THE STATE OF THE ENVIRONMENT IN ALLEGHENY COUNTY:

Land, Water and Air

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Table of Contents

Table of Contents (cont.)

APPENDICES

Figures

Maps

Tables

Executive Summary

This report is the first of what is expected to be a series of biennial reports on environmental and ecological conditions in Southwest Pennsylvania. The first report focuses on land use, and water and air quality in Allegheny County. The objective of this report is to provide a baseline of environmental conditions at local levels in Allegheny County.

Land use in Allegheny County is analyzed using remote sensing data from the early 1990's, the most recent available at this local scale. The vast majority, 57%, of land is in some type of tree cover. Urban uses, which include residential, commercial, industrial and transportation uses, comprise 28% of land use. Agriculture uses 10% of Allegheny County's land area.

The most notable result of the analysis of land use is the clear relationship between land use and water quality. Differences in water quality are significantly related to the extent of forest cover along streams and across townships; increased forest cover is positively correlated with the attainment of Pennsylvania stream water quality standards. This may be attributed to the human activities that accompany loss in forest cover, but may also be due to the loss of forest itself, as trees play important roles in reducing sediment and nutrient runoff into streams.

Loss of farmland and forests in Allegheny County is just one of many consequences of urban sprawl, in which populations and economic activity migrate from densely to sparsely populated areas. It is clear from the data that population increases are greatest where forested area is highest. This implies that growth areas will face the greatest losses in tree cover, resulting in the loss of free water quality management services previously provided by natural systems. Water quality management will become increasingly costly to these high growth areas unless particular attention is paid to managing human activities in the landscape and maintaining adequate vegetative cover in critical locations within watersheds.

Only 52% of the roughly 1400 miles of streams and rivers in Allegheny County have been assessed to determine whether they meet Pennsylvania's water quality standards. The unassessed streams are mostly in the southeast and northwest areas of the county. Roughly 60% of Allegheny County's assessed streams do not meet Pennsylvania's water quality standards. This compares unfavorably to Pennsylvania as a whole, where 20% of Pennsylvania's assessed streams do not meet these standards. Roughly one-third of US streams do not meet similar standards.

The major causes of for not attaining water quality standards in Allegheny County are siltation, nutrients and metals. Siltation and nutrients each account for roughly 20% of the non-attainment in the county's streams. The major sources of these pollutants include acid mine drainage (AMD), urban runoff and storm sewers, habitat modification, vegetation removal and land development. A map of the county showing land use and attainment of stream water quality standards illustrates that urbanization of previously rural areas may be a major source of siltation. It is clear from this source-cause analysis that what we do in our landscape can have significant consequences for water quality in the region.

Air quality in Allegheny County has fluctuated over the past decade between attainment and non-attainment of US clean air standards. Ozone has been the major contributor to this pattern. While the county and region are on the brink of attaining

the old 1-hour air quality standards, it is clear they will not be in compliance with the more stringent proposed 8-hour standards.

Ozone is typically formed from reactions of volatile organic compounds and nitrogen oxides in the presence of heat and sunlight. These chemicals are emitted from vehicles, chemical plants and refineries, and fossil-fuel fired power plants. Ozone conditions in Allegheny County are of particular concern due to the county's large young and old populations, which may be exposed to ozone. Ozone can cause adverse health conditions, such as respiratory problems in these populations and in populations of otherwise healthy asthmatics. It can also have adverse impacts on growth and health of vegetation.

Average ozone levels in Allegheny County have fallen between 1998 and 1999 for all monitoring sites except the downtown Pittsburgh site. This may be a disturbing pattern as it may reflect the real environmental impacts of increased economic activity and resulting vehicle traffic downtown. Also, increased emissions of ozone causing chemicals may make attaining air quality standards at downwind monitors more difficult. Attainment of air quality standards in the region is complicated by emissions from upwind sources in Ohio and West Virginia. However, it is clear that Allegheny County is itself a major emitter of chemicals that can cause its own ozone problems. Increased ozone levels in the City of Pittsburgh may be a reason why downwind monitors, such as those in Penn Hills, do not air quality standards.

The presence of particulates in the air of Allegheny County may be both a present and future problem. Particulates are the result of fuel combustion in vehicles, power plants and industry, as well as from residential fireplaces. While Allegheny County has met standards for coarse particulates, referred to as PM-10, during the period 1997-1999, the Clairton, Glassport, Liberty, Lincoln and Port Vue sites in the county did not meet these standards in 2000. More problematic for the county, however, may be the new proposed fine particulate, referred to as PM-2.5, standards. Some monitoring sites in the county have violated the proposed standard, although interpretation of the PM-2.5 data is problematic at this point.

Sulfur dioxide is in the same condition as particulates in terms of meeting air quality standards. While most of the county is well within the range of compliance, the Hazelwood monitoring site violated standards in 2000 and Glassport violated them in 1999. While levels of carbon monoxide have fallen in Pennsylvania, this has not been the case for the Monongahela Valley region. However, monitors in Allegheny County have not exceeded standards for this pollutant during the past decade.

The region's greatest challenges appear to be in management of landscapes and ecosystems. These are at great risk from urbanizing activities, as residential and commercial activities spread into previously pristine landscapes. The resulting loss of natural system services, such as water run-off or soil and nutrient control, will make it only more difficult to attain acceptable water qualities in the region's streams and rivers. While systems are in place for monitoring and managing air quality, this is not the case for landscapes and ecosystems. The region will have to pay increasing attention to what is done on its land, how it is done, and where it is done, if it wants to sustain the quality of ecosystems necessary for future economic vitality and quality of life in the region.

PART I: LAND USE AND ENVIRONMENTAL QUALITY IN ALLEGHENY COUNTY

INTRODUCTION

Land use is critical to the quality of ecosystems. What we do on our land impacts the quality of not only the land itself but also the quality of our air and water. Society is becoming increasingly aware of this connection. For example, the purpose of Pennsylvania's Growing Greener program[1] is to assure that growth in economic activity is compatible with maintaining the health and integrity of ecosystems. The governor's 21st Century Commission's Final Report noted:

> "…we give top priority to the challenge of promoting responsible land use. Promoting environmental stewardship may be the most important issue, but correcting our land use patterns is the most pressing." [2]

This section of the report presents the most recent data on land use and the relationships between land use and water quality in Allegheny County.

