Ohio Department of Natural Resources

AIR AND WATER QUALITY ANALYSES

CZM
Ohio Coastal Zone Management Program

ODNR Lake Erie Shoreline Study

AIR QUALITY & POINT SOURCE EMISSIONS ANALYSES

Completed by

The Ohio Environmental Protection Agency
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ODNR Lake Erie Shoreline Study

REPORT ABSTRACT

LAKE ERIE SHORELINE AIR QUALITY ASSESSMENT - 1974

The nine counties in the study area include many of the largest industrial complexes and 25% of the coal burning electric generating facilities in the State. There are 811 major sources of Total Suspended Particulate - TSP (airborne particle matter) and Sulfur Dioxide - SO_2 (gas) in the shoreline counties. These sources emit more than 197,000 tons per year of TSP and nearly 600,000 tons per year of SO_2. As a result of these high emission rates, the existing air quality along the shoreline appears to be unacceptable (non-attainment) or marginal in many areas:

Ashtabula County. Overall air quality appears to be better than the air quality standards. However, several sites near the City of Ashtabula are marginal.

Cuyahoga County. Numerous air quality violations for both SO_2 and TSP exist throughout the City of Cleveland. Much of the county does not appear to be attaining air quality standards.

Erie County. Overall, the air quality in the county appears to be better than the air quality standards. However, several sites near the City of Sandusky are marginal.

Lake County. Much of the county appears to have air quality better than the standards. Several sites within the vicinity of major sources, however, are above the standards and are identified as non-attainment areas.

Lorain County. Lorain County is very similar to Lake County, as much of the county appears to have air quality better than the

the standards. Several sites within the vicinity of major sources, however, are above the standards, and are identified as non-attainment areas.

Lucas County. Numerous air quality violations exist throughout the City of Toledo. Much of the county does not appear to be attaining air quality standards.

Ottawa County. Ottawa County exhibits much cleaner air than the industrialized shoreline counties. The entire county appears to be in attainment of clean air standards.

Sandusky County. Much of the county appears to have air quality better than the standards. Several sites within the vicinity of major sources, however, are above the standards and are identified as non-attainment areas.

Wood County. Wood County is very similar to Ottawa County in that the entire county appears to be attaining air quality standards.

ODNR Lake Erie Shoreline Study

ABSTRACT

This report was prepared by the State of Ohio Environmental Protection Agency (OEPA) during the period November, 1976 through January, 1977 for the Ohio Department of Natural Resources (ODNR). The purpose of the report was to document the existing point sources of air pollution and the existing air quality in a nine-county study area along the Lake Erie Shoreline (in alphabetical order): Ashtabula, Cuyahoga, Erie, Lake, Lorain, Lucas, Ottawa, Sandusky, and Wood Counties. Comments regarding projected future air quality in each county were also developed. Two major products resulted: (1) a detailed report entitled "ODNR Lake Erie Shoreline Study AIR QUALITY & POINT SOURCE EMISSIONS ANALYSES"; and (2) a complete set of nine county base maps with air quality monitoring sites and clear plastic overlays with emission points. Copies of the report are available from the ODNR, Fountain Square, Columbus, Ohio 43215. Copies of the maps are not available.

The report begins by establising the relationship between the Ohio State Implementation Plan (SIP) and the Clean Air Act of 1970. The second section describes the air quality operations of the OEPA and the data stored in the SAROAD data system. Calendar year 1975 air quality data are presented. The third section identifies long-term air quality trends. The fourth section describes the point source emissions data collection activities of the OEPA and the data stored in the EIS data system. Calendar year 1974 point source emissions data are presented. The final section of the report is a county-by-county analysis of current data. The report includes data tables and other associated appendix materials.

CLEAN AIR ACT OF 1970

AND

THE OHIO AIR IMPLEMENTATION PLAN

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In 1970, the U. S. Congress responded to the mounting national concern regarding air pollution by passing the Clean Air Act Amendments. This legislation revised the Clean Air Act of 1967 into a much stronger and more comprehensive authority for air pollution control.

The 1970 amendments broadened the role of the federal government in setting standards for air quality, directing state efforts to meet the standards and enforcing plans to meet the standards when a state fails to do so. The "standards" established by the federal government identify the ambient air quality (the air we breathe) levels necessary to protect the public health and the public welfare. The federal standards establish the maximum concentration of pollutants allowed in the outdoor air. Each state may set stricter standards if it so desires.

As of this time, the U. S. EPA has established national air quality standards for six pollutants: Sulfur Dioxide, Particulate Matter, Carbon Monoxide, Oxides of Nitrogen, Photochemical Oxidants and Hydrocarbons. Primary and secondary standards have been adopted for each pollutant. The primary standards define levels of air quality which are necessary, with an adequate margin of safety, to protect the public health. The secondary standards define levels of air quality necessary to protect the public welfare from any known or adverse effects of a pollutant.

The Act required that each state prepare and submit to the U. S. EPA for approval a comprehensive plan (State Implementation Plan or SIP) for

attaining and maintaining the air quality standards established by U.S. EPA The plan had to include a strategy: (1) for improving air quality within three years to the levels established by the standards; and (2) for maintaining the air quality standards once attained.

Development of Ohio's SIP

Work on Ohio's State Implementation Plan was begun in 1971 by the staff of the air pollution unit of the Ohio Department of Health. This effort was led by Jack Wunderle who is currently Chief of the Office of Air Pollution Control at the Ohio EPA. The original SIP was submitted to U.S. EPA on January 31, 1972. That original submission was subsequently approved in part by U.S. EPA.

Some of the questions which influenced the development of the SIP were: (1) will the strategy attain and maintain the applicable air quality standards? (2) what control strategy options are available and what will each cost? (3) how will the plan be implemented? (4) how much manpower will be needed? Is the local manpower contribution adequate? (5) what new statutory and regulatory authority will be needed to implement and enforce the strategy?

Contents of the SIP

At the heart of the SIP are the emission limitation regulations which control the amount of each pollutant which can be emitted into the atmosphere by any source. These emission limitations were developed on the basis of existing air quality and emissions data in conjunction with mathematical models designed to predict future air quality after the emission limitations were attained. The emissions limits and control requirements have been

established at a level necessary to attain and maintain the applicable air quality goals (standards).

The implementation and enforcement of the emission limitation regulations are accomplished through the issuance of air permits. Two types of permits are involved: (1) Permits to Operate are issued to sources in full compliance; and (2) Variances are issued to sources out of compliance. Each Variance includes a time-oriented compliance schedule which outlines the control program that the source will follow to attain full compliance, whereupon it will be issued a Permit to Operate. The field surveillance and source inspection activities conducted by the Agency are intended to assure that those sources in compliance (having permits) continue in compliance and those sources not in compliance (having a variance) install control methods in a timely manner. A history of failure to comply may lead to recommendations for enforcement action. Enforcement activities are coordinated by the OEPA legal staff and the State of Ohio Attorney General.

In addition to emission limitations, the SIP addresses many other elements in a comprehensive air program plan. These include: (1) emergency episode procedures; (2) restrictions on open burning; (3) review of new sources of air pollutants prior to construction or installation; (4) transportation control plans; (5) the establishment of extensive procedural means for citizen and industry involvement in actions of the Agency; and (6) provisions for daily Air Quality Index readings in each major metropolitan area.

Controversy about the SIP

The Ohio SIP has been a subject of controversy from the very beginning.

That is no surprise considering the widespread (seven major urban areas) and extensive (more than 2000 major sources) industrial and utility facilities in the State. The potential air pollution problem is further highlighted by the fact that Ohio's industries and utilities are more closely tied to utilization of coal than are those in other states. The difficult task facing those involved in writing SIP regulations is to ensure that the air quality standards will be attained and maintained while at the same time avoiding regulatory "overkill." Unnecessary or unjustified "overkill" is certain to lead to court battles and delays in meeting the clean air objectives.

The original target data for attaining the ambient air quality standards was July 1, 1975. Numerous court cases have challenged both the procedural means used by the U.S. EPA in adopting the Ohio SIP and the methods/data used to justify the emissions limitation regulations. As a result of a court case against the Administrator of U.S. EPA the target date for attaining the ambient air quality standards for Particulate Matter, Carbon Monoxide, Oxides of Nitrogen, and Photochemical Oxidants has been postponed until April 15, 1977. In addition, these setbacks have contributed to the confusion regarding the status of the Sulfur Dioxide protion of the SIP.

The Continuous Planning Cycle/Revisions to the SIP

The first priority for revisions to the current SIP is to adopt an enforceable set of Sulfur Dioxide (SO_2) regulations. Some progress has been made in the absence of SO_2 regulations, but the largest part of the

sulfur dioxide cleanup job is still in the future for Ohio. The U.S. EPA has adopted SO_2 emission limitation regulations (August 27, 1976) and Ohio EPA has proposed to adopt identical state regulations. Hearings are currently being held in several Ohio cities and final regulations will most likely be adopted by the State in the early summer of 1977.

The Ohio State Implementation Plan has been developed and will undergo change as part of the continuous air program planning cycle: plan development, implementation, evaluation and plan revision. This cycle acknowledges that the air planning process is not perfect. Adjustments must be made because assumptions and data may be in error, improvements in technology open entirely new alternatives, changed circumstances occur (fuel shortages, etc.) or the objectives of the effort are changed to reflect different societal pressures.

The following changes to the SIP will be considered in the coming months: (1) review of SIP adequacy regarding continued maintenance of the air quality standards after they have been attained (Air Quality Maintenance Area planning) (2) review of new sources to assess their impact on attainment and/or maintenance of the air quality standards; (3) an evaluation of the need for stricter point source control of particulate emissions in non-attainment counties; (4) an expanded program to control hazardous air pollutant sources (National Emission Standards for Hazardous Air Pollutant Sources); (5) the incorporation of non-significant deterioration provisions in counties where air quality is substantially better than the standards require; and (6) an overall review of the necessity for transportation controls in the major metropolitan areas of Ohio.

Changes to the SIP are only made after careful consideration by the Agency's technical and policy staff and subsequent to hearings where testimony from all interest groups is solicited. Every Ohio citizen and organization with an interest in air pollution control is encouraged to become familiar with the Ohio State Implementation Plan and to participate at hearings when changes to the SIP have been proposed. Copies of the SIP are available for public inspection at each of the twelve Ohio Local Air Agencies, at each of the five Ohio EPA District Offices, and at the Central Office of the Ohio EPA in Columbus.

1975 AIR QUALITY

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Air quality data collected from all Ohio monitoring sites is stored in a computerized format called Storage and Retrieval of Aerometric Data (SAROAD). Appendix "A" - Statistical Analysis, contains printouts of statistical analyses from the SAROAD system for the nine Erie shoreline counties in 1975. Table 1 is a key to the various data fields in these printouts. Some additional clarification follows.

Ultimate responsibility for the operation of the Ohio Air Sampling Network (OASN) lies with the Ohio Environmental Protection Agency (OEPA). Ohio is served by five OEPA District Offices: Northwest District Office at Bowling Green; Northeast District Office at Twinsburg; Central District Office at Columbus; Southwest District Office at Dayton; and Southeast District Office at Logan. In many localities authority for operating monitors in the OASN has been delegated by the state agency to pre-existing county and city air pollution control agencies.

The choice of a location for an air sampler is a function of many factors including meteorology (prevailing wind directions, average temperatures, mixing heights), topography (presence or absences of low-lying areas such as valleys; proximity to a large body of water such as Lake Erie, with its lake breezes and moderating effects on temperature), and the locations of industries which emit air pollutants.

Another factor to be considered in locating a monitor is the purpose for which the monitoring is being done. A PROJECT to determine background concentrations (the concentration expected if all sources of air pollution in the immediate area were shut down) would locate monitors in rural areas which are relatively "clean" with respect to the pollutant being measured.

A source-oriented surveillance project would locate monitors near an industry or cluster of industries. A population-oriented surveillance project might require that monitors be located in a housing development. Other types of projects include: data collected from Air Quality Index sites; data gathered during air alert conditions (episode); and special studies (an example of a special study would be in Cuyahoga County where certain intermittent monitors are run on a three-day rather than a six-day sampling schedule).

Standard METHODS for collecting air samples include intermittent (high volume samplers, gas bubblers) and continuous (instrumental) monitors. The high volume sampler operates on the same principle as a vacuum cleaner, drawing a known volume of air through a pre-weighed filter which is later reweighed for its particulate content. A bubbler draws a known volume of air through a specially prepared liquid. The pollutant being collected (SO_2 or NO_2) goes into solution and is chemically retained there for later analysis at a laboratory. In Ohio, high volume samplers and bubblers are operated on an intermittent six-day schedule, running for twenty-four hours every sixth day throughout the year.

Continuous monitors are more sensitive, complex instruments. They collect samples constantly (except when down for calibration or repair), average the data every few minutes, and record the values on a strip chart. The values must then be hand translated into hourly averages for the pollutant being measured. Carbon Monoxide (CO), Ozone (O_3), Hydrocarbon (HC) and Nitrogen Oxide (NO_X) levels are measured utilizing continuous monitors. The use of continuous instruments to measure SO_2 levels is increasing, due

to problems with the temperature degradation of samples collected by the bubbler method.

The United States Environmental Protection Agency (USEPA) publishes and updates a list of approved reference methods. All instruments in the air monitoring network must meet certain specifications, and must be calibrated according to a regular schedule, in order for the data to be acceptable to the National Aerometric Data Bank (NADB). New sample collection methods are frequently tested to determine whether they produce data equivalent to that produced by the approved reference methods. If they do, then these methods are also approved. Intermittent monitors must be calibrated as follows:

A. High Volume Samplers
    1. Measure and/or adjust flow rate and redo charts quarterly.
    2. Clean and check motor annually.

B. Gas Bubblers
    1. Calibrate the needle before and after every sample.
    2. Calibrate the standard orifice once per year.
    3. Do random vacuum checks as needed.

All continuous monitors must receive a daily zero and span, and be calibrated once per quarter. Continuous ozone monitors must be calibrated specifically during the months of April, July, October, and January due to the seasonal nature of that pollutant.

The United States Environmental Protection Agency (USEPA) and OEPA each supervise their own quarterly inter-laboratory quality assurance

program for SO_2 and NO_2 bubblers. These programs check the accuracy of the people doing the lab analysis by asking them to determine the concentrations of known samples of SO_2 and NO_2 in solution. Monitoring agencies may also participate in an optional USEPA audit which checks the accuracy of the calibration methods used.

