants reaching the waterway originate as leachate from the city's major solid waste landfill in Staten Island.

Upstream discharges also contribute to the pollution of area waters. These discharges may cause heavy metal pollution on the same order of magnitude as that caused by sewage treatment plants, direct industrial discharges, cooling water, CSO, surface runoff, and atmospheric fallout combined. Leaching of bottom sediments also contributes to water pollution.

The city's wastewater treatment system is massive

New York City has 12 operating sewage treatment plants and 2 more are under construction. The operating plants have a total design capacity of 1,600 million gallons per day, ranging in size from 45 MGD to 310 MGD, and the flow reaching these plants averaged 1,460 MGD during 1980. Approximately 65 percent of this flow originates from residences, 20 percent from commercial enterprises, about 8 percent from ground water and tidal infiltration, and 7 percent from industry.

The design capacity, average daily flow, and the receiving water for each plant are listed below.

Plant	Design capacity	Average flow 1980	Receiving water
	------(MGD)------		
Hunts Point	200	135	Upper East River
Coney Island	110	99	Rockaway Inlet
Newtown Creek	310	291	East River
Owls Head	160	97	Upper Bay
26th Ward	85	97	Jamaica Bay
Wards Island	250	342	East River
Bowery Bay	150	146	Rikers Island Channel
Jamaica	100	101	Jamaica Bay
Rockaway	45	21	Jamaica Bay
Tallmans Island	85	64	East River
Oakwood Beach	45	23	Lower Bay
Port Richmond	60	44	Kill Van Kull
Total	1,600	1,460	

The majority of the city is served by combined sanitary and storm sewers; more than 70 percent of the sewered area is combined. The ability of the remaining separate sewer systems to limit the pollution from sewer overflows is greatly mitigated by cross connections between sanitary and storm sewers. These connections were made to eliminate overloading of certain systems and to alleviate local flooding.

The sewer system also needs major repair. Approximately 40 percent of the system is over 60 years old. Numerous parts of the system need replacement or reconstruction because of their age and the lack of resources to provide adequate preventive maintenance. According to the 1980 EPA needs survey, New York City accounts for 66 percent of the Nation's sewer rehabilitation needs.

A "city within a city" has no sewage treatment

The sewage of more than 750,000 residents is discharged into area waters untreated. Sewage from the North River and Red Hook sewer districts receives no treatment. Sewage treatment plants are under construction to serve these locations, but the lack of operating facilities currently results in 205 MGD of untreated discharge, representing 13 percent of total dry weather effluent flow from New York City treatment plants.

The estimated completion date for the North River sewage treatment plant has slipped 12 years, the Red Hook project is also delayed, and recent Federal budget cuts may cause further delay in both projects. The plants at North River and Red Hook have been in the planning stages since the 1930's and are still far from complete.

In 1974, the North River plant was billed as "the largest capital construction project ever sponsored by a municipality" and the "largest competitively bid, non-defense contract ever awarded in the Western hemisphere." It will be located on a 30-acre platform over the Hudson River, and in 1977 it was estimated to cost over $700 million. Current estimates exceed $1 billion and may rise if Federal budget cuts slow construction further.

North River was originally scheduled to be completed in September 1976, but, in April 1981, city officials projected a 1988 completion date. City officials contended the delays until 1977 were to be expected because of the structure's complexity and size and the relatively new construction techniques being used. However, a 1977 State Comptroller's report cited lack of early action by the city and contractor to resolve construction problems as the cause for much of the delay. That report also blamed EPA and the State Department of Environmental Conservation for inadequate supervision and delays in approving change orders for the project.

Construction at Red Hook has been delayed as well. Estimated completion dates have slipped from 1980 to 1984, to 1985, and recently to 1987. In addition to construction problems at North River, city officials said that delays at both North River and Red Hook occurred as a consequence of massive design changes necessitated by the energy crisis (the plants were made less energy intensive) and EPA regulations. The design changes delayed the projects so significantly that EPA required the city to obtain public participation in planning the changes, slowing the projects even further.

In 1979, the city, State, and U.S. Government entered into an amended consent order covering the two treatment plants. The original agreement, signed in 1977, covered a third plant as well and was in response to a U.S. Government complaint that the city had failed to construct all three plants according to the schedules in their permits. The 1979 order recognized that the city would not meet the schedules set forth in the 1977 agreement for the Red Hook and North River projects and set 1987 as the new deadline for completing both plants. The 1979 agreement also provided for monetary penalties if the city did not comply and required the appointment of a special master to monitor compliance with the order.