LAND USE

Pennsylvania[3]

Forested land is the most extensive land cover in the state. There are 17 million acres of forests, which account for 59% of Pennsylvania's land area, compared to 21% nationally. Nearly 74% of Pennsylvania's forested land is privately owned. The remainder is owned by public agencies, including the state Bureau of Forestry, which manages 12% of the forested area in the state.

Farmland, which includes crop and pasture land, accounts for 24% of Pennsylvania's land area, compared to 25% nationally. Between 1982 and 1997, 1.5 million acres of farmland were developed in Pennsylvania, representing 21% of the state's farmland. This farmland conversion occurred primarily between 1992 and 1997 with a loss of 1.1 million acres in these five years compared to 0.4 million acres during the previous ten years. Thus, the loss of farmland has accelerated in recent years. Since 1950, Pennsylvania has lost nearly 50% of its farmland compared to a loss of only 20% nationally.

Developed land includes land used for residential, commercial, industrial, utility, and transportation purposes; it is referred to as the "Built Environment." Pennsylvania's share of developed land is 15%, compared to 5% nationally. Developed land is expanding rapidly, largely at the expense of farmland.

Allegheny County

Land use patterns in Allegheny County are based on the data extracted from Landsat Thematic Mapper Images, which were taken during the first half of the 1990's.[4] Even though the image indicates up to 15 different land-use classifications,

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[1] For a description of the Growing Greener program visit: http://www.dep.state.pa.us/growgreen/

[2] The report can be found at: http://www.21stcentury.state.pa.us/2001/executive_summary.htm

[3] Source: *Land Use Trends in Pennsylvania* Report. The entire report can be found at: http://www.dced.state.pa.us/PA_Exec/DCED/government/pdf/annualreport-trends.pdf

[4] Files may be downloaded from the PASDA site http://www.pasda.psu.edu/access/terrabyte.shtml

these have been recoded in this report into 4 broad categories: Tree Cover, Urban, Farmlands, and Other uses. Map I-1 shows the spatial distribution of the four major categories. Urban uses are concentrated mostly in the center of the county while Tree Cover and Farmlands are located toward the periphery.

Map I-1: Distribution of Major Land Use Categories in Allegheny County

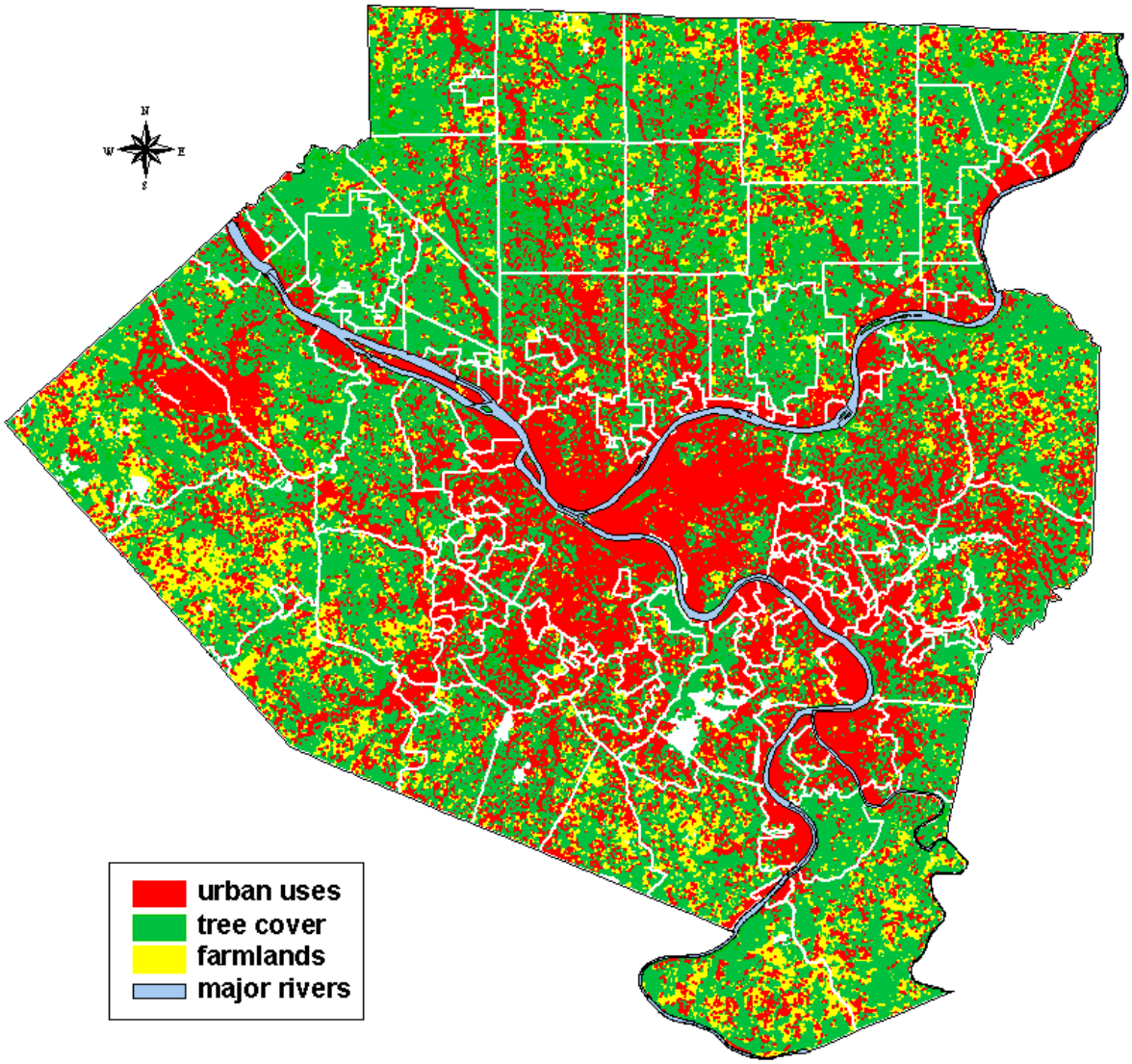


Table I-1 indicates the land use distribution in Allegheny County. Land uses are also broken down by township in Appendix I-A. The dominant land use in Allegheny County is Tree Cover (57%).[5] Tree Cover use is comprised of four different types: evergreens (i.e. conifers), deciduous trees (i.e., oaks, maples, etc.),

[5] The term *Tree* Cover is used instead of *Forest* Cover since a significant proportion of that area is composed by small stands of trees that may not qualify to be called "forests". Stands may be as small as to be represented in the photo by a single pixel of 30x30 meters. They may, however, be large enough as to be considered as a *small forest*.