NADB validity criteria require not only that the monitoring instrument be of an approved type and be calibrated on a regular basis but also require that a minimum number of samples be taken with a particular temporal spacing. Intermittent data must have a minimum of five readings per quarter. If there is one blank month in the quarter, then the other two months must each have more than one reading. There cannot be two blank months in a row. A year is valid if it contains four valid quarters. Continuous data must have a minimum of 75% of the total possible number of hours in any given time period, whether the period be a month, a quarter, or a year.

Some air quality data collected by the OEPA monitoring network in 1975 has been omitted from Appendix "A". The paper tape sampler method is considered to be obsolete. Particulate data collected utilizing this method may be stored in the SAROAD system for the convenience of the monitoring agency, but its use is unacceptable to OEPA and USEPA. Information from ongoing sulfate, nitrate, and nitric oxide studies has been omitted from Appendix "A" because no standards have yet been set for these pollutants.

Table 2 - Lake Erie Shoreline Study - 1975 Air Quality Data in Nine Ohio Counties has been compiled from Appendix "A". It contains 1975 air quality data from only those sites reporting a number of samples adequate to meet NADB criteria for statistical validity. The location of each site

in Table 2 has been plotted on the appropriate county map in the map folder. Monitoring sites were first plotted on a working map using the Universal Transverse Mercator (UTM) coordinates listed in the SAROAD file. Northing and Easting in the UTM system are the metric equivalents of latitude and longitude. All nine Erie shoreline counties lie entirely within UTM Zone 17. These site locations were double checked against the working maps which had been used in the preparation of the OEPA publication entitiled "Air Quality Monitoring Sites and Instrumentation of Ohio", prepared by Diana Donohue in April of 1975.

Most of the headings in Table 2 are self-explanatory. MONITOR TYPE indicates whether the instrument collects samples on an intermittent (I) or on a continuous (C) basis. The ANNUAL measured concentration represents a geometric mean for Total Suspended Particulate (TSP) and an arithmetic mean for the other pollutants. An annual concentration value is calculated for all pollutants, whether monitored intermittently or continuously, and is found in Appendix "A". The 24-hour concentration value is the reported second maximum for intermittent TSP and SO_2 monitors. The one-hour concentration value is the reported second maximum for continuous carbon monoxide and ozone monitors. These values are all found in Appendix "A".

A NADB Annual Frequency Distribution printout for 1975 provides the three-hour concentration values for continuous SO_2 monitors, and the eight-hour concentration values for continuous carbon monoxide monitors. The 24-hour value for continuous sulfur dioxide monitors was hand calculated.

LONG-TERM AIR QUALITY TRENDS

LONG-TERM AIR QUALITY TRENDS

Table 3 - Trends in Maximum Annual Mean Air Quality Values ($\mu g/m^3$) for TSP and SO_2 in the Nine Ohio Shoreline Counties, shows the highest annual mean pollutant concentration measured at any site for each of the nine Erie shoreline counties from 1969 through 1975. The TSP values are geometric means, and the SO_2 values are arithmetic means. A blank indicates that no monitoring was done in that county for that pollutant in that year. Rural Erie and Ottawa Counties have had little or no monitoring done in them. The more industrial Counties of Cuyahoga and Lucas have monitoring data for all seven years. The letters DNMC indicate that monitoring was done in that county for that pollutant in that year, but that the resultant data did not meet (NADB) criteria.

The values of Table 3 are no more than a general indication of air quality trends. The recorded pollutant concentration in each county is the average annual value at the worst site. This highest value may occur at a different site each year. Site locations may change from year to year. The point which would yield the true maximum reading in the county may not correspond to any monitoring site in operation during the year. The total number of sites operating varies from year to year. Any apparent increase or decrease in the maximum annual mean may actually be the artificial result of such changes in the monitoring network.

Real increases in air pollution concentrations may be the result of an influx of new sources or a production increase at existing sources. Increases may also reflect unusual meteorological conditions. Prevailing winds may cause the emissions from a given facility to impact more often on

a particular receptor. Air stagnations which trap pollutants close to the earth, preventing their dispersion and thus promoting the buildup of high concentrations, may occur more frequently in one year than in another.

Similarly, real decreases in air pollution concentrations may be the result of actual emissions reductions achieved as sources on a variance reach their ultimate compliance dates. Or decreases may reflect economic and/or meteorological fluctuations. All of these possible influences on air quality measurements must be kept in mind and the interpretation of Table 3 should be tempered accordingly.

1974 EMISSIONS INVENTORY

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Emissions data for all Ohio industrial sources generating 25 tons per year (TPY) or more of any criteria pollutant is stored in a computerized Emissions Inventory System (EIS). Appendix "B" - Ohio EPA Emissions Inventory System - Sources with One Pollutant Greater than 25 TPY Actual (11-19-76) contains a listing from the EIS system for those facilities located on this listing. Table 4 explains the format used in Appendix "B".

A criteria pollutant is any air contaminant for which air quality standards have been set. At present the USEPA and the OEPA recognize six criteria pollutants: total suspended particulates, sulfur dioxide, carbon monoxide, photochemical oxidants, non-methane hydrocarbons, and nitrogen dioxide. Table 5 - Air Quality Standards lists these pollutants and their applicable standards. The federal primary standard was set to protect the public health. The federal secondary standard was set to protect the public welfare.

Five of the criteria pollutants are emitted from stationary and mobile point sources as by-products of fuel combustion. Photochemical oxidants are not. They are produced in the atmosphere as a result of chemical interactions among hydrocarbons and oxides of nitrogen in the presence of sunlight.

The first two digits in the 14-character APPLICATION NUMBER identify the agency which is directly responsible for permit processing in this area. The third and fourth digits identify the county in which the facility is located (01-Adams through 88-Wyandot). The fifth through tenth digits specify the facility. The alphabetic character and final three digits in the 14-character sequence identify the specific piece of source equipment

within the facility from which pollutants are emitted. A "B" indicates that the source is a boiler, "P" indicates a process, "I" indicates an incinerator, "T" is a storage tank, and "R" is a spray booth.

Not every source has to meet emissions limitations for every pollutant. In "clean air" areas which meet state and federal ambient air quality standards, it may not be necessary to reduce the emissions of certain pollutants at existing sources. Thus the ALLOWABLE EMISSIONS column may be blank for a given pollutant even though there is an indicated value for that same pollutant in the ACTUAL EMISSIONS column. Restrictions on the emission of criteria pollutants from new sources do apply in "clean air" areas, however.

All pollutant sources in Ohio must have either a PERMIT TO OPERATE (PTO) or a VARIANCE in order to legally operate. Issuance of a PTO means that the source is presently in compliance with all applicable laws. Issuance of a Variance indicates that the source is not yet in compliance but that it has an approved plan and time schedule for coming into compliance. This plan may include repairing or replacing existing equipment, altering operational procedures, or installing air pollution control devices such as electrostatic precipitators or venturi scrubbers. The source on a Variance is allowed to continue to operate while executing its compliance plan, or on or before the ULTIMATE COMPLIANCE DATE it should be able to qualify for a permit.

Small sources, whose contribution to the overall atmospheric pollution load is minimal (< 10 TPY of Sulfur Dioxide and Total Suspended Particulate), can be registered or put on "T" status. "Registration Certificates" are

issued to these small sources only if they would otherwise qualify for a Permit to Operate.

Any permit action taken by the OEPA can be appealed by the facility or any interested party. An ADJUDICATION CODE of 1 indicates that an objection to some permit action has been raised. Such objections have the effect of suspending or postponing the permit action and possibly the ultimate compliance date.

Table 6 - Lake Erie Shoreline Study - Major Air Pollution Sources in Nine Ohio Counties has been compiled from Appendices "B" and "C". It contains a list of the names of industries in the nine-county Erie shoreline area with one or more sources emitting 25 actual TPY or more of a criteria air pollutant. Each industry name has an application number associated with it for easy cross reference to Appendices "B" and "C". The location of each industry in Table 6 has been plotted on the appropriate county map overlay in the map folder using UTM coordinates. In some counties these industry locations have been double checked by an engineer in the district or local air agency office. The headings in Table 6 are self-explanatory.

COUNTY BY COUNTY ANALYSIS

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ASHTABULA

Ten major industries operated a combined total of 32 sources, each of which emitted 25 TPY or more of a criteria pollutant in 1974. These sources are clustered in the northern central portion of the county. The Cleveland Electric Illuminating Company-Ashtabula Plant and the Union Carbide orporation Metals Division were the largest polluters, with seven and eight sources greater than 25 TPY respectively. Five criteria pollutants were being emitted (TSP, SO_2, NO_2, CO, HC).

Four monitoring sites produced air quality data meeting NADB acceptability criteria in 1975. Only total suspended particulate concentration was being monitored at these sites. The highest measured TSP concentration was 75 $\mu g/m^3$ annual geometric mean at site "D" on Lake Road in Ashtabula. This level exceeds the state standard of 60 $\mu g/m^3$, and meets the federal primary standard of 75 $\mu g/m^3$.

Eleven of these 32 sources were on a Permit to Operate in 1974 and the remainder were on a Variance. Ultimate compliance dates on the Variances ranged from March 1, 1975 to July 1, 1977. Objections were raised on Variances involving the four sources of the R.M.I. Company Metals and Sodium Plants.

Table 3 does not show a clear-cut trend in air quality. The annual maximum mean particulate level appeared to decrease from 124 $\mu g/m^3$ in 1971 to 59 $\mu g/m^3$ in 1973, increase to 79 $\mu g/m^3$ in 1974, and then decrease again slightly to 75 $\mu g/m^3$ in 1975.

CUYAHOGA

One-hundred and three major industries operated a combined total of 445 sources, each of which emitted 25 TPY or more of a criteria pollutant. in 1974. Some sources are scattered throughout the county, but most are clustered in the City of Cleveland, particularly along the Cuyahoga River area known as "the flats". The Ford Motor Company and the Republic Steel Corporation were by far the biggest polluters, with 61 and 54 sources greater than 25 TPY respectively. Five criteria pollutants were being emitted (TSP, SO_2, NO_2, CO, HC).

Nineteen monitoring sites produced air quality data meeting NADB acceptability criteria in 1975. TSP, SO_2, and NO_2 concentrations were being monitored in numerous locations. One site monitored CO. There were no sites sampling ozone concentrations.

The highest measured TSP concentration was 149 $\mu g/m^3$ annual geometric mean at site "J" on Broadway in Cleveland. This value exceeds both the state and the federal ambient air quality standards. All 11 Cuyahoga TSP sites reported pollutant concentrations exceeding the state standard.

The highest measured SO_2 concentration was 97 $\mu g/m^3$ annual arithmetic mean at site "R" on St. Tikhon Avenue in Cleveland. This concentration exceeds both the state standard of 60 $\mu g/m^3$ and the federal standard of 80 $\mu g/m^3$. Of the 16 locations monitoring for SO_2 concentrations, nearly half (7) exceeded one or both of these standards, set to protect the public health.

Site "E" on Broadway in Cleveland reported the highest NO_2 concentration, a value of 84 $\mu g/m^3$ annual arithmetic mean. All 17 locations

monitoring NO_2 concentrations found the air quality to be better than the standard of 100 $\mu g/m^3$ annual arithmetic mean with respect to this pollutant.

The single CO monitor in this county reported an eight-hour arithmetic mean concentration of 25 $\mu g/m^3$, which greatly exceeds the standard of 10 $\mu g/m^3$. It also reported a one-hour arithmetic mean of 38 $\mu g/m^3$ which nearly equals the standard of 40 $\mu g/m^3$.

Two-hundred fifty-three of these 445 sources were on a Permit to Operate in 1974, and the remainder were on a Variance. Ultimate compliance dates ranged from February 1, 1974 to November 1, 1977. Numerous objections have been raised. The adjudication process may effectively delay the ultimate compliance date on many Variances in this county.

Table 3 shows a steady decrease in the maximum annual mean TSP concentration from 226 $\mu g/m^3$ in 1969 to 149 $\mu g/m^3$ in 1975. The latter value still greatly exceeds both the state and the federal standards for ambient air quality. However, the apparent downward trend is encouraging. The maximum annual mean SO_2 concentration fell from 134 $\mu g/m^3$ in 1969 to 87 $\mu g/m^3$ in 1974, with no data meeting NADB criteria in 1973. Then in 1975 a somewhat higher maximum of 97 $\mu g/m^3$ was recorded.

ERIE

Eleven major industries operated a combined total of 35 sources, each of which emitted 25 TPY or more of a criteria pollutant in 1974. The Glidden-Durkee Division of S.C.M. was the largest polluter with 18 sources greater than 25 TPY, all of which emit hydrocarbons exclusively. TSP, SO_2, NO_2, CO, and HC were all being emitted in various quantities in this county.

There were no air quality monitoring sites with valid data in this county in 1975.

Thirty of these 35 sources were on a Permit to Operate in 1974 and the remainder were on a Variance. Ultimate compliance dates on the Variances are largely unknown due to objections which have been raised.

Table 3 shows only one value, and that is a maximum annual geometric mean of 75 $\mu g/m^3$ for TSP in 1974. This value exceeds the state standard and meets the federal primary standard for ambient air quality with respect to this pollutant.

LAKE

Thirteen major industries operated a combined total of 75 sources, each of which emitted 25 TPY or more of a criteria pollutant in 1974. The Diamond Shamrock Chemical Company and the Fasson Technical Center were the two largest polluters with 19 and 17 sources greater than 25 TPY respectively. Universal PVC Resins was ranked third with 13 sources greater than 25 TPY. All of the Fasson and Universal sources emit hydrocarbons exclusively. The Diamond Shamrock sources emit TSP, SO_2, NO_2, CO, and HC.

Eleven monitoring sites produced air quality data meeting NADB acceptability criteria in 1975. Only TSP, SO_2, and NO_2 were being sampled at these sites. The highest measured TSP concentration was 73 $\mu g/m^3$ annual geometric mean at site "G" on East High Street in Painesville. This level exceeds the state standard but meets the federal primary ambient air quality standard. This same site recorded the highest county SO_2 value of 86 $\mu g/m^3$ annual arithmetic mean, which exceeds both state and federal standards.

The Lake County Air Agency utilized the sodium arsenite-frit gas bubbler method for NO_2 sampling in January through May of 1975. They then changed to the National Air Sampling Network (NASN) sodium arsenite-orifice gas bubbler method from May through December of 1975. These two methods are compatible. Therefore, in order to get a full year of valid NO_2 data, the monitored results from the two methods were combined into a single weighted annual arithmetic average. The highest reported maximum for either of the two methods was used as the maximum for that site. The highest NO_2 value reported was 47 $\mu g/m^3$ annual arithmetic mean measured at site "I" on Euclid Avenue in Wickliffe. This concentration is well below the standard.