As a result of cuts made in Clean Water Act funding, the city and New York State are planning to ask EPA to renegotiate the completion dates in the consent order. City officials say there is no way they can meet the completion dates in the consent order with available funding and are drawing up plans for slowing down all of their sewage treatment projects.

Operating problems at treatment plants continue, but some improvements have been made

Plant inefficiency is a long-standing problem for the city's sewage treatment plants. Improvements have occurred, but permit violations are still numerous.

A 1975 State Comptroller's audit found that from 1965 to 1973 average removal percentages for the operating secondary plants declined from 75 to 61 percent and from 66 to 57 percent for suspended solids and biological oxygen demand, respectively. Federal and State goals for wastewater treatment are 85 percent removal for both. Sewage treatment operations have improved since 1973, however. In 1980, suspended solids and biological oxygen demand removal percentages at the 12 plants were 75 and 76 percent, respectively. The biological oxygen demand removal rate in 1980 was higher than both the 1965 and 1973 rates. Plants whose permits require 85 percent removal averaged 79 percent for suspended solids and almost 85 percent for biological oxygen demand during that year.

City officials stated that at least 4 of their 12 operating plants do not regularly meet the standards for removal of biological oxygen demand and suspended solids. Those officials and the areawide waste treatment plan cite weak influent as the cause for the low removal percentages. The plan states that required removal rates are difficult to obtain even though effluent concentrations after treatment are low in absolute terms.

The New York State Legislative Commission on Expenditures Review took a harsher view toward sewage treatment plant compliance. In a 1979 report, the commission wrote that in general the plants are not effective. It stated that permit requirements for removal of biological oxygen demand and suspended solids are lower for city plants than for some other large plants in the State, and the city operation is frequently not adequate to meet even those lower requirements.

Four of the city's 12 operating sewage treatment plants violated the effluent limits of their permits for at least one-third of 1980. The Bowery Bay Plant exceeded effluent limits in 8 months of the year, and the Coney Island Plant never met the effluent limitations of its permit.

EPA, in February 1981, reported that 5 of the city's 12 operating plants were not in compliance with their permits and compliance at 3 additional plants was marginal. According to State Discharge Monitoring Reports, at least seven city treatment plants violated their permits during the first quarter of fiscal year 1981. All seven plants were cited as being previous and/or recurring violators.

Excessive flows to sewage plants decrease efficiency

When the flow of wastewater to a sewage treatment plant exceeds its design capacity, treatment operations are impaired. Although the average total flow to all city treatment plants was less than total capacity, the average 1980 flow to three of the operating plants exceeded their individual capacities. The greatest excess occurred at the Wards Island Plant where flow was 37 percent greater than design capacity. Flows for 1981 were lower than 1980, partially the result of a program to shut off water in abandoned buildings. Sewage treatment plants accommodate the excess by reducing the time the sewage is treated and stressing other plant systems as well. The superintendent responsible for one of the city plants where flows exceeded capacity said that frequently the excess receives only primary treatment. According to a 1980 State Comptroller's report, operating sewage treatment plants at or above design capacity for extended periods contributes to lowered removal percentages for suspended solids and biochemical oxygen demand.

Debate over how many plants should provide secondary treatment

Nine of the city's 12 operating sewage treatment plants are designed to provide secondary treatment. Actually, all plants, including the two under construction, are designed to ultimately provide such treatment. Two plants, Owls Head and Coney Island, are being upgraded to provide full secondary treatment. February 1981 estimates were that upgrading for both would be complete in late 1985, but city officials now believe Federal budget cuts may delay completion beyond then.

City officials desire relaxation of the year-round secondary treatment requirements for one operating plant, Newtown Creek and the two under construction: Red Hook and North River. The city has requested from EPA a formal waiver of full secondary treatment at Newtown Creek while retaining modified aeration which is more effective than primary treatment. City officials expect, and State officials have recommended, approval of the Newtown Creek waiver request. Permission is also desired to operate the plants at Red Hook and North River at less than full secondary treatment levels.

EPA region II's Deputy Regional Administrator believes allowing less than secondary treatment at Red Hook and North River may be possible if the areawide waste treatment plan indicates that such a level of treatment can meet water quality standards. With regards to North River, the existing Federal investment in foundations and structures may preclude the possibility of considering levels of treatment less than biological treatment.