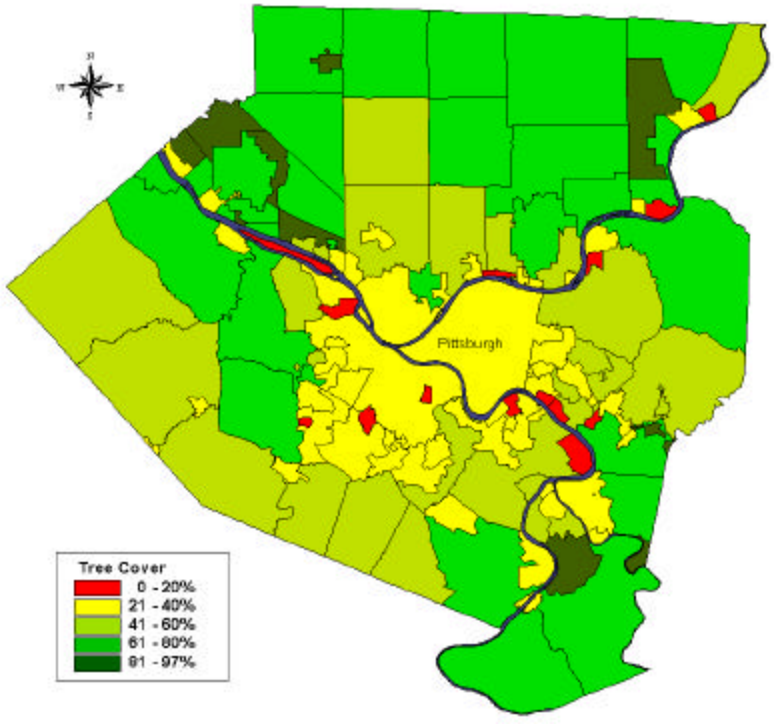
mixed stands, and woody wetlands. Nearly half of Allegheny County's area is covered by deciduous species.

Table I-1: Land Uses in Allegheny County; Early 1990's

Land Use Category	%	Land Use	%
Tree Cover	57.0	Evergreen Species	1.2
		Deciduous Species	46.7
		Mixed Stands	9.0
		Woody Wetlands	< 0.1
Farmland	10.5	Row Crops	4.3
		Pasture/Hay	6.2
Urban	28.3	Low Intensity Residential	21.5
		High Intensity Residential	4.8
		Commercial/industrial/Transport	2.0
Others	4.2	Quarries/Strip Mines/Gravel Pits	1.7
		Transitional Areas	0.2
		Water Bodies	2.3

Map I-2 shows Tree Cover by Township.[6] This map shows that tree cover is greatest (60-100%) in the northwestern, northeastern, and southeastern townships. Tree cover is the lowest (0-10%) in the center, south, and eastern townships of the county.

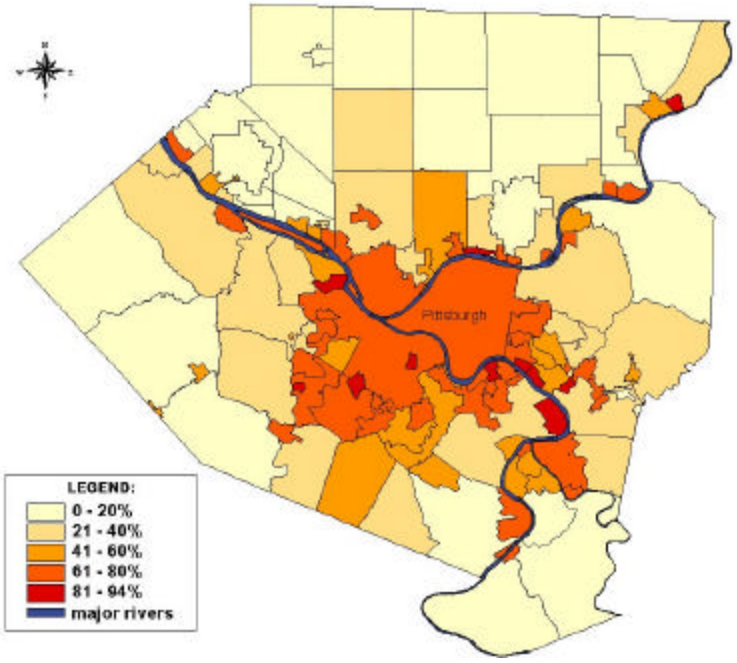
Map I-2: Tree Cover by Township



[6] The term "township" will be used throughout this report to indicate also boroughs and municipalities.

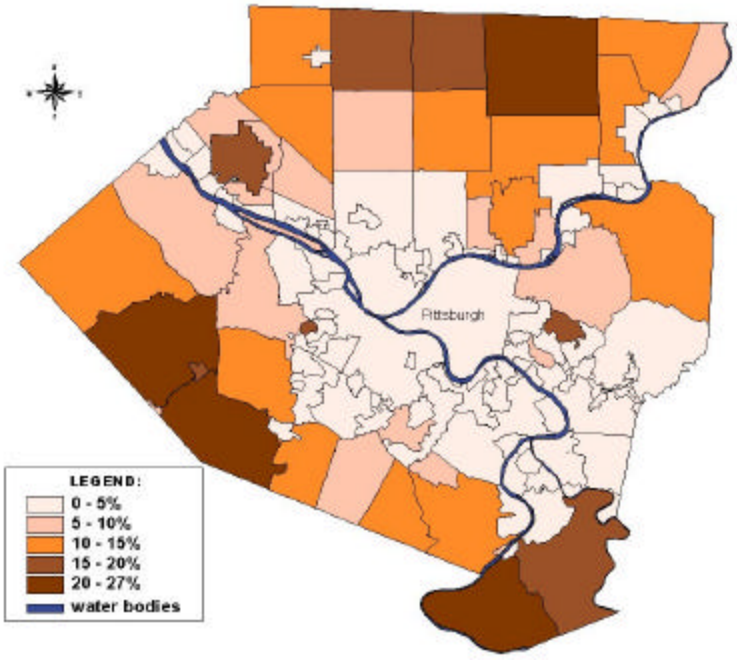
The second major land use in Allegheny County is Urban (see Map I-3). This category includes low and high density residential uses as well as commercial, industrial, and transportation. Low density residential is the second largest land use (21.5%) in the county.