Thirty-four of these 75 sources were on a PTO in 1974, and the remainder were on a Variance. Ultimate compliance dates on the Variances ranged from January 15, 1974 to July 1, 1977. Few objections were raised.

Table 3 shows the air quality in this county to be rather stable for TSP, varying between 68 and 78 $\mu g/m^3$ annual geometric average from 1972 to 1975 with no apparent directional trend. SO_2 values appear to be on the increase, holding steady at 58 $\mu g/m^3$ annual arithmetic mean in 1972 and 1973, and increasing to 73 and 86 $\mu g/m^3$ in 1974 and 1975 respectively.

LORAIN

There are only five major industries in this county, but four of them are large. A combined total of 79 sources operated in 1974, each of which emitted 25 TPY or more of a criteria pollutant. All of these sources

are located in the upper half of the county. The single largest facility is the Fisher Body Division of General Motors Corporation with 28 sources greater than 25 TPY. TSP, SO_2, NO_2, CO, and HC were all being emitted.

Five monitoring sites produced air quality data meeting NADB acceptability criteria in 1975. Four of these measured only TSP. The highest TSP value was 84 $\mu g/m^3$ annual geometric mean reported at site "C" on Tenth Street in Lorain. This concentration exceeds both the state and the federal ambient air quality standards for TSP. The fifth monitoring site measured only SO_2 and recorded an annual arithmetic mean of 84 $\mu g/m^3$, a value which also exceeds both standards.

Forty-two of the 79 sources in this county were on a Permit to Operate in 1974, and the remainder were on a Variance. Ultimate compliance dates on the Variances ranged from September 1, 1974 to October 20, 1976. Objections raised on the variances for six of the sources account for the absence of compliance dates in these cases.

Table 3 shows the maximum annual mean TSP values varying between 74 $\mu g/m^3$ and 96 $\mu g/m^3$ during the period 1972 to 1975, with no particular pattern. SO_2 values, on the other hand, appear to be increasing from a low of 16 $\mu g/m^3$ in 1973 to a high of 84 $\mu g/m^3$ in 1975.

LUCAS

Fifty-six major industries operated a combined total of 264 sources, each of which emitted 25 TPY or more of a criteria pollutant in 1974. These sources are clustered in the greater Toledo area. The Sun Oil Company was by far the largest polluter, with 65 sources greater than 25 TPY. The

Gulf and Standard Oil Companies also had a substantial emissions impact with 33 and 28 sources respectively. TSP, SO_2, NO_2, CO and HC were all being emitted.

Eighteen monitoring sites produced air quality data meeting NADB acceptability criteria in 1975. Of the thirteen sites reporting TSP data, site "H" at Lee and Front Streets in Toledo had the highest concentration of 75 $\mu g/m^3$ annual geometric mean. This value exceeds the state standard, but meets the federal primary standard.

Site "C" on Bayshore Road in Oregon reported a value of 102 $\mu g/m^3$ annual arithmetic mean for SO_2 in 1975. This value greatly exceeds both state and federal standards. It is several times higher than the concentrations found at any of the six other SO_2 sites in the county, whose reported concentrations range between 21 $\mu g/m^3$ and 50 $\mu g/m^3$.

The highest of the five NO_2 sites was site "J", reporting 58 $\mu g/m^3$ annual arithmetic average. This value is well within state and federal limits.

The single CO monitor reported an eight-hour concentration of 6 $\mu g/m^3$, which meets the state and federal standard of 10 $\mu g/m^3$ annual arithmetic mean. The lone ozone monitor measured a one-hour mean concentration of 265 $\mu g/m^3$. This value substantially exceeds both the state standard of 119 $\mu g/m^3$ and the federal standard of 160 $\mu g/m^3$.

One-hundred ninty-four of these 264 sources were on a Permit to Operate in 1974, and the remainder were on a Variance. Ultimate compliance dates on the Variances ranged from December 1, 1974 to April 15, 1977.

Only four objections were filed in this county and should not delay emissions control.

Table 3 shows no trend in TSP concentrations from 1969 to 1972, but in 1973 through 1975, TSP levels appear to drop and stabilize near the federal primary standard of 75 $\mu g/m^3$ annual geometric mean. There is no trend evident in the SO_2 levels. Concentrations vary erratically, with low levels in the 16-23 $\mu g/m^3$ range in 1969, 1970, and 1974 and high levels in the 89 to 103 $\mu g/m^3$ range in 1971 through 1973 and in 1975.

OTTAWA

Six major industries operated a combined total of fourteen sources, each of which emitted 25 TPY or more of a criteria pollutant in 1974. These few sources were widely scattered across the county, increasing the probability that the air will be cleansed of pollutants through the natural processes of wind dispersion and rain before high concentrations can build up. The Uniroyal Company was the largest polluter, with six sources greater than 25 TPY actual. There were no 25 TPY hydrocarbon sources here. Only TSP, SO_2, NO_2 and CO were being emitted.

No air quality monitoring sites were operated in this county in 1975.

Four of these fourteen sources were on a Permit to Operate in 1974, and the rest were on a Variance. Ultimate compliance dates on the Variances ranged from July 1, 1975 to January 1, 1977. There were no objections to any state permit actions.

Table 3 has no data for this county for the years 1969 through 1975.

SANDUSKY

Nine major industries operated a combined total of 43 sources, each of which emitted 25 TPY or more of a criteria pollutant in 1974. The Ohio Lime Company and Pfizer Incorporated were the largest polluters, with 15 and 14 sources respectively. There were no 25 TPY NO_2 sources in this county. Only TSP, SO_2, and CO were being emitted.

None of the monitoring sites operated by the local air agency in this county met criteria in 1975.

The operation of an air quality monitor or monitors is sometimes required of an industry as one of the conditions of a consent order. This is the case in Sandusky County. All seven monitors reporting air pollution data which meets criteria in 1975 were run by private industry. Sites "A" and "B" were operated by the J. E. Baker Company, and sites "C" through "G" were operated by the Pfizer Corporation. Although these monitors have been run the appropriate number of days to meet NADB validity criteria, the data they generated is subject to question. These instruments are not calibrated by any local, state, or federal air pollution control agency, nor do these industries participate in the quality assurance program.

All seven industry instruments sample for TSP only. The highest TSP value was 134 $\mu g/m^3$ annual geometric mean reported at site "C" on County Road 85 in Gibsonburg. This value greatly exceeds both the state and federal TSP standards.

Twenty-three of these 44 sources were on a Permit to Operate in 1974, 20 were on a Variance.

Ultimate compliance dates on the Variances ranged from October 1, 1974 to January 1, 1978. Two objections were raised on state permit actions related to the Kelsey Hayes Fremont Foundry.

Table 3 indicates TSP levels of 208 $\mu g/m^3$ in 1973 and 105 $\mu g/m^3$ in 1974.

WOOD

Fourteen major industries operated a combined total of 28 sources, each of which emitted 25 TPY or more of a criteria pollutant in 1974. As in Ottawa County, these sources are widely scattered, enhancing the dispersion of any pollutants being generated. The Goodyear Tire and Rubber Company and the Libbey Owens Ford Company were the largest polluters, with six sources greater than 25 TPY each. TSP, SO_2, NO_2, CO, and HC were all being emitted.

Only one monitoring site produced air quality data meeting NADB acceptability criteria in 1975. The particulate monitor at this site recorded a TSP concentration of 54 $\mu g/m^3$ annual geometric mean. This value is below both the state and the federal TSP standard.

Twenty-five of these 28 sources were on a Permit to operate in 1974, and three were on a Variance. The ultimate compliance date for these Variances was July 1, 1975, so these sources should all have Permits to Operate at this time. There was one objection raised regarding the PTO of the 25 TPY source at Smith Foundry and Machine Company.

Table 3 shows TSP values fluctuating between 54 $\mu g/m^3$ and 74 $\mu g/m^3$ maximum annual mean during the years 1971-1975, with no trend evident.

TABLES

TABLE 1

Key to SAROAD Format

AGENCY:	Political subdivision responsible for operating this monitor
STATE-AREA:	Six digit identification number assigned by USEPA
PERIOD:	Time span over which the monitor was operated
OEPA-AGCY:	Agency responsible for operating this monitor
DISTRICT:	OEPA district in whose jurisdiction the monitor is located
COUNTY:	County in which the monitor is located
STATE:	State in which the monitor is located
PROJECT:	Specific reason for doing the monitoring
METHOD:	Method used to collect the pollutant sample
SITE:	Address at which the monitor is located
ANALYSIS:	Method used to analyze the pollutant concentration in the sample--must be USEPA approved reference method
PARAMETER:	Pollutant being measured
SAMPLING INTERVAL:	Unit of time over which each sample is collected. For example, "daily" means the sample ran for 24-hours before being analyzed.
UNITS:	Units in which the pollutant level is measured
TYPE:	Agency setting the standard
PRIMARY STANDARD:	Set to protect the public health
SECONDARY STANDARD:	Set to protect the public welfare
SITE NUM:	Three-digit number assigned by OEPA which, along with the STATE-AREA number, identifies a unique location.
NUM OBS:	Number of samples taken
MIN OBS:	Lowest recorded pollutant concentration occurring within the time period sampled

TABLE 1 (Con't.)

PERCENTILES:	Samples taken are ranked in order of increasing pollutant concentration and assigned a percentile. The 99th percentile cannot be used at this time, due to a programming error.
MAX OBS:	Highest recorded pollutant concentration occurring within the time period sampled
PERCENT ACTUAL:	Number of days actually sampled as a percent of 365 possible sampling days
ARITH MEAN:	Arithmetic mean
STD DEV:	Arithmetic standard deviation
GEO MEAN:	Geometric mean
GEO DEV:	Geometric standard deviation
2ND MAX:	Second highest recorded pollutant concentration
3RD MAX:	Third highest recorded pollutant concentration
K-S:	A statistic indicating log normality, not used by this agency

TABLE 2

LAKE ERIE SHORELINE STUDY
1975 AIR QUALITY DATA IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	MONITOR SITE ADDRESS	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	POLLUTANT	MONITOR TYPE	MEASURED CONCENTRATION ($\mu g/m^3$) ANNUAL	24-HOUR	OTHER	SAROAD CODE
ASHTABULA	A	12 West Jefferson Jefferson	519.0	4625.0	TSP	I	58	120	-	36-0220-002
	B	217 N. Ridge Ashtabula	519.8	4635.8	TSP	I	69	139	-	36-0220-003
	C	Pymatuning Park Andover Township	538.2	4603.6	TSP	I	44	99	-	36-0220-004
	D	2120 Lake Road Ashtabula	516.6	4636.6	TSP	I	75	161	-	36-0200-002
CUYAHOGA	A	8911 Euclid Avenue Cleveland	447.9	4594.7	SO_2	I	62	142	-	36-1300-001
	A	"	"	"	NO_2	I	79	-	-	"
	B	E. 152nd & St. Clair Cleveland	452.1	4600.1	SO_2	I	40	114	-	36-1300-003
	B	"	"	"	NO_2	I	64	-	-	"
	C	3701 East 77th & Marble Cleveland	446.4	4589.3	TSP	I	89	190	-	36-1300-005
	C	"	"	"	SO_2	I	53	138	-	"
	C	"	"	"	NO_2	I	64	-	-	"

TABLE 2

LAKE ERIE SHORELINE STUDY
1975 AIR QUALITY DATA IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	MONITOR SITE ADDRESS	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	POLLUTANT	MONITOR TYPE	MEASURED CONCENTRATION ($\mu g/m^3$) ANNUAL	24-HOUR	OTHER	SAROAD CODE
CUYAHOGA	D	17100 Harvard Avenue Cleveland	452.9	4588.6	SO_2	I	46	154	-	36-1300-006
	D	"	"	"	NO_2	I	59	-	-	"
	E	4749 Broadway Avenue Cleveland	445.1	4591.3	SO_2	I	92	237	-	36-1300-008
	E	"	"	"	NO_2	I	84	-	-	"
	F	W. 25th & Denison Cleveland	441.4	4588.7	TSP	I	93	194	-	36-1300-009
	F	"	"	"	SO_2	I	57	154	-	"
	F	"	"	"	NO_2	I	71	-	-	"
	G	4125 Fulton Road Cleveland	439.6	4588.1	TSP	I	69	185	-	36-1300-010
	G	"	"	"	SO_2	I	50	171	-	"
	G	"	"	"	NO_2	I	66	-	-	"
	H	1910 W. Boulevard Cleveland	437.2	4592.0	TSP	I	71	165	-	36-1300-011
	H	"	"	"	SO_2	I	46	150	-	"

TABLE 2

LAKE ERIE SHORELINE STUDY
1975 AIR QUALITY DATA IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	MONITOR SITE ADDRESS	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	POLLUTANT	MONITOR TYPE	MEASURED CONCENTRATION ($\mu g/m^3$) ANNUAL	24-HOUR	OTHER	SAROAD CODE
CUYAHOGA	H	1910 W. Boulevard Cleveland	437.2	4592.0	NO_2	I	71	-	-	36-1300-011
	I	E. 55th & St. Clair Cleveland	445.6	4596.8	SO_2	I	54	141	-	36-1300-012
	I	"	"	"	NO_2	I	77	-	-	"
	J	2785 Broadway Avenue Cleveland	443.8	4592.4	TSP	I	149	340	-	36-1300-013
	J	"	"	"	SO_2	I	79	266	-	"
	J	"	"	"	NO_2	I	75	-	-	"
	K	E. 105th & Superior Cleveland	448.6	4596.6	NO_2	I	69	-	-	36-1300-017
	L	W. 98th & Almira Cleveland	437.3	4590.1	TSP	I	69	173	-	36-1300-020
	M	5100 Biddulph Road Cleveland	439.7	4586.6	TSP	I	65	146	-	36-1300-021
	M	"	"	"	SO_2	I	47	141	-	"
	M	"	"	"	NO_2	I	59	-	-	"