The State's regional water quality engineer believes the proposal to limit the North River plant to primary treatment has

little merit since it would result in negligible waste removal, high disinfection costs, and is contrary to the assumption of secondary treatment at North River, which partially justified the Newtown Creek waiver application.

The Interstate Sanitation Commission generally opposes allowing less than full secondary treatment in the city. It believes that area receiving waters are already substantially below required standards and lessened treatment will only aggravate the present unsatisfactory conditions. It argues further that appropriate waste treatment would then be more difficult to obtain from surrounding localities and States.

Correcting CSOs will be complex and costly

The waters around New York City may never achieve their full potential because of CSOs. Correcting the CSO problem would cost billions, and the city still needs significant funding to complete ongoing water pollution control projects. In addition, data gaps exist with respect to controlling nonpoint sources of water pollution, which makes cleaning up area waters all the more difficult.

CSOs close beaches

The city's treatment plants can accommodate twice the average dry weather flow of wastewater, but because sanitary and storm sewers are combined, the average rainfall triples the dry weather flow, with peak flows being as much as 50 times the normal flow. The wastewater not accommodated by the treatment plants is discharged to the waterways as CSO, causing bacteria levels to rise precipitously and producing a large volume of floatables and sewage-related materials.

According to the city's Department of Health, the adverse effect of CSOs on beach water quality cannot be overemphasized. During every significant rainfall, millions of gallons of sewage are discharged untreated directly to area waterways. According to the areawide waste treatment plan, discharges of untreated wastewater during storms increased the annual discharge of two pollutants--biological oxygen demand and suspended solids--by 20 and 35 percent, respectively. The plan discussed several alternatives to correct CSO and recommended further study of the problem. The plan ruled out sewer flushing and other CSO controls as not cost effective and favored, instead, storage (preferably in the sewer system) and treatment of CSOs.

The Interstate Sanitation Commission has strong views on the CSO problem. The commission, in a 1972 report, stated that the necessary improvements in the quality of receiving waters and the reopening of beaches would not be accomplished by the multi-billion dollar treatment plant upgrading and expansion program now going on and the monies spent for this construction in large parts will be wasted if means of mitigating the effects of CSO are not found. It has often repeated this warning since then.

The city has one CSO control project beyond the discussion phase. The Spring Creek Auxiliary Water Pollution Control Plant in Brooklyn is in operation, skimming and disinfecting CSOs which have been stored apart from the sewer systems. Further study might justify building similar plants in Jamaica and Eastchester Bays.

Correcting CSO unlikely because of resources required

It does not appear likely the CSO problem will be eliminated soon, and it may never be eliminated. Both the commission and officials from the city's Health Department have said it would cost billions of dollars to correct. Suggested studies of the CSO problem alone could cost at least $200 million, and the city has much higher priorities.

In addition to funding already approved, the city needs about $1.75 billion to complete construction and upgrading of its sewage treatment plants. These funds have been requested from, but not yet obligated by, the Federal and State governments. Therefore, budget cuts could jeopardize the city's ability to provide secondary treatment to all its dry weather wastewater flow. City Health Department officials said that eliminating CSOs would never be economically feasible. With ongoing projects being jeopardized by potential Federal budget cuts, and possibly billions more needed for the CSO problem, it does not seem likely that additional money will come from other sources to solve the CSO problem as well.

DRINKING WATER MEETS NATIONAL STANDARDS, BUT MAJOR DISTRIBUTION SYSTEM IMPROVEMENTS NEEDED

New York City's drinking water meets national standards, but the State has recommended that water from one of the city's three systems be further treated to offset deteriorating water quality. The city also needs a third tunnel to distribute its water supply. There is concern that the other two tunnels--one of which has been in continuous operation since 1917--could fail if not inspected and repaired. Construction of the third water tunnel would cost billions.

City's water supply system is complex

The city's water supply system delivers 1.5 billion gallons of water daily from as far as 125 miles away. The system is gravity fed and includes 6,100 miles of pipeline connected to some 800,000 commercial and residential buildings. It has a storage capacity of 550 billion gallons. The water is stored in three upstate systems: the Croton, the Catskill, and the Delaware. These three systems include 17 reservoirs and 4 controlled lakes.