Map I-3: Urban Uses by Township



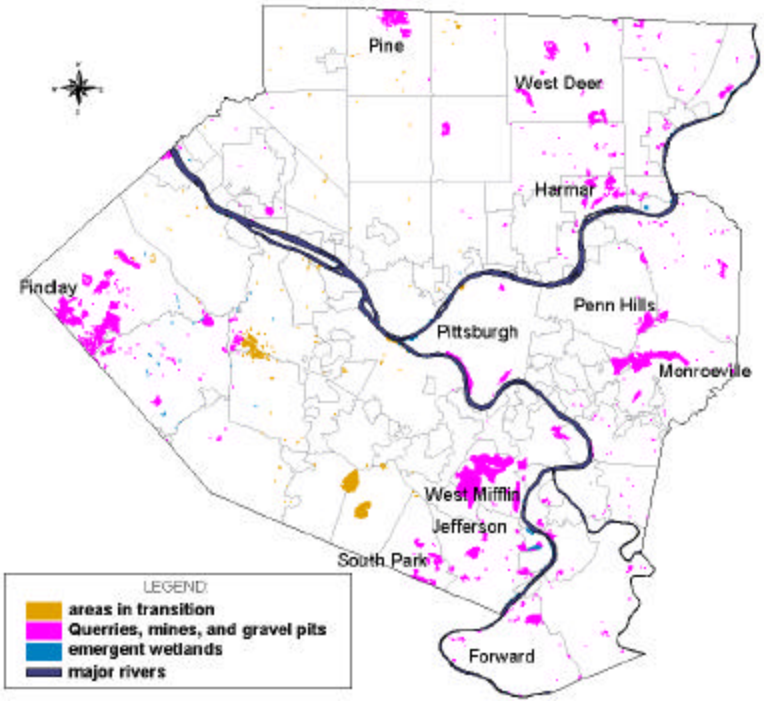
The third largest land use category is *Farmland* (10.5%), which includes row crops and pastures. Map I-4 shows the areas with the greater concentration of farmlands are the northern, southwestern, and far southeastern townships.

Map I-4: Farmlands by Township



Other minor land uses include strip mines, quarries, gravel pits, emergent wetlands, rivers, and transitional areas (those in the process of being converted from one use to another). Map I-5 shows these areas. The area covered by these uses is small, representing only 4.2% of the total county area.

Map I-5: *Minor* Land Uses

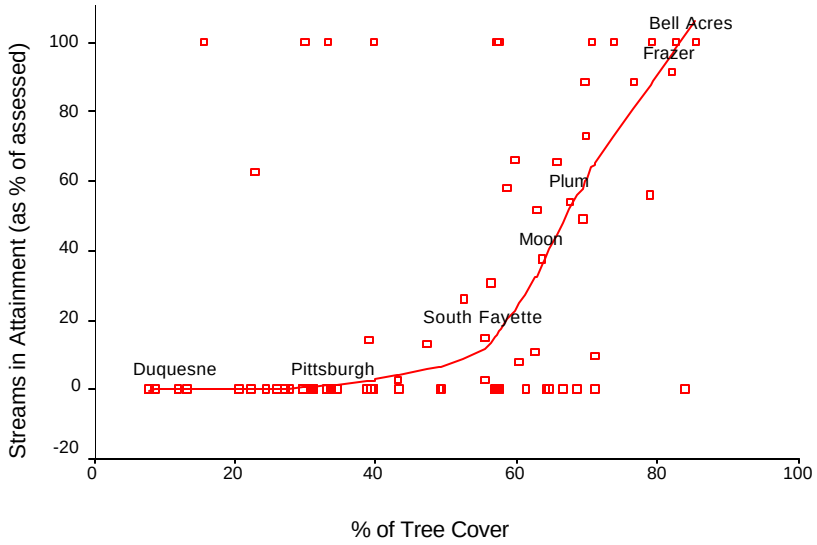


Environmental Implications of Land Use Patterns

Land use patterns may have an effect on the quality of the environment. For example, an analysis of the relationship between tree cover and attainment of the Clean Water Act's water quality standards (WQS) in county streams shows that tree cover is positively associated with higher water quality in nearby streams (Water quality is discussed in Section II of this report). Figure I-1 shows the positive relationship between Tree Cover and Attainment. Townships with a higher percentage of tree cover will tend to have a higher percentage of their streams in attainment of WQS. The figure also indicates that this positive effect begins when the tree cover is above 40%. After this point, attainment of WQS will sharply increase with tree cover.

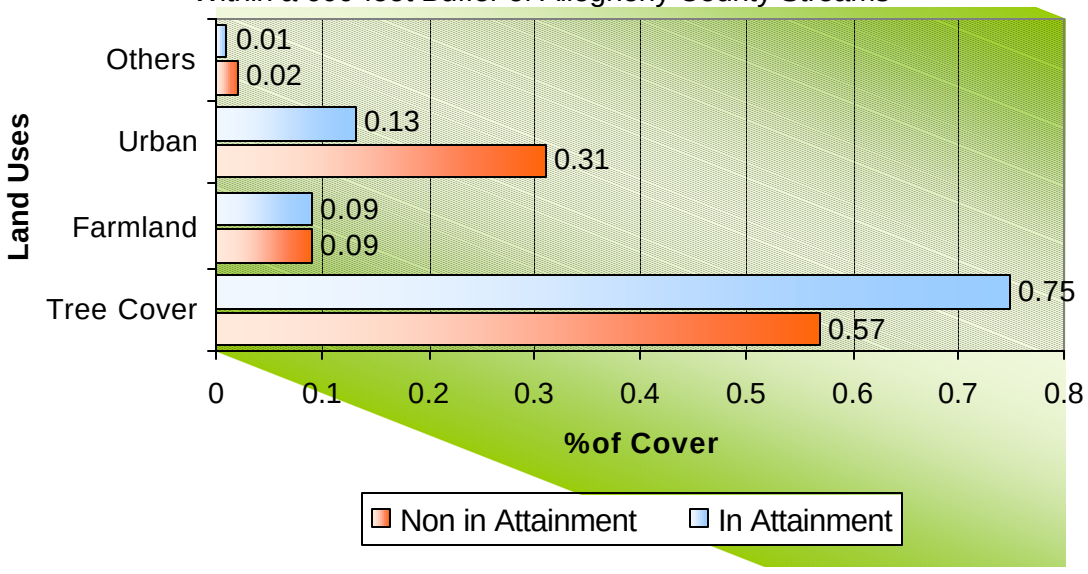
Figure I-1 also shows some outliers with high levels of attainment but low levels of tree cover. These are very small townships with high tree cover in adjacent upstream townships (i.e. Leetsdale, Tarentum, Cheswick). Stream quality in these small counties is dominated by surrounding township land uses. This suggests how important land uses in one township are to environmental quality in another. Other outliers, such as those showing low levels of attainment in spite of higher percentages of tree cover, may be explained by the presence of other uses such as transitional uses and mines (i.e. Robinson, Collier, Jefferson).