TABLE 2

LAKE ERIE SHORELINE STUDY
1975 AIR QUALITY DATA IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	MONITOR SITE ADDRESS	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	POLLUTANT	MONITOR TYPE	MEASURED CONCENTRATION ($\mu g/m^3$) ANNUAL	24-HOUR	OTHER	SAROAD CODE
CUYAHOGA	N	3055 E. Boulevard Cleveland	449.1	4591.5	SO_2	I	54	153	-	36-1300-024
	N	"	"	"	NO_2	I	62	-	-	"
	O	4150 E. 49th Street Cleveland	444.8	4588.2	TSP	I	139	364	-	36-1300-026
	O	"	"	"	SO_2	I	93	283	-	"
	O	"	"	"	NO_2	I	67	-	-	"
	P	2200 W. 28th Street Cleveland	441.2	4592.2	SO_2	I	67	180	-	36-1300-027
	P	"	"	"	NO_2	I	68	-	-	"
	Q	E. 22nd & Woodland Cleveland	443.5	4593.5	SO_2	I	72	246	-	36-1300-033
	Q	"	"	"	NO_2	I	77	-	-	"
	Q	" (AQI)	"	"	TSP	I	146	363	-	"
	Q	" (8AM)	"	"	TSP	I	129	365	-	"
	Q	" (4PM)	"	"	TSP	I	138	381	-	"

TABLE 2

LAKE ERIE SHORELINE STUDY
1975 AIR QUALITY DATA IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	MONITOR SITE ADDRESS	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	POLLUTANT	MONITOR TYPE	MEASURED CONCENTRATION ($\mu g/m^3$) ANNUAL	24-HOUR	OTHER	SAROAD CODE
CUYAHOGA	R	2547 St. Tikhon Avenue Cleveland	443.1	4591.6	SO_2	I	97	271	-	36-1300-038
	R	"	"	"	NO_2	I	73	-	-	"
	S	1986 E. 107th Street Cleveland	448.9	4594.2	CO	C	-	25 (8Hr)	38 (1Hr)	36-1300-039
ERIE		No Air Quality Data for Erie County which meets criteria for 1975								
LAKE	A	1941 Red Bird Road Madison Township	494.8	4629.7	TSP	I	53	137	-	36-3280-001
	B	13028 LeRoy Center Road LeRoy Township	485.8	4614.8	TSP	I	48	113	-	36-3280-002
	C	56 Hale Road Painesville Township	483.1	4621.8	TSP	I	57	137	-	36-3280-003
	C	"	"	"	SO_2	I	33	133	-	"
	C	"	"	"	NO_2*	I	30	-	-	"
	D	92 E. Main Street Madison Village	496.2	4624.2	TSP	I	49	109	-	36-3280-004
	D	"	"	"	SO_2	I	32	111	-	"
	D	"	"	"	NO_2*	I	29	-	-	"

* Combined results of two compatible methods.

TABLE 2

LAKE ERIE SHORELINE STUDY
1975 AIR QUALITY DATA IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	MONITOR SITE ADDRESS	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	POLLUTANT	MONITOR TYPE	MEASURED CONCENTRATION ($\mu g/m^3$) ANNUAL	24-HOUR	OTHER	SAROAD CODE
LAKE	E	36010 Lake Shore Blvd. Eastlake	464.8	4613.4	TSP	I	69	138	-	36-1880-001
	F	3520 Stevens Blvd. Eastlake	463.5	4610.8	TSP	I	67	147	-	36-1880-002
		"	"	"	SO_2	I	44	158	-	"
	F	"	"	"	NO_2*	I	42	-	-	"
	G	71 E. High Street Painesville	479.8	4618.7	SO_2	C	63	254	980 (3Hr)	36-5320-002
	G	"	"	"	TSP	I	70	160	-	"
	G	" (AQI)	"	"	TSP	I	73	166	-	"
	G	"	"	"	SO_2	I	86	216	-	"
	H	6733 Reynolds Road Mentor	468.6	4615.1	TSP	I	59	142	-	36-4200-003
	I	29240 Euclid Avenue Wickliffe	460.5	4605.9	TSP	I	65	144	-	36-7380-001
	I	"	"	"	SO_2	I	47	156	-	"
	I	"	"	"	NO_2*	I	47	-	-	"

* Combined results of two compatible methods.

TABLE 2

LAKE ERIE SHORELINE STUDY
1975 AIR QUALITY DATA IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	MONITOR SITE ADDRESS	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	POLLUTANT	MONITOR TYPE	MEASURED CONCENTRATION ($\mu g/m^3$) ANNUAL	24-HOUR	OTHER	SAROAD CODE
LAKE	J	2882 Cricket Lane Willoughby Hills	460.6	4603.2	TSP	I	48	100	-	36-7460-001
	K	301 E. 293rd Street Willowick	460.2	4608.6	TSP	I	67	131	-	36-7480-001
	K	"	"	"	SO_2	I	42	161	-	"
	K	"	"	"	NO_2*	I	44	-	-	"
LORAIN	A	Palm Avenue & 31st St. Lorain	406.7	4587.7	TSP	I	75	133	-	36-3620-002
	B	"G" Street Lorain	404.1	4591.0	TSP	I	83	150	-	36-3620-003
	C	329 10th Street Lorain	400.8	4590.4	TSP	I	84	165	-	36-3620-004
	D	2270 E. 42nd Street Lorain	406.4	4587.6	TSP	I	66	129	-	36-3620-006
	E	200 West Erie Avenue Lorain	400.7	4591.8	SO_2	C	84	658	2137 (3Hr)	36-3620-010
LUCAS	A	Providence & Maumee St. Whitehouse	266.1	4599.9	TSP	I	64	150	-	36-3720-001
	B	109 E. Dudley Maumee	277.7	4604.5	TSP	I	66	157	-	36-4080-001
	C	4421 Bayshore Road Oregon	296.6	4618.2	SO_2	I	102	351	-	36-5200-001

* Combined results of two compatible methods.

TABLE 2

LAKE ERIE SHORELINE STUDY
1975 AIR QUALITY DATA IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	MONITOR SITE ADDRESS	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	POLLUTANT	MONITOR TYPE	MEASURED CONCENTRATION ($\mu g/m^3$) ANNUAL	24-HOUR	OTHER	SAROAD CODE
LUCAS	D	5330 Seaman Street Oregon	298.5	4613.7	TSP	I	53	138	-	36-5200-002
	E	2532 Evergreen Ottawa Hills	280.9	4616.2	TSP	I	50	148	-	36-5280-001
	F	6635 Maplewood Sylvania	275.0	4621.6	TSP	I	46	98	-	36-6520-001
	G	635 N. Erie Street Toledo	288.9	4614.6	NO_2	I	51	-	-	36-6600-001
	H	Lee & Front Street Toledo	293.8	4617.2	TSP	I	75	156	-	36-6600-003
	I	26 Main Street Toledo	289.3	4613.5	SO_2	C	39	249	974 (3Hr)	36-6600-006
	I	"	"	"	SO_2	I	42	126	-	"
	I	"	"	"	NO_2	I	51	-	-	"
	I	" (AQI)	"	"	TSP	I	68	212	-	"
	J	545 N. Huron Street Toledo	289.2	4614.5	SO_2	I	31	100	-	36-6600-007
	J	"	"	"	NO_2	I	58	-	-	"
	J	" (AQI)	"	"	CO	C	-	6 (8Hr)	10 (1Hr)	"

TABLE 2

LAKE ERIE SHORELINE STUDY
1975 AIR QUALITY DATA IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	MONITOR SITE ADDRESS	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	POLLUTANT	MONITOR TYPE	MEASURED CONCENTRATION ($\mu g/m^3$) ANNUAL	24-HOUR	OTHER	SAROAD CODE
LUCAS	J	545 N. Huron Street Toledo (AQI)	289.2	4614.5	SO_2	C	50	275	1013 (3Hr)	36-6600-007
	K	2754 Laskey Road Toledo	283.0	4620.3	SO_2	I	21	52	-	36-6600-009
	K	"	"	"	NO_2	I	47	-	-	"
	L	5235 Summit Toledo	293.7	4621.1	TSP	I	59	133	-	36-6600-011
	M	2626 Laskey Road Toledo	283.2	4620.3	TSP	I	54	115	-	36-6600-013
	N	60 N. Westwood Avenue Toledo	283.0	4613.0	TSP	I	71	134	-	36-6600-015
	O	2445 Monroe Street Toledo	286.8	4614.9	TSP	I	63	152	-	36-6600-017
	P	1503 Broadway Street Toledo	287.1	4611.8	TSP	I	69	136	-	36-6600-018
	Q	815 Navarre Toledo	290.4	4612.2	TSP	I	74	157	-	36-6600-019
	R	2930 131st Street Toledo	294.1	4622.0	SO_2	I	31	131	-	36-6600-081
	R	"	"	"	NO_2	I	43	-	-	"
	R	" (AQI)	"	"	Ozone	C	-	-	265 (1Hr)	"

TABLE 2

LAKE ERIE SHORELINE STUDY
1975 AIR QUALITY DATA IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	MONITOR SITE ADDRESS	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	POLLUTANT	MONITOR TYPE	MEASURED CONCENTRATION ($\mu g/m^3$) ANNUAL	24-HOUR	OTHER	SAROAD CODE
OTTAWA		No Air Quality Data for Ottawa County which meets criteria for 1975								
SANDUSKY	A	State Route 635 Millersville	309.7	4576.9	TSP†	I	66	329	-	36-5980-002
	B	Greensburg Pike Millersville	309.2	4575.8	TSP†	I	46	125	-	36-5980-003
	C	County Road 85 Gibsonburg	305.2	4585.4	TSP†	I	134	1112	-	36-2460-009
	D	State Route 600 Gibsonburg	304.8	4584.0	TSP†	I	59	353	-	36-2460-005
	E	Keller's Garage Gibsonburg	306.1	4584.2	TSP†	I	91	746	-	36-2460-006
	F	County Road 42 Gibsonburg	304.6	4585.3	TSP†	I	80	580	-	36-2460-007
	G	Reeves Avenue Gibsonburg	305.5	4584.1	TSP†	I	72	526	-	36-2460-008
WOOD	A	133 Osborne Street Rossford	286.5	4609.2	TSP	I	54	112	-	36-5860-001

† Site operated by private industry.

TABLE 3

TRENDS IN MAXIMUM ANNUAL MEAN AIR QUALITY VALUES ($\mu g/m^3$)
FOR TSP & SO_2 IN NINE OHIO COUNTIES

COUNTY	POLLUTANT	1969	1970	1971	1972	1973	1974	1975
ASHTABULA	TSP	-	-	124	89	59	79	75
CUYAHOGA	TSP	226	212	201	188	179	175	149
	SO_2	134	124	120	109	DNMC	87	97
ERIE	TSP	-	-	-	-	-	75	-
LAKE	TSP	-	-	-	78	72	68	73
	SO_2	-	-	-	58	58	73	86
LORAIN	TSP	-	-	-	81	96	74	84
	SO_2	-	-	-	-	16	18	84
LUCAS	TSP	120	140	116	124	84	76	75
	SO_2	32	16	95	103	89	29	102
OTTAWA	-	-	-	-	-	-	-	-
SANDUSKY	TSP	-	-	-	-	208	105	DNMC
WOOD	TSP	-	-	73	74	59	73	54

TABLE 4

Key to Emissions Inventory System Format

APPLICATION NUMBER:	Unique 14-digit source identification number
ACTUAL EMISSIONS TONS/YEAR:	Actual tons of each pollutant expected to be emitted from this source in 1974
ALLOWABLE EMISSIONS TONS/YEAR:	Maximum emissions of each pollutant, in tons per year, that the source is legally allowed to discharge under all applicable state and federal laws, rules and regulations, or any other legally binding agreements.
PART:	Total Suspended Particulate
SO_2:	Sulfur Dioxide
NO_x:	Oxides of Nitrogen
HC:	Hydrocarbons
CO:	Carbon Monoxide
TYPE:	Type of source permit application 1 = permit to operate 2 = permit to construct or modify 3 = variance to operate
STATE ACTION:	Action taken on the source permit application A = approved D = denied F = provisionally approved T = registered X = being reviewed by the local agency/district office
ADJ CODE:	Adjudication code indicates any citizen or entity appeal of a state action 0 or blank = no objection 1 = objection has been raised
ULT COMP:	Ultimate compliance date for variances only

TABLE 5

AIR QUALITY STANDARDS ug/m^3

POLLUTANT	DURATION	RESTRICTION	OEPA	USEPA Primary	USEPA Secondary
Suspended Particulates	Annual Mean (G)	Not to be exceeded	60	75	60
"	24-hour concentration	Not to be exceeded more than once per year	150	260	150
Sulfur Dioxide	Annual Mean (A)	Not to be exceeded	60	80	
"	24-hour concentration	Not to be exceeded more than once per year	260	365	
"	3-hour concentration	"			1,300
Carbon Monoxide	8-hour mean (A) concentration	Not to be exceeded more than 1 eight hour period per year	10*	10*	10*
"	1-hour mean (A) concentration	Not to be exceeded more than once per year		40*	40*
Photochemical Oxidants (Ozone)	1-hour mean (A) concentration	Not to be exceeded	119	160	160
	4-hour mean (A) concentration	Not to be exceeded more than 1 consecutive 4-hour period per year	79		
"	24-hour mean (A) concentration	Not to be exceeded more than 1 day per year	40		
Non-methane Hydrocarbons	3-hour mean (A) concentration	Not to be exceeded between 6 AM and 9 AM	126	160	160
"	24-hour mean (A) concentration	Not to be exceeded more than 1 day per year	331		
Nitrogen Dioxide	Annual mean (A)	Not to be exceeded	100	100	100

(A) Arithmetic (G)Geometric * Only standard expressed in milligrams per cubic meter

TABLE 6

LAKE ERIE SHORELINE STUDY
MAJOR AIR POLLUTION SOURCES IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	INDUSTRY NAME	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	APPLICATION #	#SOURCES> 25 TPY
CUYAHOGA	9	ANCHOR INDUSTRIES INC.	453.5	4600.4	1318000514	1
	10	APEX SMELTING CO.	446.2	4587.5	1318170029	3
	11	ART GRAVURE CORP.	443.4	4595.0	1318000852	1
	12	ASHLAND PETRO CO.	451.5	4587.5	1318002664	1
	13	ATLANTIC RICHFIELD CO.	443.5	4592.1	1318001676	4
	14	BRADLEY RD. TERMINAL STANDARD OIL	444.0	4587.0	1318000216	10
	15	CEREAL FOOD PROCESSORS	441.4	4593.5	1318000229	1
	16	CHASE BAG CO.	467.6	4586.9	1318130038	2
	17	CHASE BRASS & COPPER CO.	459.1	4605.0	1318201688	1
	18	CHEMETRON CORP.	444.7	4588.3	1318361442	2
	19	CHEVROLET MOTOR DIV. CLEVELAND	435.4	4585.0	1318451029	4
	20	CITIES SERVICE OIL CO.	447.3	4569.8	1318082842	2
	21	CITY OF EUCLID INCINERATOR	459.4	4606.0	1318203249	2
	22	CLARK OIL & REFINING CORP.	446.3	4569.7	1318083493	2
	23	CLECON INC.	447.4	4590.8	1318000242	2
	24	C. E. I. LAKE SHORE PLANT	446.3	4598.3	1318000245	6
	25	C. E. I. STEAM HEATING PLANT	444.3	4596.2	1318000246	6
	26	C. E. I. STEAM HEATING PLANT	442.4	4593.7	1318000244	5
	27	CLEVELAND ALLOY CASTINGS	427.9	4580.3	1318340339	1