The Croton system is the oldest system. It has 12 reservoirs and a usable storage capacity of about 87 billion gallons. It supplies about 10 percent of daily needs. Part of this system first became available in 1842. It is located in parts of three upstate

counties--Putnam, Dutchess, and Westchester--on the east side of the Hudson River. Croton water is delivered via an aqueduct to a reservoir in the Bronx and subsequently via aqueducts and conduits to the reservoir in Central Park.

The Catskill system supplies about 40 percent of daily needs and has a usable storage capacity of about 141 billion gallons. It has two reservoirs both on the west side of the Hudson River. The first became available in 1915 and the second in 1924. The Catskill water is delivered primarily through the 92-mile long Catskill aqueduct.

The Delaware system is both the newest and largest. It supplies about 50 percent of the city's daily needs and has three reservoirs with a usable storage capacity of 271 billion gallons. This system is located adjacent to the Catskill system and parts of it are up to 125 miles from the center of Manhattan. The first reservoir in the system became available in 1954 while the last one began operation in 1964. The Delaware water is delivered primarily via the 85-mile-long Delaware aqueduct. Unlike the aqueducts for the other two systems, the Delaware aqueduct is a pressure tunnel constructed in bedrock at depths 300 to 1,000 feet below the ground.

New York City's water delivery system is unique in its dependence on extensive deep-rock tunnels. Two tunnels are in operation while a third is under construction. Water tunnel number 1, almost 18 miles long, was put in service in 1917 and has a diameter ranging from 11 to 15 feet. It is located under the boroughs of the Bronx, Manhattan, and Brooklyn. Water tunnel number 2, about 20 miles long, was put in service in 1936 and has a diameter ranging from 15 to 17 feet. It is located beneath the boroughs of the Bronx, Brooklyn, and Queens. Water tunnel number 3 is currently under construction. When completed it will be about 13 miles long, its diameter will vary from 20 to 24 feet, and it will be concrete lined in bedrock 200 to 800 feet below the surface.

Water use exceeds system's safe yield

About 1.5 billion gallons of water are used in the city daily. The "safe yield" of the system--the amount of water the system could deliver daily in the worst drought on record--however, is 1.29 billion gallons. Daily use, therefore, exceeds safe yield by more than 200 million gallons.

There is general agreement that the city could reduce water use through metering, detecting and repairing leaks in the distribution system, and requiring mandatory use of water conservation devices. Metering residential water users has been discussed for many years but attempts to adopt it have been unsuccessful. New York is one of six major U.S. cities not having universal metering.

Additional treatment needed for one water supply system

The city's drinking water meets national standards, and EPA has given the city an approved classification. Still, one system needs further treatment to offset deteriorating water quality. New York City's water supply system has the reputation as being one of the finest in the world. In 1980, city drinking water placed first in a blind tasting of various bottled water and other kinds of water based on tests conducted by "Consumer Reports," an independent, consumer-oriented organization.

According to city officials, the drinking water is of excellent quality because it is fresh mountain water. The principal safeguard for the water's quality is the long detention period afforded in the large reservoirs, which almost entirely removes bacterial and viral content and turbidity. Each reservoir also has chlorinating facilities. Additional safeguards for the water's quality include the city's acquisition of wide marginal strips of land adjacent to the reservoirs and inspection forces patrolling the watershed areas to detect and prevent contamination.

The State has recommended, however, that water supplies from the Croton system--which provides 10 percent of daily needs--receive further treatment. The Croton is the oldest of the three upland systems, and most of the watershed serving its reservoirs is located in an area of substantial residential development. Seasonal algae growths, stimulated by nutrients reaching the reservoir, have frequently been the cause of objectionable color and odor problems. In addition, concentrations of nitrates, solids, and chloride have increased over the years due to urban runoff, growing sewage discharges, and increased use of salt to remove ice from roads.

In June 1979, consulting firms engaged by the city estimated that, depending on the type of treatment selected, total capital costs to treat the supplies from this one system would range from $90 to $148 million. Annual costs, including debt service and operation and maintenance, would range from $12 to $17 million. Annual costs are probably understated, however, since debt service estimates assumed an annual interest rate of 6.5 percent.