Figure I-1: Relation Between Tree Cover in Allegheny Townships and Stream Attainment of Water Quality Standards



In order to make a more detailed and accurate analysis of the relationship between land use and water quality, we narrowed the scope of analysis to the areas adjacent to streams. We established a 300-foot buffer on each side of the streams. Figure I-2 shows the land use percentages within the 600-foot buffers for streams in attainment and not in attainment of WQS. Streams in attainment clearly had a higher percentage of tree cover (75%) than those in non-attainment (57%). Streams in attainment also had a considerably lower percentage of land in urban use (13%) than streams, which were not in attainment (31%). Figure I-2 suggests that farmland uses do not have a discernible impact on the attainment of WQS.

Figure I-2: Attainment of WQS and Land Use Within a 600-foot Buffer of Allegheny County Streams



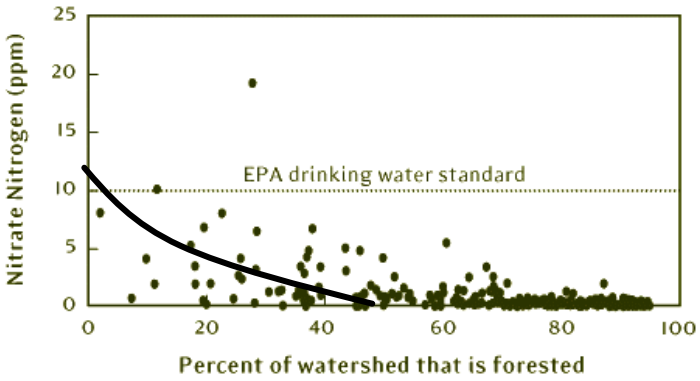
The low forest cover adjacent to streams that were not in attainment suggests that loss of forest cover can cause stream degradation. Since forest cover is often lost due to urban activities, it may be the urban activities themselves, such as construction and re-grading, that may be causing the stream degradation, and not the loss of forest cover, per se. However, other studies have shown that forest loss may have a direct impact on stream quality, as forests play an important role in the biogeochemistry of streams.

The relationship between forests and water quality not only derives from human activities that remove forests but also from the ecology of forests. For example, a study of 346 watersheds in the Mid-Atlantic found that:

> "Watersheds with a higher proportion of forest area generally have lower concentrations of nitrates, a common pollutant, than do similar watersheds with less forest area. As a result of competition among trees, plants, and soil microbes, nitrogen is retained (in the land and vegetation), and concentrations in forest streams are usually low." [7]

This relationship is illustrated in Figure I-3. Nitrates in streams diminish with increased forest cover. This may be significant for Allegheny County, where nutrients are the second leading cause of Non-Attainment of water quality standards, as the water quality section of this report shows.

Figure I-3:
NITRATE CONCENTRATIONS
IN FORESTED WATERSHEDS

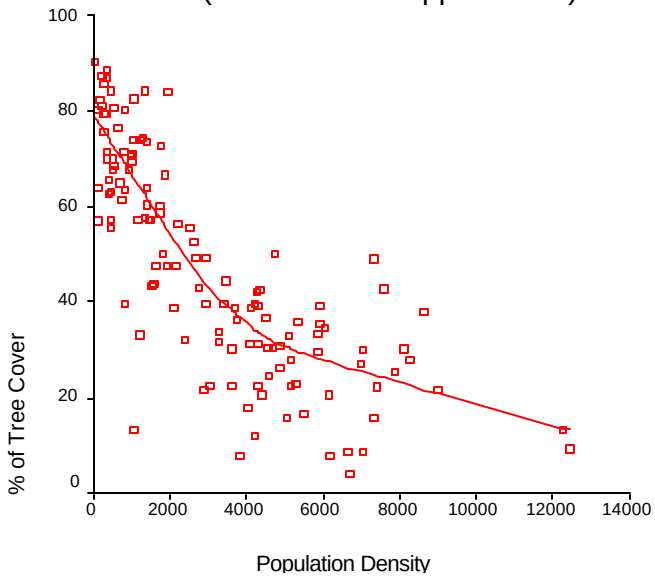


Source: USGS National Water Quality Assessment

Other statistical relationships illustrate the impact of human activities on the environment. As one would expect, increases in population density significantly reduce tree cover in Allegheny County. Figure I-4 shows that townships with higher population density will tend to have lower levels of tree cover. This association seems to be particularly true for townships with densities higher than 4,000 persons per square mile.