TABLE 6

LAKE ERIE SHORELINE STUDY
MAJOR AIR POLLUTION SOURCES IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	INDUSTRY NAME	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	APPLICATION #	#SOURCES> 25 TPY
CUYAHOGA	28	CLEVELAND CLINIC FOUNDATION	448.0	4594.5	1318004039	1
	29	CLEVELAND STEEL CONTAINER	450.2	4600.1	1318000139	5
	30	CONTINENTAL CAN CO.	457.1	4585.7	1318032018	1
	8	CONTINENTAL METAL PROCESSING	436.1	4591.6	1318002177	1
	31	CORTLAND CONTAINER CORP.	447.9	4590.0	1318000399	1
	8	CROWN CORK & SEAL	436.5	4591.5	1318001695	8
	32	CUYAHOGA CONSOLIDATED INC.	442.3	4588.7	1318000061	1
	33	DAIRY PAK	424.0	4581.5	1318411812	1
	34	DIV. OF LIGHT & POWER	445.2	4597.6	1318000131	6
	35	DIV. PUMPING STATION	440.2	4593.3	1318002490	6
	36	DONN PRODUCTS INC.	420.5	4592.0	1318611045	1
	37	DUPONT PLANT	444.5	4591.4	1318000151	3
	38	EATON CORP.ENG. FSTN. DIV.	437.5	4585.5	1318101265	1
	39	EUCLID INC.	456.1	4603.8	1318202774	1
	40	FERRO CORP. CLEVE. FRIT.	445.6	4588.2	1318170235	9
	29	FISHER BODY DIV. GMC	450.8	4600.0	1318002266	5
	41	FLUORESCENT EQUIP. MFG.	447.5	4588.5	1318003296	1
	42	FORD MOTOR CO. CASTING	431.4	4584.5	1318120180	31
	43	FORD MOTOR CO. ENGINE PCT.1	431.3	4585.2	1318120179	7

TABLE 6

LAKE ERIE SHORELINE STUDY
MAJOR AIR POLLUTION SOURCES IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	INDUSTRY NAME	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	APPLICATION #	#SOURCES> 25 TPY
CUYAHOGA	44	FORD MOTOR CO. ENGINE PCT.2	430.7	4584.0	1318120178	12
	45	FORD MOTOR CO. STAMPING	456.2	4577.9	1318581043	11
	46	FOREST CITY FOUNDRIES	437.5	4589.8	1318000372	6
	47	FOREST CITY FOUNDRIES	441.3	4591.8	1318000373	2
	23	G. & S. METAL PRODUCTS CO.	447.2	4590.6	1318004145	1
	48	GENERAL ELECTRIC CO.	455.6	4602.7	1318200203	4
	49	HARRIS CALORIFIC CO.	439.4	4593.0	1318002271	1
	50	HARSHAW CHEM. CO.	442.8	4588.6	1318001007	5
	51	HARVARD MFG. DIV. OF RUSCO	457.9	4581.5	1318042059	3
	52	HIGHLAND VIEW HOSPITAL	458.0	4588.9	1318590195	4
	53	HORVITZ CO.	442.8	4590.9	1318003729	2
	54	HUPP INC.	452.3	4600.1	1318004160	3
	55	HYDRAULIC PRESS BRICK CO.	447.8	4580.9	1318270383	3
	56	INDEPENDENT TOWEL SUPPLY	443.5	4594.0	1318002816	2
	57	INLAND STEEL CONTAINER	448.5	4589.0	1318000775	4
	35	INTERNATIONAL SALT CO.	440.0	4593.6	1318000397	3
	53	JONES & LAUGHLIN STEEL	443.0	4591.2	1318000078	19
	24	KROMEX DIV. ATAPCO	446.5	4598.5	1318001482	1
	58	L. B. MANUFACTURING CO.	446.4	4593.5	1318002778	1

TABLE 6

LAKE ERIE SHORELINE STUDY
MAJOR AIR POLLUTION SOURCES IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	INDUSTRY NAME	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	APPLICATION #	#SOURCES> 25 TPY
CUYAHOGA	59	LAKEWOOD INCINERATOR	435.0	4591.1	1318282775	3
	39	LINCOLN ELECTRIC CO.	456.4	4603.8	1318202137	5
	60	MEDICAL CENTER CO.	449.2	4595.0	1318003059	6
	3	MEECH FOUNDRY INC.	447.0	4585.5	1318224005	1
	24	METAL BLAST INC.	446.2	4598.0	1318001716	1
	8	MIDLAND STEEL PRODUCTS CO.	436.4	4591.7	1318001127	1
	61	MIDWEST MICA & INSULATION CO.	435.0	4585.7	1318002663	2
	9	MINNESOTA MINING & MFG.	453.3	4600.2	1318000086	7
	62	MOBIL CLEVELAND TERMINAL	443.1	4592.7	1318003300	3
	63	MT. SINAI HOSPITAL	448.5	4595.3	1318000090	3
	13	N. L. INDUSTRIES INC.	443.3	4592.2	1318000222	2
	64	NASA LEWIS RESEARCH CENTER	427.8	4584.7	1318001169	4
	65	NATIONAL METAL ABRASIVE CO.	433.9	4589.5	1318001721	4
	66	NORANDEX INC.	455.7	4579.3	1318582751	1
	61	PARMA INCINERATOR	434.6	4585.5	1318454169	2
	67	POLYCLINIC HOSPITAL	446.2	4594.6	1318004505	2
	68	PRE-VEST INC.	456.8	4604.6	1318201649	1
	69	REPUBLIC STEEL CORP.	444.2	4590.9	1318001613	54
	70	SAND PRODUCTS CORP.	440.2	4593.8	1318003287	2

TABLE 6

LAKE ERIE SHORELINE STUDY
MAJOR AIR POLLUTION SOURCES IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	INDUSTRY NAME	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	APPLICATION #	#SOURCES> 25 TPY
CUYAHOGA	71	SANYMETAL PRODUCTS	452.9	4599.8	1318001617	3
	72	SCHLOSS ASPHALT PAVING CO.	450.9	4585.6	1318224741	1
	73	SHELL SANDS INC.	443.6	4586.7	1318000958	1
	74	SHERWIN WILLIAMS CO.	422.6	4584.6	1318371515	1
	75	STANDARD OIL CO. ASPHALT PLT.	443.9	4592.3	1318001871	3
	76	STANDARD OIL CO.	444.9	4586.2	1318170183	1
	77	STANDARD SLAG CO. REPUBLIC PCT.	444.8	4590.4	1318002662	1
	77	SUN OIL CO.	444.3	4590.4	1318002698	1
	78	SYNTAC CORP.	439.2	4591.3	1318001745	1
	58	T. & B. FOUNDRY	447.0	4593.4	1318000504	1
	79	TEREX DIV. GMC	437.7	4589.3	1318101652	3
	62	U. S. STEEL CORP. LORAIN WORKS	443.6	4592.8	1318001622	9
	18	U. S. STEEL CORP. CUY. WORKS	444.4	4588.0	1318171623	9
	77	VANTAGE ALUMINUM FOUNDRY	444.3	4590.4	1318002998	1
	80	VETS. ADMS. HOSPITAL	446.8	4571.0	1318083522	3
	14	WABASH ALLOYS INC.	443.8	4587.3	1318001287	2
	67	WARNER & SWASEY	445.8	4594.5	1318001748	2
	8	WESTVACO CONTAINER DIV.	436.3	4591.6	1318001420	1
	81	WHITE TRUCK DIV.	447.1	4597.9	1318004010	7

TABLE 6

LAKE ERIE SHORELINE STUDY
MAJOR AIR POLLUTION SOURCES IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	INDUSTRY NAME	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	APPLICATION #	#SOURCES> 25 TPY
ERIE	1	BARR INC.	359.2	4590.2	0322020006	1
	2	C. J. OTTO GREENHOUSE	375.1	4579.2	0322000173	1
	3	CHRYSLER PLASTIC PRODUCTS CORP.	354.4	4589.4	0322020019	2
	4	FORD MOTOR CO.	353.9	4586.7	0322020042	3
	5	G. & C. FOUNDRY CO.	354.8	4589.5	0322020044	1
	6	GLIDDEN - DURKEE DIV. OF S.C.M.	371.3	4581.0	0322000184	18
	7	HURON LIME CO.	370.6	4583.8	0322010062	3
	8	J. H. OTTO SONS GREENHOUSE	375.1	4581.6	0322010174	1
	9	MATCO INC. PARKERTOWN PLANT	350.6	4578.4	0322020158	1
	10	NEW DEPARTURE - HYATT	356.2	4587.8	0322020045	3
	11	OHIO ROAD PAVING CO.	359.1	4585.9	0322020094	1

TABLE 6

LAKE ERIE SHORELINE STUDY
MAJOR AIR POLLUTION SOURCES IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	INDUSTRY NAME	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	APPLICATION #	#SOURCES> 25 TPY
LAKE	1	BUD RADIO INC.	463.8	4608.7	0243160163	2
	2	C. E. TYLER	471.1	4613.6	0243080191	1
	3	C. E. I. EAST LAKE PLANT	463.0	4613.2	0243160009	5
	4	DIAMOND SHAMROCK CHEMICAL CO.	478.3	4622.8	0243020456	19
	5	FASSON TECH. CENTER	478.9	4619.7	0243110099	17
	6	I. R. C. FIBERS CO.	482.9	4624.5	0243000165	6
	7	LUBRIZOL CORP.	477.2	4618.3	0243000024	2
	8	NORTHEASTERN RD. IMPROVEMENT CO.	480.6	4621.5	0243110556	1
	9	OHIO RUBBER CO.	465.4	4610.2	0243160174	1
	10	PAINESVILLE MUNICIPAL ELEC.	479.0	4619.2	0243110008	3
	11	REPUBLIC STEEL CORP. LIME PLANT	476.4	4621.9	0243030257	2
	12	UNIROYAL CHEM. DIV.	480.4	4623.6	0243000030	3
	13	UNIVERSAL PVC RESINS INC.	480.8	4622.3	0243000012	13

TABLE 6

LAKE ERIE SHORELINE STUDY
MAJOR AIR POLLUTION SOURCES IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	INDUSTRY NAME	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	APPLICATION #	#SOURCES> 25 TPY
LORAIN	1	C. E. I. AVON LAKE PLANT	412.0	4595.2	1947030013	13
	2	FISHER BODY DIV. GMC	405.3	4579.8	1947040038	28
	3	FORD MOTOR CO.	394.0	4586.5	1947080234	14
	4	OHIO EDISON EDGEWATER	400.6	4591.3	1947080049	3
	5	U. S. STEEL CORP. LOR- CUY WORKS	404.4	4590.8	1947080229	21

TABLE 6

LAKE ERIE SHORELINE STUDY
MAJOR AIR POLLUTION SOURCES IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	INDUSTRY NAME	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	APPLICATION #	#SOURCES> 25 TPY
LUCAS	1	ALLIED CHEM. CORP.	282.2	4609.7	0448010071	3
	2	AMERICAN ASPHALT PRODUCTS INC.	271.7	4617.6	0448040001	1
	3	AMERICAN CAN CO.	266.9	4599.7	0448002007	3
	4	AMERICAN MOTORS JEEP CORP.	290.0	4620.5	0448010414	2
	5	AMERICAN MOTORS JEEP CORP.	286.7	4617.6	0448010413	8
	6	ANDERSONS GRAIN DIV.	277.5	4605.1	0448030164	1
	7	ANDERSONS GRAIN DIV.	289.1	4617.7	0448010495	1
	8	ARCO PIPE LINE CO.	293.5	4616.7	0448010984	3
	8	ASHLAND PETRO CO.	293.6	4616.9	0448010360	1
	8	ATLANTIC RICHFIELD CO.	293.8	4617.0	0448010321	1
	9	CARGILL INC.	289.4	4611.9	0448010203	1
	10	CARGILL INC.	278.3	4605.4	0448030017	1
	11	CITIES SERVICE OIL CO.	291.7	4614.5	0448010387	3
	12	CLEVELAND METAL ABRASIVE CO.	283.3	4612.6	0448010499	1
	13	COULTON CHEM. CORP.	296.0	4617.8	0448020014	2
	14	DEVILBISS CORP.	287.7	4618.2	0448010344	2
	15	DOEHLER- JARVIS CASTING DIV.	288.8	4620.8	0448010057	4
	16	DURA DIV. DURA CORP.	288.1	4619.4	0448010252	1
	17	E. I. DUPONT DE NEMOURS & CO.	284.6	4619.1	0448010058	1

TABLE 6

LAKE ERIE SHORELINE STUDY
MAJOR AIR POLLUTION SOURCES IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	INDUSTRY NAME	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	APPLICATION #	#SOURCES> 25 TPY
LUCAS	35	PHILLIPS PETRO CO. CARBON BLK.	293.9	4616.7	0448010221	3
	35	PHILLIPS PETRO CO. TOLEDO	293.9	4616.7	0448010193	6
	36	R. G. C.	278.5	4612.9	0448010699	1
	32	SHELL OIL CO.	292.3	4616.7	0448010123	1
	37	ST. CHARLES HOSPITAL	293.0	4612.1	0448020002	3
	38	ST. VINCENT HOSPITAL	288.2	4615.2	0448010051	3
	12	STANDARD OIL CO.	283.1	4612.8	0448010067	1
	39	STANDARD OIL CO. REFINERY	295.7	4616.8	0448020007	27
	40	SUN OIL CO. TERMINAL	291.5	4611.8	0448010035	1
	40	SUN OIL CO. REFINERY	291.5	4611.8	0448010246	65
	41	TOLEDO EDISON ACME	290.5	4614.3	0448010086	10
	42	TOLEDO EDISON BAY SHORE	297.3	4618.1	0448020006	4
	43	TOLEDO EDISON WATER ST.	289.1	4613.9	0448010087	5
	44	TOLEDO HOSPITAL	283.9	4616.5	0448010037	2
	45	TOLEDO MENTAL HEALTH CENTER	283.1	4610.6	0448010247	3
	46	TOLEDO PLATE & WINDOW GLASS	289.2	4615.5	0448010038	1
	47	UNION OIL TERMINAL	296.5	4617.8	0448010220	3
	48	UNIVERSITY OF TOLEDO	282.1	4615.1	0448010805	1