Third tunnel needed to assure reliable water supply

As stated previously, delivery of water within the city depends on deep-rock tunnels. The two existing tunnels have been in continuous use since 1917 and 1936. If either tunnel suffered a major breakdown, the city would face a disastrous water shortage. Constructing the third tunnel is costly and attempts to obtain Federal assistance have been unsuccessful.

Both existing tunnels have shown signs of deterioration. For example, it is common in lower Manhattan for the flow from faucets

to slow to a trickle on hot days, for hydrants in some sections of Queens to supply 10 pounds per square inch of pressure instead of the 40 considered necessary to fight fires, and for consumers to experience discolored and poor-tasting water.

Since these two tunnels have been in continuous operation, they have never been inspected. Large sections of the tunnels are 800 feet below ground level and do not provide direct access for either maintenance engineers or diagnostic equipment. Moreover, under ideal conditions, the giant valves which control the flow of water would be tested periodically to insure they will operate if problems develop. But engineers are hesitant to close the valves because they are so old that once closed they may not reopen. Until water tunnel number 3 is completed, the city will not be able to close down, inspect, and repair the existing two tunnels. Other cities have survived water system breakdowns by trucking in water. However, a city official said it would not be possible in New York City because of the large population involved--7.5 million residents and 3 million daily commuters.

The total cost for completion of water tunnel number 3 was estimated by the city's comptroller to be $3.5 billion (in 1981 dollars). However, the State Comptroller issued a report in August 1981 with an estimate of $11 billion with completion sometime after the year 2000. The City Comptroller also stated that the project needs outside funding. Federal aid is considered improbable, since prior attempts to obtain such assistance were unsuccessful.

SOLID WASTE DISPOSAL IS A MAJOR PROBLEM

New York City generates about 28,000 tons of solid waste daily--more than the cities of Paris, London, and Tokyo combined. Although about 15 percent of the solid waste is incinerated at municipal and nonmunicipal incinerators, the remainder is landfilled at five sites. None of the landfills meets Federal and State environmental standards, and, as such, they are classified as "open dumps." Further, the city projects that only one landfill will have unused capacity beyond the year 2000. The city plans to construct a series of resource recovery facilities to burn its solid waste.

The solid waste disposal system

Of the 28,000 tons of solid waste generated daily, 78 percent is disposed of in municipal landfills and incinerators by the city's Department of Sanitation and private carters. Eleven percent is disposed of in nonmunicipal incinerators and 11 percent is transported by private carriers to out-of-State landfills. To dispose of its garbage, the city operates three incinerators, three truckfed landfills, and a 3,000-acre barge-fed landfill. A fifth landfill is used solely for construction waste.

Incinerator operations

The city currently operates three incinerators--down from six in 1979. The inactive incinerators were closed due to air pollution problems. Of the three active incinerators, two are located in Brooklyn and one is in Queens. Although they have a design capacity of 1,000 tons daily, they are averaging about 500 daily. The incinerators operate 6 days a week.

Incineration is the most costly method of disposal, according to the city. It will continue to be used in conjunction with landfills, however, until better disposal methods are developed. Incineration can reduce the original volume of solid waste by about 90 percent, and the residue is then landfilled. Incineration cannot handle all types of solid waste. Bulky material such as mattresses and large pieces of wooden and metal furniture, along with refrigerators, sinks, etc., can be disposed of only at the landfills.

Landfill operations

The 3,000-acre landfill in Staten Island--Fresh Kills--is the world's largest garbage dump. Operating day and night, 6 days a week, it receives about 10,000 tons of solid waste daily. Solid waste is transported to Fresh Kills by barges operating from nine marine transfer stations located throughout the city. The typical transfer station loads two barges averaging 125 truckloads of material each day. The more active stations load three and four barges daily.

At Fresh Kills, the barges are unloaded by three stationary cranes located along the waterside. The cranes then load the refuse onto wagons which are pulled by tractor for disposal at a prepared strip of land. After the load is dumped, it is bulldozed, sprayed with disinfectant, compacted by heavy equipment, and finally covered with a layer of fresh earth.

In addition to Fresh Kills, the city operates three truck-fed landfills in Brooklyn, Queens, and Staten Island to handle garbage. The Fountain Avenue site in Brooklyn is the largest. It receives about 9,000 tons of solid waste daily and is owned by the Department of the Interior's National Parks Service. The city's lease expires in December 1985. Since 1979, the city has closed five landfills, two of which were used exclusively to dispose of construction debris.