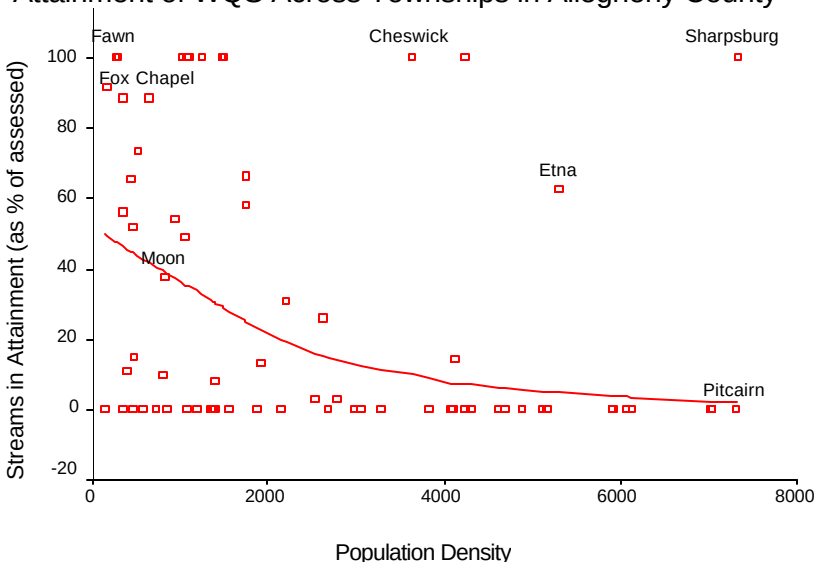
[7] http://www.us-ecosystems.org/forests/essential_chemicals/index.html#3

Figure I-4: Relationship Between Population Density and Percent of Tree Cover Across Allegheny County Townships (data shown in Appendix I-B)



As a consequence of greater population density and reduced tree cover, water quality attainment will decrease with increased population densities, as Figure I-5 illustrates. Figure I-5 also shows that the impact of population density is most severe for population densities above 4,000 persons per square mile.

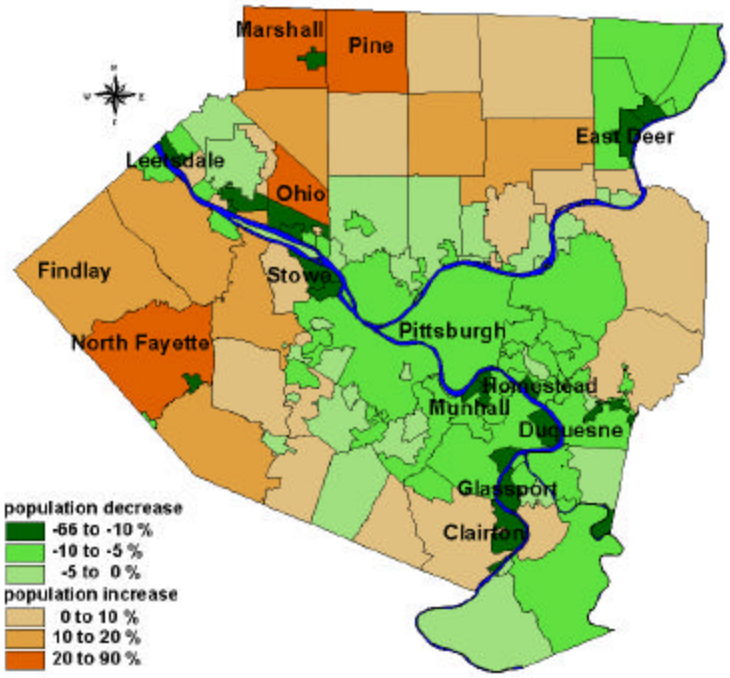
Figure I-5: Relationship Between Population Density and Attainment of WQS Across Townships in Allegheny County



Map I-6 shows the pattern of population change in Allegheny County over the past decade. Population has fallen in the central and eastern areas of the county while increasing in the western areas. Comparing this map with Map I-2, townships with positive rates of population growth are also those with higher proportions of

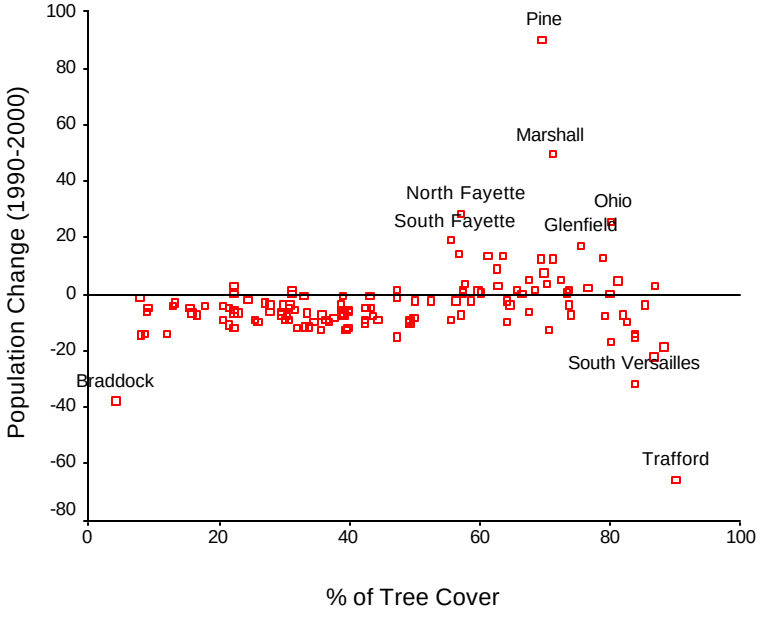
forested land. This is a typical "urban sprawl" population pattern; this shift of population from more densely populated urban centers into more rural, sparsely populated areas. Figure I-6 shows that townships with higher levels of tree cover (above 50%) are the ones experiencing population growth (i.e. Pine, Ohio, Marshall, Indiana). Nonetheless, some forested small townships are also experiencing population decline (i.e. Trafford, South Versailles).

Map I-6: Population Change in Allegheny County (1990-2000)*



* as a percentage of population in 1990

Figure I-6: Relationship Between Tree Cover and Population Change



MANAGEMENT CONSIDERATIONS

According to the report, *Land Use Trends in Pennsylvania*,[8] many factors have shaped the land use patterns outlined above. These include economic expansion, which brings more jobs and increases the demand for commercial land. Income growth generates demand for new and larger homes. Families may be escaping what they perceive as the disamenities of urban living. Land use has also been shaped by the proliferation of automobiles, the expansion of road, sewer and water infrastructure, and changing industrial structure from centralized heavy manufacturing to light manufacturing and services. Other contributing factors are local government competition for tax base, the spirit of individualism in American culture, state and federal development policies, and federal mortgage requirements that favor new housing over older housing in existing communities.