TABLE 6

LAKE ERIE SHORELINE STUDY
MAJOR AIR POLLUTION SOURCES IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	INDUSTRY NAME	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	APPLICATION #	#SOURCES> 25 TPY
LUCAS	35	PHILLIPS PETRO CO. CARBON BLK.	293.9	4616.7	0448010221	3
	35	PHILLIPS PETRO CO. TOLEDO	293.9	4616.7	0448010193	6
	36	R. G. C.	278.5	4612.9	0448010699	1
	32	SHELL OIL CO.	292.3	4616.7	0448010123	1
	37	ST. CHARLES HOSPITAL	293.0	4612.1	0448020002	3
	38	ST. VINCENT HOSPITAL	288.2	4615.2	0448010051	3
	12	STANDARD OIL CO.	283.1	4612.8	0448010067	1
	39	STANDARD OIL CO. REFINERY	295.7	4616.8	0448020007	27
	40	SUN OIL CO. TERMINAL	291.5	4611.8	0448010035	1
	40	SUN OIL CO. REFINERY	291.5	4611.8	0448010246	65
	41	TOLEDO EDISON ACME	290.5	4614.3	0448010086	10
	42	TOLEDO EDISON BAY SHORE	297.3	4618.1	0448020006	4
	43	TOLEDO EDISON WATER ST.	289.1	4613.9	0448010087	5
	44	TOLEDO HOSPITAL	283.9	4616.5	0448010037	2
	45	TOLEDO MENTAL HEALTH CENTER	283.1	4610.6	0448010247	3
	46	TOLEDO PLATE & WINDOW GLASS	289.2	4615.5	0448010038	1
	47	UNION OIL TERMINAL	296.5	4617.8	0448010220	3
	48	UNIVERSITY OF TOLEDO	282.1	4615.1	0448010805	1

TABLE 6

LAKE ERIE SHORELINE STUDY
MAJOR AIR POLLUTION SOURCES IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	INDUSTRY NAME	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	APPLICATION #	#SOURCES> 25 TPY
OTTAWA	1	NATL. ALFALFA DEHYDRATING & MILLING	320.7	4596.4	0362000047	1
	2	ROHLOFF BROS. INC.	311.7	4601.0	0362000062	1
	3	STANDARD PRODUCTS CO.	339.8	4596.9	0362010068	2
	4	U. S. GYPSUM CO.	303.7	4597.9	0362000079	2
	5	U. S. GYPSUM CO.	343.5	4595.0	0362000078	2
	6	UNIROYAL INC.	330.4	4601.3	0362010139	6

TABLE 6

LAKE ERIE SHORELINE STUDY
MAJOR AIR POLLUTION SOURCES IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	INDUSTRY NAME	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	APPLICATION #	#SOURCES> 25 TPY
SANDUSKY	1	GOLD BOND BUILDING PRODUCTS	306.3	4584.4	0372000163	2
	2	J. E. BAKER,MILLERSVILLE PLANT	308.6	4576.5	0372000081	3
	3	KELSEY HAYES, FREMONT FOUNDRY	321.7	4580.5	0372030086	3
	4	MARTIN MARIETTA	302.9	4592.9	0372000127	3
	5	MODERN CONSTRUCTION CO.	321.2	4579.0	0372030099	1
	6	NORTHERN OHIO SUGAR CO.	323.5	4580.3	0372030103	2
	7	OHIO LIME CO.	303.2	4590.2	0372000104	15
	8	PFIZER INC.	305.2	4584.8	0372000109	14
	9	WOODVILLE LIME & CHEMICAL CO.	302.4	4592.3	0372000147	1

TABLE 6

LAKE ERIE SHORELINE STUDY
MAJOR AIR POLLUTION SOURCES IN NINE OHIO COUNTIES

COUNTY	MAP REFERENCE	INDUSTRY NAME	UTM COORDINATES EASTING	UTM COORDINATES NORTHING	APPLICATION #	#SOURCES> 25 TPY
WOOD	1	A. B. CAPLE CO.	271.6	4588.1	0387000003	1
	2	A. B. CAPLE CO.	288.4	4607.7	0387040002	1
	3	B. & R. MILLS INC.	279.8	4601.6	0387040020	1
	4	BOWLING GREEN STATE UNIVERSITY	278.9	4583.7	0387029240	2
	5	ENRIGHT MILLS INC.	266.7	4563.7	0387000005	1
	6	GOODYEAR TIRE & RUBBER CO.	292.0	4592.4	0387000110	6
	7	H. P. STREICHER INC.	296.8	4606.1	0387000038	1
	8	LIBBY OWENS FORD CO.	291.0	4610.0	0387000040	4
	9	LOF CO. ROSSFORD PLANT 6	286.9	4609.8	0387010012	6
	10	NATL. ALFALFA DEHYDRATING & MILLING CO.	278.4	4569.9	0387000008	1
	11	NATL. ALFALFA DEHYDRATING & MILLING CO.	282.2	4592.8	0387000009	1
	12	NORTHERN OHIO ASPHALT & PAVING CO.	291.9	4568.1	0387000232	1
	13	PERRYSBURG ALFALFA MILLS INC.	278.4	4600.4	0387040011	1
	14	SMITH FOUNDRY & MACHINE CO.	275.0	4562.2	0387000013	1

ODNR Lake Erie Coastal Zone Management Program

WATER QUALITY ANALYSES

Completed By

The Ohio Environmental Protection Agency

Office of Waste Water

For

The Ohio Department of Natural Resources

March 1977

TABLE OF CONTENTS

APPENDICES

SUMMARY FOR LAKE ERIE WATER QUALITY

Some of the most serious water quality problems of Lake Erie are manifest in the nearshore zone. Obviously, point sources of pollution are clustered along the shoreline and circulation of many nearshore waters is restricted by breakwalls and other structures, resulting in semi-entrapment of pollutants. Less obviously, prevailing long shore currents tend to prevent dispersion of nearshore waters and its pollutants into the greater volume of mid-lake. A good example is the Lower Cuyahoga River and the associated estuary which are so polluted that water quality standards have been relaxed for the area.

Much concern has been expressed about the eutrophication of Lake Erie. High nutrient concentrations have resulted in algae growth problems in parts of the lake. Theoretically, an immediate reduction in algal growth could be accomplished by determining which nutrient is currently limiting in Lake Erie and reducing its concentration to a lower level. However, phosphorus is the only algal nutrient which is controllable using best practical technology.

Nitrogen-fixation by blue-green algae and certain bacteria producing plant-usable forms of nitrogen from atmospheric nitrogen are intense in Lake Erie. This process apparently occurs whenever nitrogen is the limiting nutrient. Consequently, it is the policy of the U.S. Environmental Protection Agency to require phosphorus reduction by wastewater treatment plants. The International Joint Commission recommended the same approach in their 1969 study. The 1972 Executive Agreement between the United States and Canada established the maximum permissible phosphorus loadings into Lake Erie from each country through 1976. This was in recognition of the critical role of phosphorus in the eutrophication of Lake Erie, and therefore excessive algal growth, hypolimnion anoxia, dead fish and other related problems.

A number of municipalities along Lake Erie have phosphorus removal facilities in their sewage treatment plants. However, large amounts of phosphorus still enter the lake from municipalities without such facilities and from non-point sources. The State of Ohio is currently considering legislation banning phosphate detergents. Such a measure would significantly reduce phosphorus loadings from municipal dischargers.

The major source of non-point phosphorus loadings to Lake Erie is from agricultural runoff. It is also the major source of silt to the Lake. High turbidity and heavy siltation have severely reduced the water quality in several Lake Erie estuaries; the Maumee River mouth is a prime example. Control of non-point phosphorus loadings as well as siltation must be based on management programs designed to reduce erosion and runoff from agricultural lands.

Oxygen depletion in Lake Erie, caused primarily by bacterial oxidation of organic matter, is a phenomenon that has caused far reaching changes in the limnological system of the lake. Midsummer anoxic conditions in the Lake Erie central basin have gradually increased in extent and severity during the past 28 years. Control of this problem is based upon the reduction of nutrient and BOD loadings to the lake.

At the present time thermal pollution does not appear to have a widespread effect on Lake Erie, but localized problems near power generating facilities do occur. The future growth of power plants on the lake may significantly alter this picture, however.

Toxic and hazardous materials represent a threat to water quality in Lake Erie. While present concentrations of toxic compounds in the lake are very low, they can and often are bio-accumulated to much higher concentrations in aquatic organisms. Mercury contamination of fish is a problem in the western part of Lake Erie. Polychlorinated bi-phenols (PCB's) and some pesticide concentrations are also increasing in the lake. The Toxic Substances Control Act, now pending in Congress, would impose controls on the manufacture, use and disposal of substances deemed dangerous to human health or the environment.

In the last several years the water quality of Lake Erie has begun to improve. This change reflects improvements in municipal and industrial wastewater treatment facilities; further improvements are planned. The legislative framework has been provided for continued improvements with Best Available Technology to be used at all treatment plants by 1983 and zero discharge of pollutants by 1985. However, much controversy exists as to the economic feasibility of these objectives.

INTRODUCTION & BACKGROUND

Legal Base for Lake Erie Water Quality Programs

The Water Resources Planning Act (PL 89-90) passed in 1965 established the Water Resources Council whose primary functions are to periodically assess water supplies and to coordinate water resource policies for several federal agencies. The Act further provided for the establishment of various river basin commissions along hydrologic boundaries to act as water resource planning bodies. The establishment of the Great Lakes Basin Commission (GLBC) in 1967 was a direct result of the Act. The commission is composed of eight state members and twelve representatives from various federal agencies. The GLBC is charged by law to establish and maintain a comprehensive joint plan for the water and related land resources of the Great Lakes.

The Federal Water Pollution Act Amendments of 1972 (PL 92-500) are undoubtedly the most comprehensive set of environmental legislation ever enacted in the United States. One major provision of the Act (Section 208) provides for areawide institutions to plan, control and maintain water quality and reduce pollution from non-point as well as point sources. In pursuit of these goals it was necessary to establish water quality standards. The Ohio Water Quality Standards will be discussed in more detail in a subsequent section.

The Coastal Zone Management Act of 1972 (PL 92-583) administered by the National Oceanic and Atmospheric Administration under the Department of Commerce provides for U.S. coastal and Great Lake states to join the federal government in a partnership to coordinate government activities and to balance competing uses which have a direct and significant impact on the lands adjoining the nations oceans and Great Lakes. Initial planning (Section 305) grants are available on a voluntary basis to states wishing to cooperate in the program. The efforts are funded on a two-thirds federal, one-third state basis. Planning guidelines established by the Act cover six major items which the states must address:

1. Identification of the coastal zone boundaries,
2. Inventory and designation of areas of particular concern,
3. Broad guidelines on priority of uses,
4. Desirable land and water uses,
5. The means of controlling designated uses, and
6. Administration of the management plan.

Following the development of an acceptable management plan, additional federal grants are available under Section 306 of the Act for plan implementation. These grants require 50% state matching funds and are subject to annual renewal.

Trends in Lake Erie Water Quality

Water quality data for Lake Erie before 1900 are scarce and few comments concerning water quality trends during that period can be made. However, the following historical notes and observations made by early settlers, explorers and military men in the early 1800's indicate that Lake Erie was not the clear blue oligotrophic lake that we have assumed: 1827, "Lake Erie, the colour of whose waters was green not blue like those of Lake Ontario." 1804, "... the water of the lake appears to be of a ... deep green color." 1842, "The shallow Lakes Erie and St. Clair are less transparent than the deeper ones above, for the wind agitates them to the bottom, which throws up a portion of its slime."[1]

The history of Cleveland's water supply intake suggests that localized pollution problems may have been severe in the last half of the 19th century. In approximately 1850 the city was forced to change from a groundwater to a surface source for its drinking water supply. The water intake was established approximately 400 feet offshore in Lake Erie in 1854. Industrial discharges severly polluted the lake for a distance of one mile from shore by the year 1869. During the 1870's the water intake was moved 6,200 feet into the lake. The period 1900 to the present has witnessed large scale industrial and municipal growth in the basin with a resultant increase in pollutant loadings to Lake Erie.

Eutrophication is the process of enriching a lake with nutrients needed for algal growth. At the time of the first pioneer settlements, the Lake Erie basin was covered with undisturbed forest, grassland, swamps and vegetation which helped retain the plant nutrients on land. Settlement resulted in removing the forests, draining marshes, tilling and fertilizing the soil and discharging ever-increasing amounts of pollutants into the lake and its tributaries.

Algal growth in lakes is often limited by the availability of the nutrient phosphorus. All of the effects of civilization mentioned above have increased the annual loadings of phosphorus and other nutrients to the lake. Lake Erie was the first Great Lake to become eutrophic, or over-enriched, because it was the shallowest, the oldest, had the warmest temperatures, the richest soils and the largest human population within its basin.

Lake Erie Water Quality Standards

Section EP-1-07 of the Ohio Water Quality Standards, Regulation EP. 1, sets forth water quality standards for Lake Erie that are in variance from the general water quality standards for the state of Ohio (see Appendix A). All other water quality standards for Lake Erie are the same as those set down in the general standards.

(1) Taft, Clarence E., et al., "Cladaphra As Related to Pollution and Eutrophication in Western Lake Erie", State of Ohio, Water Resources Center, The Ohio State University, January 1973.

LAKE ERIE POLLUTION SOURCES

Nonpoint

Urban runoff problems occur during periods of heavy rainfall and high stream flows and thus tend to be more severe in the late winter and early spring. The opposite is true of point source problems which occur in the low stream flow periods of summer and fall when dilution is least.