The remaining two truck-fed landfills service only those sections of the city in which they are located. The Edgemere landfill, located in Queens, receives about 400 tons of solid waste daily. The Muldoon Avenue landfill, located in Staten Island, receives about 1,200 tons of solid waste daily. The city estimates that Fountain Avenue, Edgemere, and Muldoon Avenue will

be full by 1985. Fresh Kills will still have unused capacity after the year 2000, if planned resource recovery facilities are in operation.

Landfills do not meet environmental requirements

None of New York City's landfills complies with Federal and State environmental laws. All are classified as open dumps rather than sanitary landfills. Problems include surface and ground water pollution, the lack of proper cover material, and the presence of vermin. One of the smaller landfills is located in a flood plain.

In 1977, the State Department of Environmental Conservation was authorized to regulate the design, construction, and operation of all solid waste management facilities. The city subsequently engaged a consultant to provide detailed engineering data on upgrading the landfills to conform to the revised code. In 1980, the consultant reported that none of the landfills complied with the code and estimated that it would cost about $208 million to comply for the period 1980 to 1985. Of that total, about $156 million was for capital costs, while more than $52 million was for operating costs.

According to the consultant, the costs could be reduced to about $72 million if the State granted reasonable variances. The variances would include use of lifts (depth of solid waste) greater than 10 feet, final cover without an impervious seal, a leachate collection system only in critical areas, and the use of city personnel to construct dikes.

In the fall of 1981, the city awarded a contract to another consultant to develop an implementation plan for the first consultant's recommendations.

City plans to construct a series of resource recovery plants

City officials anticipate that the Fountain Avenue landfill will close by the end of 1985. If that happens, the city will lose about 40 percent of its current waste disposal capacity. At present, there is no additional land in the city which could be used as a landfill. While the city may request that Fountain Avenue remain active beyond 1985, it believes resource recovery offers an alternative that is exceptionally attractive--both economically and environmentally. Officials estimate that seven or eight resource recovery plants must be built over the next two decades. The city has received $2.4 million from the Department of Energy and EPA for initial development activities.

Resource recovery is the process of extracting useful materials and/or energy from solid waste. At the resource recovery facility, waste is mechanically converted into an energy product such as steam, electricity, or solid fuel. Material such as paper,

glass, and metals also may be separated out of the waste stream for reprocessing into new materials.

The city received four proposals for construction of a resource recovery facility at the former Brooklyn Navy Yard. The solid waste would arrive daily by barge, and the facility would convert 3,000 tons of refuse daily into energy in the form of steam. The steam will be sold to a nearby Con Edison plant which will use it for the heating and air conditioning of office buildings in lower Manhattan.

According to city officials, the facility will be built to meet all environmental regulations and will be patterned after resource recovery facilities operating in Chicago, Illinois; Nashville, Tennessee; and Saugus, Massachusetts. The "mass burning" process is the resource recovery technology proposed for the Navy Yard facility. The furnace, specially designed for refuse combustion, will use a waterwall incinerator. The furnace will be lined with tubes through which water flows. The heat of combustion will boil the water and produce steam. Any residue will ultimately be disposed of at the Fresh Kills landfill.

The city estimates capital costs of the plant to be about $226 million. It will be financed through a combination of tax exempt industrial revenue bonds, State and Federal grants, and a possible contribution of city general obligation capital funds.

The facility will be designed and built by a private company and will be operated by the company under a long-term contract. The company will charge the city an operating fee. The plant is expected to begin commercial operation by 1986 or 1987.

Concern has been expressed with respect to the potential air pollution from these facilities. Even if an individual plant can meet its emissions limits, a cluster of similar facilities in the same area could pose problems. For example, in 1980, the former commissioner of New Jersey's Department of Environmental Protection asked for an examination of the potential health effects from emissions from 32 incinerators and coal conversion plants planned for the New York City-Northeastern New Jersey metropolitan area.

The evaluation performed by EPA--admittedly preliminary in nature--showed that in Jersey City, New Jersey, where the maximum concentration from trace metal emissions exists, the added risk from emissions from the planned facilities is about 10 times higher than the background risk, a level which cannot be ignored.

EPA's Environmental Criteria and Assessment Office also evaluated the potential health effects of emissions of trace metals from the planned facilities. The report concluded that some of the trace metals evaluated posed carcinogenic and/or noncarcinogenic health problems to residents of the study area. The report also pointed out that in analyzing the impact of these emissions on humans, indirect exposure--for example, from ingestion--could

also pose a health threat along with direct exposure from inhalation.