The *Land Use Trends in Pennsylvania* report has noted that land use is partially dependent on public management of land and its uses. It notes that nearly all direct mechanisms for land-use planning in Pennsylvania are relegated to municipal government, which means that the effort is fragmented among its 2,568 cities, townships and boroughs. Furthermore, roughly 61% of Pennsylvania's municipalities have populations of less then 2,500, making land use management an arduous task for many of Pennsylvania's smaller municipalities. Joint planning among municipalities remains the exception rather than the rule. Cooperation among municipalities is most prevalent in the Southeast, Northeast, Central, and Southwest counties, regions that are experiencing the highest rate of urbanization and land development. And even though cooperation is mostly on transportation, tourism, or watershed plans rather than land use planning, several steps have been taken in that direction. According to the report, 28 counties have adopted an *open space* plan. Sixteen counties are utilizing the concept of growth areas as a tool to manage growth. In most of these counties, municipalities are encouraged to direct development to areas where infrastructure already exists or is planned.

To further encourage this trend, Pennsylvania enacted “Growing Smarter” legislation, Acts 67 and 68, in 2000. This marks the most dramatic change in state land use law in more than 30 years. These acts provide needed amendments to the Commonwealth’s Municipalities Planning Code (MPC) to promote smart growth. They require that “state agencies shall consider and may rely upon comprehensive plans and zoning ordinances when reviewing applications for the funding or permitting of infrastructure or facilities.” *Growing Smarter* also includes the *Growing Greener*[9] grant program, which will invest nearly $650 million over the next five years to preserve farmland and protect open space; eliminate the maintenance backlog in State Parks; clean up abandoned mines and restore watersheds; and provide new and upgraded water and sewer systems.

[8] Find report at: http://www.dced.state.pa.us/PA_Exec/DCED/government/pdf/annualreport-trends.pdf

[9] It may be found at: http://www.dep.state.pa.us/growgreen/

CONCLUSIONS

This section of the report presents the most recent data on land use and the relationships between land use and water quality in Allegheny County. Land use in Allegheny County is based on spatial data covering the first half of the 1990's. The data have been recoded into four broad categories: Tree Cover, Urban, Farmland, and Other uses. The dominant land use in Allegheny County is Tree Cover (57%). Nearly half of Allegheny County's area (48%) is covered by deciduous species. The second major land use in Allegheny County is Urban, comprising 28.3% of land area. This category includes low and high density residential uses as well as commercial, industrial, and transportation. Low density residential alone comprises 21.5% of land use in the county. The third largest land use category is Farmland, comprising 10.5% of land use. Other minor land uses include strip mines, quarries, gravel pits, emergent wetlands, rivers, and transitional areas.

Land use patterns have an effect on the quality of the environment. Tree cover is positively associated with higher water quality in Allegheny County streams. Townships with higher percentages of tree cover have a greater percentage of their streams in attainment of water quality standards. This positive effect begins when the percentage of tree cover is above 40%. After this point, attainment of water quality standards increases sharply with tree cover.

Land use within a 600-foot buffer along streams shows a higher percentage of tree cover (75%) for streams in attainment of water quality standards than for streams not in attainment (57%). Streams in attainment also have a considerably lower percentage of adjacent land in urban use (13%) than streams not in attainment (31%). Some of this adverse impact of land use on stream quality may not be the result of loss of tree cover, per se, but a result of the urban activities that lead to tree cover loss, such as construction, re-grading, etc. However, other studies show that loss in forest cover can have a direct impact on stream quality, as forests play an important role in the biogeochemistry of nutrient cycling and water runoff into streams.

Increases in population density significantly reduce tree cover in Allegheny County. Townships with higher population densities have lower tree cover. This association seems to be particularly true for townships with densities higher than 4,000 persons per square mile. As a consequence, water quality attainment will decrease with population densities. This suggests that more densely populated areas will have to rely on careful management of their natural systems, such as forests, and will be faced with more expensive non-natural systems to provide for water quality management.

Even though population has decreased in Allegheny County over the past decade, there are townships that are experiencing population growth. Noticeably, townships with positive rates of population growth are also those with higher proportions of forested land. The townships experiencing population growth are those with tree cover exceeding 50% of land use. This is a typical "urban sprawl" population pattern; the shift of population from more densely populated urban centers into more rural, pristine, sparsely populated areas. The implication is that increased population growth in the more rural and pristine areas will result in a loss of forest cover and increased difficulties in future water quality management.

II. STREAM WATER QUALITY IN ALLEGHENY COUNTY

INTRODUCTION

According to the 1998 Report to Congress: *The Quality of Our Nation's Waters*,[10] water pollution affects at least 35% of assessed stream miles in the US. Water pollution threatens public health directly through the consumption of contaminated food and drinking water, and indirectly through skin exposure. It impacts public welfare through degradation of waters used for recreation and through visual unattractiveness. Aquatic organisms can be affected by the presence of toxic chemicals and are susceptible to changes in the physical quality of their environments, such as changes in pH, temperature, dissolved oxygen, and habitat.

Section 305(b) of the Clean Water Act [11] requires that states assess the health of their waters and determine whether their waters support state water quality standards (see *2000-2002 Guidance*). The goals of the Clean Water Act are to achieve and maintain water quality that provides for healthy communities of fish and shellfish and that allows for recreation. States collect data and information that allow them to characterize whether water quality meets these and other uses for their waters.[12] Water quality assessment begins with setting goals through water quality standards. The standards must be approved by the US Environmental Protection Agency (EPA) before they become effective under the Clean Water Act. Water quality standards require establishing:

1. **Designated uses**. The Clean Water Act requires that all waters provide for recreation and the protection and propagation of aquatic life. Additional uses can be adopted, such as drinking water supply and fish consumption. States establish designated uses.
2. **Criteria.** Criteria protect designated uses. For example, criteria include chemical, physical and biological conditions that protect fish and humans.

After comparing water quality data to standards, states must classify their waters into the general categories of Attainment and Non-Attainment.

ATTAINMENT OF WATER QUALITY STANDARDS

The United States

The *National Water Quality Inventory: 1996 Report* to Congress [13] reported on water quality conditions in the US. Figure II-1 shows that only 19% (693,905 miles) of US rivers and streams had been surveyed for quality conditions by 1996. Roughly, 37% of these surveyed river miles were not in attainment of the standards for their designated uses. The main pollutants were siltation, nutrients, bacteria, and oxygen-depleting substances. Agriculture was by far the main source of pollutants nationwide.