Significant loads of oil and grease, suspended solids, BOD, phosphorus, nitrogen ammonia, heavy metals, iron and lead, are transported to the streams from paved areas in cities and towns soon after rainfalls. Combined sewers which carry sanitary sewage as well as storm water in the older sections of municipalities such as Cleveland and Toledo, further complicate the urban runoff problem because some wastewater treatment plants are not equipped to treat oil and grease, nutrients or heavy metals. Also, during heavy rains these wastewater treatment plants are sometimes forced to bypass some of the raw sewage because they are unable to handle the increased input from storm sewers. A total solution to these problems will be extremely difficult to implement both in design and in construction cost. Huge amounts of grant money from the federal government will be required. Toledo and Cleveland are proceeding with innovative cost effective projects to alleviate overflow problems. The projects are generally designed to maximize existing facilities through sophisticated control systems.

Agricultural runoff is a significant problem in the Lake Erie Basin, especially in the low, flat farming lands of northwestern Ohio. Water quality data shows that the Maumee River is the major source of phosphorus and other nutrients discharged into Lake Erie from Ohio during the spring high flow period. These nutrients have a significant effect on the eutrophication of the lake. About 90% of the total area of the Maumee Basin is used for agriculture.[1] This results in non-point source loadings of silt, nutrients, organic matter and bacteria. Of all agricultural land uses, cropland occupies the largest percentage and has the highest sediment delivery rate.[2] The Maumee River discharges approximately two million tons per year of nutrient laden silt to Lake Erie and is the largest source of rural runoff materials in the Lake Erie Basin.[3]

Pesticides are a concern in Lake Erie because of their accumulation in the flesh of some fishes. Pesticides are adsorbed onto the soil particles and then washed away with nutrients and soil during heavy rainfall. Generally, pesticide losses on sediment range from 0% to 3% of the applied quantity. Approximately 160,000 tons each of insecticides, herbicides and fungicides are used annually on croplands in the Maumee Basin. Present pesticide levels in Lake Erie waters are low, apparently the result of dilution, sediment interaction, biological flocculation or detoxification and biotic assimilation.[4] Development of methods for controlling runoff from farm lands is needed. Emphasis should be upon improved tillage methods to minimize the loss of soil, fertilizer and pesticides.*

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* The Army Corps of Engineers is preparing a special study on some experimental agricultural projects in the Honey Creek area designed to minimize agricultural runoff.

(1) (2), (3) "State of Ohio Annual Water Quality Report", The Ohio Environmental Protection Agency, April 1975.

(4) Leshniowsky et al, 1970; Sweeny, 1969, "Great Lakes Regional Assessment Study", Part Two, Voluem II, June 1975.

Point Sources

Municipal sewage treatment plants and industrial waste dischargers account for many of the water quality problems of Lake Erie. Industries and power plants have located on Lake Erie and its tributaries because of their convenience as waste disposal areas and heat sinks. The Toledo and Cleveland areas are both heavily industralized. The entire Ohio shore of Lake Erie is densely populated resulting in major water supply and municipal wastewater disposal problems. However, some progress has been made in upgrading wastewater treatment facilities. In those areas where treatment has been upgraded, water quality of affected near shore areas has shown noticeable improvement. Nevertheless, major water quality problems due to point sources still exist.

CURRENT WATER QUALITY

Lake Erie Tributaries

This section provides an assessment of the water quality in each of the major Ohio tributaries that flow into Lake Erie. It discusses the significant point source dischargers, the type of treatment employed and, where applicable, plans for future upgrading of treatment facilities. Also included is a summary of a 1974 special study on Maumee Bay.[1]

The major findings of the Maumee Bay Study are:

1. Maumee Bay is an area where waters from Lake Erie, the Maumee River, the Toledo Edison Bayshore Power Plant and the Ottawa River mix with one another. On the average, the mixing of these waters was characterized by:

   a. an intrusion of water from Lake Erie up the shipping channel;
   b. a plume of water from the Toledo Edison Power Plant that extended in a northeasterly direction from the point of discharge; and
   c. little apparent discharge from the Lower Maumee River directly into Maumee Bay.

   This mixing pattern was due to seiche action and affected to a degree by the Toledo Edison Plant which draws a large quantity of water from the point where the Lower Maumee River joins Maumee Bay.

2. Definite water quality gradients existed across Maumee Bay from the Lower Maumee River with water of poor quality adjacent to Lake Erie which had water of good quality.

3. Comparison with current water quality standards for most parameters indicated that water of good quality existed in the outer regions of Maumee Bay.

4. The offshore waters of Maumee Bay are safe for swimming except when there is a heavy rainstorm causing an overflow of the sewage system, or other failures of the system. This conclusion does not apply to near shore waters.

5. Suspended solids levels were high resulting in extremely turbid waters in the Bay. This was particularly true in the spring. In addition, dredging operations increased the suspended solids levels and turbidity in a portion of the Bay.

(1) Fraliegh, P.C., et al., "Maumee Bay Environmental Quality Study 1974", The Toledo-Lucas County Port Authority (1975).

6. Biologically, Maumee Bay was found to be a very productive body of water and to have had a greater productivity than either Lake Erie or the Lower Maumee River. The level of productivity, which was determined from chlorophyll measurements, is typical of what one might expect in a Bay of an eutrophic lake like Lake Erie.

7. Fishery resources in Maumee Bay were good in the spring of 1974. Walleyes, white bass and yellow perch were abundant in the open waters of the Bay while catfish, walleye and white bass were abundant in the area of the diked disposal facility.

8. During the spring and fall, fecal coliform levels in Maumee Bay were 5% of the levels found upriver.

9. Most of the microbial pollution in Maumee Bay was of human origin.

10. Numerous species of waterfowl were found in the area of Maumee Bay near the diked disposal facility. Because of the abundance of fish eating species this area appeared to have been a good feeding ground for these species.

The following is a summary, by river basin, of the major industrial and municipal dischargers located on the Ohio tributaries to Lake Erie.

Maumee River

The mouth of the Maumee River at Toledo exhibits numerous water quality problems of low dissolved oxygen, high fecal coliform counts, and high phosphorus concentrations. There is significant agricultural runoff in addition to point source dischargers. The following provides a summary of some major point source dischargers that discharge into the Lower Maumee River.

Toledo Sewage Treatment Plant. The plant has a flow of 320 x 10^3 m^3/day (84 MGD) providing secondary treatment and phosphorus removal. Effluent phosphorus concentrations in 1975 averaged 2.5 mg/l. The city is proceeding in accordance with the NPDES permit compliance schedule. Toledo has received two U.S. EPA Step II Grants for the Ten Mile Creek interceptor system including correction of overflows and bypasses from the combined portion of that sewer system. A further grant for additional solids handling at the treatment plant and abatement of the remaining combined sewer overflows are in the Step I application state.

Lucas County Sewage Treatment Plant. Average 1975 flow was 11.7 x 10^3 m^3/day (3 MGD) discharging into Maumee River. The plant has been providing relatively good quality effluent with an average phosphorus concentration of 0.9 mg/l. A plant expansion program is under design to accommodate an expanded service area.

Gulf Oil Refinery, Toledo. The refinery discharged 4.5 x 10^3 m^3/day (1.2 MGD) of process wastes with loadings of 136 kg/day NH_3, 81 kg/day BOD and 63 kg/day solids and non-contact cooling water into the Maumee River. The plant is required to meet BPT effluent limitation by July 1977. Remedial

measures consist of oil and water separator, bio-oxidation, clarification, and foul water stripper. Installation of rotating biological disks has begun and may be completed by July 1, 1977. This equipment is being installed for the attainment of final permit limits during winter operation.

Standard Oil Refinery, Oregon. The refinery discharged 98.2 x 10^3 m^3/day (26 MGD) of process and cooling water into Maumee Bay via Otter Creek. 1975 average loadings were 600 kg/day of oil and grease, 7773 kg/day of BOD and 6727 kg/day of solids. The permit was issued with an effective date of September 1, 1976 for all parameters except temperature. The temperature problem is still in adjudication following extensive studies by the company and the Ohio EPA, NWDO. The company is presently installing a sand filtration system for the attainment of final limits by July 1, 1977.

Interlake, Toledo. This steel mill discharges 45 MGD of industrial wastewater with average daily loadings of 19 lb/day of total cyanide, 5 lb/day of phenol and 156 lb/day of ammonia. The entity is currently under a schedule in its NPDES permit to reduce total suspended solids to 202 lb/day by July 1, 1977.

Sun Oil, Toledo. The plant discharges a flow of 8 x 10^3 m^3/day. A new foul condensate stripping system has been installed and placed in operation. Sand filters have also been completed and placed in operation. The plant is in compliance with its NPDES permit. Loadings are shown in the Industrial Loading Summary.

L-O-F, Rossford. The flow from this plant is 45 x 10^3 m^3/day with suspended solids as the measured parameter. The plant is on schedule with construction of NPDES required facilities which should be completed by June 1977.

Perrysburg Sewage Treatment Plant. Perrysburg, with the 1970 plant additions and inclusion of phosphorus removal facilities in 1973, appears to be on schedule. The remaining item for solution is combined sewer overflows. A significant portion of the city has combined sewers. Major overflows occur on the Maumee River with minor overflows on Grassy Creek. Perrysburg has received a Step I construction grant to prepare a facility plan for the correction of inflow problems causing raw sewage overflows. Perrysburg is utilizing land application of liquid sludge whenever possible. The city has obtained ownership of cropland located near the plant and can easily pump sludge to the field at low cost. The phosphorus removal program is in operation and is meeting permit limitations. The chemical feed system to the primaries has been altered to provide liquid feed and on-site storage facilities for handling liquid alum. A large unsewered area in Wood County will be tied into the plant by the end of 1977 and will add about 0.3 MGD to plant loadings.

Portage River

Fecal coliform is a water quality problem caused by municipal discharges at Oak Harbor and Port Clinton, and land runoff in the area.

Port Clinton Sewage Treatment Plant. No major projects are involved. There is nothing being delayed that we are aware of. A facility plan is to be done and is close to funding range. Combined sewers and inflow

exist and are a problem particularly when a northeasterly storm causes lake front flooding. Facilities planning and implementation with funding will be required. Sludge is dewatered on drying beds and is quite satisfactory. Good quality sludge is hauled away by townspeople. Phosphorus removal is in operation and plans are pending for liquid alum feed rather than the dry feed now used. Some plant maintenance items have been completed. This includes a new laboratory, piping, pumping and chlorination improvements.

Sandusky River

Dissolved oxygen and fecal coliform problems are caused by the Fremont Treatment Plant and combined sewer overflows. The Sandusky River Basin is highly agricultural and probably contributes significantly to the phosphorus problem in Lake Erie.

Sandusky Sewage Treatment Plant. There are no delays on anything plant-related. The city is in funding range and is proceeding with its NPDES schedule, i.e., Facility Plan and related fundable work. Combined sewers exist and inflow is also a problem. The Facility Plan and funded projects will address this problem. Sludge is presently dewatered and dumped at the old city site. This is an unsatisfactory practice. The Facility Plan and segment project will address the problem and probably will result in land application. Excellent phosphorus removal is attained. The Chaussee Sanitary Sewer Project is under construction and should be completed in 1977. Sludge disposal plans are approved and construction should be underway in 1977.

Huron River

The Huron Treatment Plant and stormwater overflow contribute to problems in dissolved oxygen and fecal coliform. Mercury violations have been reported. The probable source of mercury is from sediment release.

Vermilion River

A fecal coliform problem is caused by the Vermilion Treatment Plant and stormwater overflow.

Black River

The water quality of the Black River below Elyria is very poor and considerable abatement measures are needed to improve these conditions. Municipal treatment plants in Elyria and Lorain together with U.S. Steel discharges in Lorain contribute to water quality problems of fecal coliform, ammonia, dissolved oxygen, phenols, copper, chromium, cadmium and BOD.

Elyria Sewage Treatment Plant. Although the 28.4×10^3 m^3/day (7 MGD) treatment plant needs tertiary treatment facilities, it is presently not in funding range. However, it is eligible to receive Step I money from reserve funding. Elyria has separate and combined sewers, though the majority of them are separate. Lift stations with overflows and other overflows are located in the system. None of the overflows are metered. This situation will be addressed in conjunction with the availability of federal funds. The plant currently does not have phosphorus removal facilities.

Lorain Sewage Treatment Plant. This 58.4 x 10^3 m^3/day (15 MGD) plant discharges to the mouth of the Black River. It has phosphorus removal facilities, however, they cannot be used because of the limits of the sludge handling facilities. About 30 percent of the sewers are combined sewers. The plant needs tertiary treatment, however, it is not high enough on the priority listing to receive Step III funding. It is eligible to receive Step I funding and may receive Step II funds from reserve funding.

Oberlin Sewage Treatment Plant. The Oberlin Wastewater Treatment Plant is a 1.5 MGD contact stabilization plant. The treatment process consists of grit removal, comminution and primary settling followed by contact stabilization and final settling. Tertiary treatment is provided by a mixed media rapid sand filter and chlorination. Phosphorus is removed by the addition of alum to the contact tank. Primary sludge is treated by an anaerobic digestor. Sludge from both digestors can be dewatered by use of a sludge concentrator or drying beds. The effluent from the plant discharges to Plum Creek which is a tributary to the West Branch of the Black River.

Republic Steel-Elyria. Republic Steel has eliminated all process wastewater by modification of process. Cooling water has been combined into one outfall. Sanitary wastes are being tied into city sewerage system.

Rocky River

Municipal sources and stormwater runoff contribute to problems with ammonia, coliform, dissolved oxygen and phosphorus.

Lakewood Sewage Treatment Plant. This 55.4 x 10^3 m^3/day (14.6 MGD) plant has received a Step I grant. Phosphorus removal facilities are in operation but the plant is not able to achieve the 1.0 mg/l level unless sludge is trucked away in a partially processed form. The feasibility of handling the sludge in such a manner will be tested throughout 1977.

Cleveland Area

The last eleven miles of the Cuyahoga River, from Cleveland Southerly STP to the mouth, are polluted to such a degree that general water quality standards cannot be attained even with the implementation of the Best Practicable Treatment levels on all dischargers.

After the Cleveland Southerly STP discharge, the Cuyahoga River remains in violation of the dissolved oxygen, ammonia, and dissolved solids water quality standards during critical low flow periods. In addition, past data indicate that water temperature, zinc, copper, phenols, and cyanide concentrations also violate general water quality standards. The problems encountered in this area are caused by the numerous sanitary overflows, industrial dischargers, and the Cleveland Southerly STP. The total pollutant loadings being discharged into this last segment of the Cuyahoga River are far too high for the river to assimilate. The flow characteristics of this area magnify the problem. Lake Erie has a similar effect upon the river as the upstream dams have, creating an extensive dam pool which must be dredged frequently to maintain a proper depth in the navigation channel. Less stringent water quality standards

have been adopted by Ohio EPA for the lower Cuyahoga River. The allowable concentration for ammonia on the lower Cuyahoga River was raised from 1.5 mg/l to 12 mg/l until June 30, 1976. From July 1, 1976 to January 1, 1979, ammonia levels are to be less than 8 mg/l. The dissolved oxygen standard also has been relaxed.