CITY DUMPS ITS SEWAGE SLUDGE INTO THE ATLANTIC OCEAN

New York City has been dumping its sewage sludge into the Atlantic Ocean for about 50 years. It has been an inexpensive and effective disposal method. Ocean dumping sewage sludge which unreasonably degrades the marine environment was prohibited after December 31, 1981, by the Marine Protection, Research, and Sanctuaries Act, but enforcement of the ban was held up by a court order. Sludge dumping obviously pollutes marine waters but the city questions whether it is as environmentally harmful as other disposal methods it has considered. The city would rather move its dumping operations further off shore than discontinue the practice completely.

New York Bight contamination

The city dumps its sludge about 12 miles offshore in a section of the Atlantic Ocean known as the New York Bight. There is no question that the New York Bight is severely contaminated. In characterizing its condition, one biologist wrote that its waters have become so poisoned that even the hardy nematode worm, perhaps the most pollution resistant of all the oceans' creatures, cannot survive in it. Recent studies, however, indicate that overall contamination of the Bight is less than was thought before. Moreover, sewage sludge contributes only a small portion of the contaminants that reach the Bight. Because of these other pollutants, it appears that immediate cessation of sewage sludge dumping would do little to improve the Bight in the near future.

Some believe that the city's sewage sludge has only been shown to be harmful by using very conservative criteria and inferior tests. On the other hand, sludge dumping could endanger the marine environment. The Director of the National Oceanic and Atmospheric Agency's Office of Marine Pollution Assessment said sewage sludge contains several types of potentially harmful materials, including petroleum hydrocarbons, PCBs, and toxic metals. The Director said possible effects of these substances included reduction of fish stocks and fish and shellfish disease. The Council on the Environment of New York City wrote that some scientists believe the 70 million cubic feet of sewage sludge that the city dumps annually reduces the penetration of light into the ocean and may, therefore, jeopardize the food chain from one-cell marine organisms to game fish and waterfowl.

Interim alternative is costly and controversial

In anticipation of the December 31, 1981, deadline to cease sludge dumping, the city developed an interim sludge management plan. This plan called for dewatering the sludge at a central

location, composting the sludge on land adjacent to two sewage treatment plants, and then barging the composted sludge to two distribution centers for application as a land conditioner on underdeveloped city parkland.

Estimated costs for this interim alternative varied widely. Capital costs ranged from $170 to $350 million and annual operating costs from $25 to $34 million. The composting alternative--the city's lowest cost alternative to ocean dumping--represented an enormous increase over the $3 million current annual cost of marine disposal.

The interim plan was short term because even the most liberal estimates projected that composted sludge could be spread on land in the city for only 9 years. Other estimates place the plan's operating lifetime at 7 years, due to the limited availability of suitable public lands and the environmental effects of the sludge.

EPA has given conceptual approval to the land application of composted and digested sewage sludge and provided detailed steps that can and should be taken to mitigate land application's environmental effects. The city, however, believed that the composted land would be precluded from other use since the applied sludge does contain quantities of heavy metal and other toxic substances. They also pointed out that composting posed other hazards on the land on which the sludge is placed and to surrounding areas which may become contaminated by runoff and seepage. Further, no comprehensive study of the risks associated with land disposal has been conducted.

EPA conceded that it had not studied the composting or land application aspects of the city's interim plan. Further, a Federal judge, in a decision regarding New York City's ocean dumping, wrote that EPA has made no effort to determine the suitability of the proposed land application sites or their drainage characteristics, nor has it concluded that the plan is realistic in light of the many precautions that must be taken to avoid human error.

Incineration is a long-term alternative

New York City has not developed a long-term alternative to ocean dumping, but it has determined that incineration is the only feasible alternative. After dewatering, sludge would be incinerated at three regional facilities, and the resultant ash would be landfilled at a site safe for hazardous wastes. The city estimates that incineration would require a $229 million capital investment (above the capital cost of the interim sludge management plan) and operating costs of $40 million annually. Incineration of sewage sludge could present air pollution problems or increase the cost of pollution control. Sewage sludge has high concentrations of trace toxic metals. According to an EPA expert, the advanced technology necessary to deal with this pollution would raise the costs of the city's long-term plan significantly.

Sludge dumping site could be changed

While EPA considers the city's petition to continue dumping at the 12-mile site, EPA is proceeding with a proposal to designate another site, 106 miles from shore, for sludge dumping. An EPA memo dated 1 week before the court's decision suggested that all municipalities dumping at the 12-mile site move their dumping to the 106-mile site as a way of protecting the Bight while at the same time allowing sludge dumping to continue until further data can be developed.

The 106-mile site is beyond the Outer Continental Shelf and the 2,000- to 6,000-foot depth at the site, compared to 150 feet at the Bight, may be enough to disperse and decompose the sludge before it reaches the bottom. EPA's region II's Deputy Regional Administrator stated the 106-mile site makes potential harm to the beaches nonexistent and that the area is not a productive fishing area.

As with all matters involving ocean dumping, there is no consensus on using the 106-mile site. One New York congressman argues for continued dumping at the 12-mile site because sludge is only a small part of the Bight's pollution while the 106-mile site is a pristine environment where the potential effects of sludge dumping are not known. A Deputy Commissioner of the city's Department of Environmental Protection argued that EPA has not adequately addressed the environmental impact of dumping at the 106-mile site and advocated further study before the dump site is moved.

The city's ocean dumping costs would rise to $17 million annually, from $2 to $3 million at present, if it has to dump its sewage sludge at the 106-mile site.

NOISE ABATEMENT PROGRAM: SOME PROGRESS, LOW PRIORITY

According to some environmentalists, the New York City Noise Code of 1972 is the most advanced in the Nation. However, significant reductions in staff have affected its enforcement. Some progress has been made toward reducing subway noise, but much more remains to be done.

There are many sources of noise in the city. They include the sounds of screeching subways and braking automobiles; wailing sirens and blaring horns; roaring engines and airplanes; overloud radios, televisions, and jack hammers; and millions of people. The hard surfaces of concrete, metal, and glass reflect these noises and cause them to echo back, and forth in the skyscraper canyons. Increasing medical evidence shows that the high noise levels in the city are not only harmful to hearing but could also cause a wide variety of ailments.

The city's Department of Environmental Protection, Bureau of Inspection and Enforcement, has a staff of 10 which is responsible for enforcing the noise code. According to bureau officials, its enforcement strategy is to rely on complaints. According to the Council on the Environment of New York City, enforcement of the code has been spotty. Because of personnel cutbacks due to the city's financial problems, the number of inspectors is "inadequately low." The number of summonses issued for noise violations declined from 3,604 in 1973 to 162 in 1977, and was 249 in 1981.

The subways are a major source of noise in the city. The New York City Transit Authority operates the subway system, which is one of the world's largest. There are about 6,500 subway cars, 460 subway stations, and 750 miles of track, of which 70 are elevated.

An April 1981 study issued by the Natural Resources Defense Council reported that the New York subway system is twice as loud as systems of comparable age in Berlin, Paris, and London. According to the study, these high noise levels pose a hazard to public health and make subway use distasteful and less competitive. The study identified three major sources of noise in the city's subways: (1) steel wheel to steel rail contact, (2) propulsion systems, and (3) elevated track structures.

The authority instituted a $123 million subway noise abatement program in the mid 1970's. This program was funded by various sources, including the Urban Mass Transit Agency. The Agency's grant, which was completed in fiscal year 1980, totaled $51 million. The Agency provided almost $41 million, while the remaining $10 million came from State and city sources. Added to this grant were a $63 million grant for improvements to the existing subway system and a $9 million trade-in of highway funds for use in the subway noise abatement program.

An authority official advised us that most of the funds were earmarked for reducing wheel to rail noise and retrofitting some subway cars with air conditioners. Almost $52 million was spent on replacing 58 miles of the system's rails with new welded rails.

The study pointed out the subways could be quieted with routine maintenance procedures and concluded that although the subway's noise abatement program has had some success, more needs to be done. One of the primary needs is developing a set of noise objectives and standards.

ORGANIZATIONS CONTACTED

State, county, and regional

Interstate Sanitation Commission

New York State Comptroller's Office

New York State Department of Environmental Conservation

New York State Department of Health

Municipal

New York City Council on the Environment

New York City Department of Environmental Protection

New York City Department of Health

New York City Department of Sanitation

New York City Office of Management and Budget

New York City Transit Authority

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