Bedford. This 3.2 MGD facility discharges to Wood Creek which is in turn a tributary to Tinkers Creek, the Cuyahoga River and Lake Erie. The facility provides advanced treatment through trickling filters and microstrainers. Phosphorus removal facilities are in operation.

Bedford Heights. This 3.6 MGD facility discharges to Tinkers Creek which is tributary to the Cuyahoga River and Lake Erie. The facility provides advanced treatment through an activated sludge process and sand filtration. The facility is designed to reduce phosphorus concentrations to 2.0 mg/l.

Berea. This 3.0 MGD facility discharges to the East Branch of Rocky River which is a tributary to Lake Erie. The facility achieves slightly better than secondary treatment through an activated sludge process. The final disposition of the facility will hinge on the outcome of the Facility Plan currently being prepared for southwestern Cuyahoga County.

Brookpark. This 1.0 MGD facility discharges to Abraham Creek which is in turn a tributary to Rocky River and Lake Erie. The facility achieves slightly better than secondary treatment through an activated sludge process. The final disposition of the facility will hinge on the outcome of the Facility Plan currently being prepared for southwestern Cuyahoga County.

Chagrin Falls. This 1.0 MGD facility discharges to the Chagrin River which is a tributary to Lake Erie. The facility achieves slightly better than secondary treatment through an activated sludge process. Phosphorus removal facilities are in operation.

North Olmsted. This 9.0 MGD facility discharges to the Rocky River which is a tributary to Lake Erie. The facility achieves advanced treatment through a contact stabilization process and microstrainers. Phosphorus removal facilities are in operation.

North Royalton. This 1.0 MGD facility discharges to an unnamed tributary to the East Branch of Rocky River which is in turn a tributary to Lake Erie. The facility provides secondary treatment through an extended aeration process. Sludge wasting facilities are being proposed by the city for 1977.

Strongsville. This 1.0 MGD facility discharges to Blodgett Creek which is in turn a tributary to Rocky River and Lake Erie. The facility achieves secondary treatment through an extended aeration process. It is proposed to expand the facility to a capacity of 2.5 MGD by late 1978. Sludge wasting and phosphorus removal facilities are also proposed.

Cleveland Westerly STP. The plant presently consists of a series of Imhoff tanks with polymer addition for phosphorus removal. A new 190 x 10^3 m^3/day (50 MGD) physical-chemical treatment plant is under construction and should be completed in 1980. This facility will be the world's largest physical-chemical treatment plant. This project, plus sewer interceptor work under

construction, will aid in abating pollution at the Edgewater Park Beach. The Cleveland Regional Sewer District (CRSD) is under permit to prepare plans for overflow control.

Cleveland Easterly STP. The plant discharges directly into Lake Erie. It currently meets the phosphorus requirement of 1 mg/l. Suspended solids and a compliance schedule for additional parameters are to be determined upon approval of the Facility Plan. There are no delays currently associated with the NPDES program for this facility. Construction of the $13 million headworks modification is nearing completion. The CRSD is under permit to prepare plans for overflow control.

Cleveland Southerly STP. The plant has an average flow of 348.7 x 10^3 m^3/day (92 MGD) which discharges into the Cuyahoga River. Downstream of the plant's discharge point, the river remains in violation of dissolved oxygen, ammonia and dissolved solids. The problem is caused partially by combined sewer overflows upstream and downstream of the plant. Control of overflow is under consideration by the Cleveland Regional Sewer District. Phosphate is removed by the presence of pickle liquor in the plant influent. The plant is currently under construction to expand its capacity to 760 x 10^3 m^3/day (200 MGD) and upgrade its treatment process to advanced wastewater treatment. The anticipated completion date is 1981.

Euclid STP. This 66 x 10^3 m^3/day (17 MGD) primary treatment plant discharges directly into Lake Erie. There are no phosphorus removal facilities. The 1975 average phosphorus effluent concentration was 7 mg/l. Construction is underway to provide for advanced treatment with phosphorus removal. Completion date is estimated to be 1978.

Solon STP. The plant discharges to a tributary of the Cuyahoga River. The average flow for 1975 was 6.3 x 10^3 m^3/day (2 MGD) with loadings of 89 kg/day phosphorus, 180 kg/day BOD and 246 kg/day suspended solids. Effluent phosphorus concentration was 14 mg/l. The facility is to be upgraded to a 3.6 MGD advanced treatment facility by late 1979. Phosphorus removal facilities are to be provided at that time.

Republic Steel Corp., Cleveland. The company discharges 616 x 10^3 m^3/day (162 MGD) of wastes highly concentrated in oil, ammonia and suspended solids to the Cuyahoga River. The 1975 actual loadings were 2900 kg/day of oil, 5840 kg/day of NH_3, and 101,472 kg/day of suspended solids. Construction of remedial programs for the mills and furnaces started in 1975 and it is anticipated that effluent requirements will be met by October 1976. Remedial measures for the various steel production processes consist of (1) emulsion breaking and separation of soluble oils in the cold mill system; (2) oil skimming and gravity separation of solids in the hot mill system; and (3) recycling of gas cleaning water in the blast furnaces to reduce blowdown to 10 percent. With these abatement measures the projected loadings are expected to decrease. Steel plant, coke plant and blast furnace recycle systems have been completed.

United States Steel - Central Furnaces, Cleveland. The company discharges 144 x 10^3 m^3/day (38 MGD) of wastes with a corresponding solids loadings of 3000 kg/day in 1975. Remedial measures required by Ohio EPA consisting of clarification with polymer addition to reduce solids loadings shall be

completed. The proposed effluent limitations are 64 kg/day average and 190 kg/day maximum to be attained by July 1976. The permit is presently under adjudication. Blast furnace scrubber water is to be recycled within 24 months.

E.I. DuPont, Cleveland. This inorganic chemical manufacturing plant discharged cooling and process waters containing zinc, lead, cadmium and chromium into the Cuyahoga River at a rate of 13.3 x 10^3 m^3/day (3.5 MGD) in 1975 with a dissolved zinc loading of 12 kg/day. Other loadings at much lower levels include lead, cadmium and total chromium. The state is in the process of setting effluent limitations for these parameters. The plant's present remedial program consists of neutralization and clarification. An impounding basin is to be constructed to collect storm water runoff for treatment prior to discharge.

Harshaw Chemical Company, Cleveland. The plant has a waste flow of 8.2 x 10^3 m^3/day (2.2 MGD) and discharges 415 kg/day of suspended solids, 830 kg/day of fluoride and 212 kg/day of NH_3. Best Practicable Technology is required under the NPDES permit system. Construction is in progress and effluent limitations should be met by July 1977.

Cleveland Electric and Illuminating Co., Cleveland. This steam generating plant has a waste flow of only 2.7 x 10^3 m^3/day (.7 MGD), but discharged 1260 kg/day of solids to the Cuyahoga River in 1975. The proposed effluent limitation would limit the solid loadings to 75 kg/day by July 1977. The permit is still under adjudication.

Ford Motor Company, Cleveland. The 15.2 x 10^3 m^3/day (4 MGD) flow enters the Cuyahoga River with solids loadings of 2280 kg/day and 760 kg/day of oil and grease. The discharge may be tied into the city sewer system by 1983. At present, the permit is in adjudication.

Chagrin River

The river is generally a shallow fast moving stream with excellent assimilative capacities. Most of the dischargers are small and scattered throughout the area.

Willoughby Eastlake. This secondary activated sludge treatment plant discharges directly to Lake Erie. It is designed to handle 7.8 MGD. Phosphorus is presently being removed by the addition of chemicals.

Grand River

Water quality problems identified are fecal coliform, temperature, MBAS, phenols, copper, ammonia, total dissolved solids, chlorides and dissolved oxygen. Several municipal and industrial dischargers have been identified as the source of these violations.

Diamond Shamrock Chemical Company, Painesville. The company discharged 1,679,000 kg/day of chloride and 29.445 kg/day of suspended solids into the Grand River. The average 1975 waste volume was 342 x 10^3 m^3/day (90 MGD). The NPDES permit conditions and compliance dates have not been finalized. It is in adjudicatory heary. All major production was terminated by December 31, 1976. Average daily flow in 1977 should be in the 1-2 MGD range.

Glyco Chemicals Inc., Painesville. In 1975 this organic chemical processing plant discharged 5.3 x 10^3 m^3/day (1.4 MGD) of wastes with 1360 kg/day of BOD, 1360 kg/day of suspended solids and 1136 kg/day of oil and grease. The plant is required to discharge its wastes into the sanitary sewer system by July 1977.

Uniroyal Inc., Painesville. This rubber and plastic processing plant contributed 2514 kg/day of BOD, 830 kg/day of solids and 64 kg/day of oil and grease to the Grand River in 1975. Its PVC operation ceased in December 1975. The wastes from the company will be discharged into the city sewers by July 1977.

Painesville STP. The sewage treatment plant has an average flow of 16.1 x 10^3 m^3/day (4.2 MGD). While there is no bypassing of sewage at the plant, sewer overflows do occur upstream of the plant. Fifteen percent of the sewers are combined. This contributes to the fecal coliform in the Grand River. Phosphorus removal facilities in the plant are operational with effluent concentrations averaging 0.90 mg/l in 1976. The Painesville Wastewater Treatment Plant has received a federal grant for construction of tertiary treatment facilities. Construction has begun and is expected to be completed in 1977.

Lake County, Mentor STP. This 8 MGD design secondary treatment plant discharges directly into Lake Erie. Chemical addition for the removal of phosphorus is being practiced.

Lake County, Madison STP. This 3 MGD design tertiary treatment plant discharges to Arcola Creek which flows into Lake Erie. Chemicals are being added for phosphorus removal.

Ashtabula River

Water quality problems in the Ashtabula River exist almost exclusively in the lower river in the vicinity of Fields Brook, a tributary to the river.

Several significant industrial dischargers include RMI Company, Diamond Shamrock Chemical Company, New Jersey Zinc Company, Detrex Chemical Industries, General Tire and Rubber Company, Oil Corporation and Sherwin-Williams Company. The only municipal dischargers is the Ashtabula Sewage Treatment Plant. Residual chlorine, dissolved solids, chlorides, and suspended solids are primary loads to the stream. Other parameters in violation include dissolved oxygen, fecal coliform, chloride, copper, and lead.

The RMI Company - Sodium and Chlorine Plant. The plant discharging approximately 3800 kg/day of residual chorine, is reported to be the most significant discharger of chlorine. The plant is pending adjudicatory hearing. Plans detailing BAT wastewater treatment facilities have been submitted.

Union Carbide, Ashtabula. The plant discharges wastes from electric furnaces, lime kilns and pickling processes to Lake Erie via a drainage ditch. The 1975 average flow was 208.5 x 10^3 m^3/day (55 MGD) with loadings of 19,000 kg/day solids, 52 kg/day total cyanide and 45 kg/day total copper. Existing treatment facilities consist of settling lagoons, clarifiers and neutralization. Best Practicable Treatment is required by July 1977. Plans have been approved and construction is underway.

Olin Corporation, Ashtabula. The wastes from this organic chemicals plant come from caustic air scrubber water, coke wash and cooing water. The 1975 average flow was 1.9 x 10^3 m^3/day (0.4 MGD) with solids loadings of 220 kg/day, oil and grease of 144 kg/day and zinc of 2.7 kg/day. Present treatment facilities consist of neutralization and settling. The permit is currently being modified. The company is beginning a program to prevent organic materials from entering the wastewater treatment system. Control of pH remains troublesome.

Ashtabula Sewage Treatment Plant. This 14 x 10^3 m^3/day (3.7 MGD) plant has secondary treatment and facilities for phosphorus removal. The phosphorus removal process went on line in October 1976. The city is required to meet effluent requirements by December 1978.

Conneaut Creek

The only parameter which may be a problem is fecal coliform bacteria. If so, it is not considered to be a significant problem. The proposed U.S. Steel plant on Conneaut Creek is in the planning stages. An Environmental Impact Statement is being prepared which will assess the effects of the plant on Conneaut Creek and Lake Erie.

Conneaut WWTP. The design flow is 2.93 MGD with an estimated 11,000 people contributary to the system. In addition to normal domestic waste, there are light commercial businesses discharging to the plant. The industrial discharges are only minor in quality and quantity. The Conneaut Wastewater Treatment Plant is an activated sludge plant with phosphorus removal. The plant was expanded from a primary plant to an activated sludge plant in 1973. The discharge point is in Lake Erie at the mouth of Conneaut but within the confines of the Conneaut Harbor breakwater structures.

Appendices B and C list the significant municipal and industrial dischargers, respectively, that discharge directly to Lake Erie or to one of its tributaries. Appendix D contains a summary of data from the OEPA Lake Erie Monitoring Program. Appendix E contains 1976 STORET data for the tributary sampling locations described in Appendix D. Appendix F contains STORET data for the water intake sampling locations.

Nearshore Lake Erie

Little water quality data for the Lake Erie shoreline area is available. What little is available is primarily confined to the monitoring of water supply intakes and public beaches. Appendix F is 1975-1976 STORET data for selected Lake Erie water supply intakes. Appendix D includes bacteria count data for several Lake Erie beaches.

Twenty beaches were monitored for fecal coliform bacteria during the months of June to September from 1970 through 1975. Bacteria counts shown over 200 are violations of the current water quality standards for Ohio. Seven beaches showed no violations. These were Cedar Point, Crane Creek, East Harbor, Headlands (N.E.), Headlands (S.W.), Kellys Island, Lakeshore and Ashland. Eight beaches had between 1 and 3 violations between 1970 and

1974, with no violations in 1975. These included Century Park, Conneaut Beach, Fairport Harbor, Geneva East, Geneva West, Huntington, Lakeshore (Lorain) and Mentor. Five beaches had chronic violations in 1975. These were Avon Lake, Edgewater, Perkins, Port Clinton, and Vermilion.

Maps

The set of nine maps contain sampling locations for the water quality data found in Appendices D, E and F and also the locations of the point sources found in Appendices B and C.

Ohio Department of Natural Resources
Fountain Square · Columbus, Ohio 43224
JAMES A. RHODES, *Governor* • ROBERT W. TEATER, *Director*