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[10] http://www.epa.gov/305b/98report/

[11] http://live.looksmart.com/cgi-bin/framer?http://www.cnie.org/nle/h2o-32.html

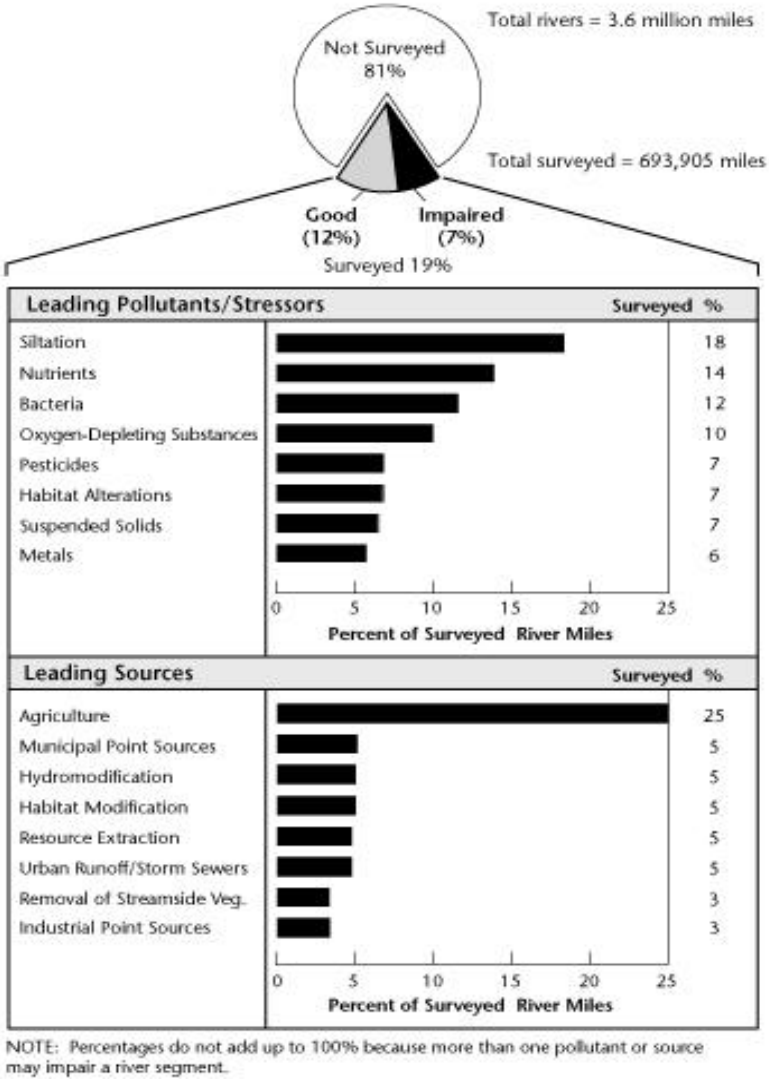
[12] Learn more about Water Uses in the US at: http://water.usgs.gov/watuse/

[13] Find entire report at: http://www.epa.gov/OW/resources/brochure/broch2.html

Pennsylvania

There are 83,260 river and stream miles in Pennsylvania. The *305(b) Report of Water Quality Assessment; April 2000* [14] notes that 43% (35,496 miles) of these stream miles were assessed through September 1999. This is considerably greater than the assessment rate for the US as a whole. Table II-1 shows that 20% of these streams were not in attainment because they did not support their designated use. Pennsylvania's surveyed streams were generally in better condition than the assessed streams of the US as a whole. Appendix II-A shows that Agriculture was the source of impairment for roughly 8% of Pennsylvania's surveyed streams. This source was closely followed by abandoned (acid) mine drainage (AMD), which also affected about 8% of surveyed streams. The actual polluting elements, or *causes*, include siltation, metals, nutrients and high acidity.

Figure II-1: 1996 Water Pollution Inventory for the US



NOTE: Percentages do not add up to 100% because more than one pollutant or source may impair a river segment.

[14] At: http://www.dep.state.pa.us/dep/deputate/watermgt/wc/subjects/WQStandards/305_wq2000_narr.htm

Pennsylvania has issued "fish consumption advisories" on 24 water-bodies.[15] Most of the advisories are due to elevated concentrations of PCBs and chlordane in fish tissue, but two advisories have been issued for Mirex and one for mercury. Also, Zebra mussels are present in Pennsylvania in Lake Erie as well as the lower Monongahela, lower Allegheny, and upper Ohio rivers.[16]

Allegheny County

Allegheny County has a total of 1444 miles of streams, of which 52% (752 miles) have been assessed (Table II-1). Of these assessed streams, 60% (450 miles) are not in attainment for water quality standards. Therefore, Allegheny County surveyed streams are in worse conditions than the assessed streams in the US and Pennsylvania as a whole.

Table II-1: Attainment Status of Pennsylvania and Allegheny County Streams

Status	Pennsylvania		Allegheny	
	Miles	%	Miles	%
Un-assessed	47,764	57%	692	48%
Assessed	35,496	43%	752	52%
Attained	~28,400	80%	302	40%
Non-Attained	~ 7,100	**20%**	450	**60%**
Total	83,260	100%	1,444	100%

Map II-1 shows the status of streams in Allegheny County. There are many un-assessed streams, mostly in the southeast and northwest areas of the county. Assessed streams in the northeastern area of the county show greater attainment than those in the southwest. Appendix II-B shows the stream conditions by township.

There are at least 19 different *causes* of Non-attainment in Allegheny County. The term *causes* refer to the types of pollutants. Table II-2 shows that the main *causes* of Non-attainment in the county are siltation, nutrients, and metals. Each of these pollutants impairs over 200 miles of assessed streams, together accounting for nearly 60% of the Non-attainment. Appendix II-C shows causes of non-attainment in each township's streams.[17]

Table II-3 lists the *sources* of the pollutants that *cause* the Non-Attainment. Acid Mine Drainage (AMD) and Urban Runoff/Storm Sewers are by far the main *sources* of these pollutants. They are a source of non-attainment in 50% of the assessed streams.[18] It is important to note that municipal and industrial point sources account for less than 1% of Non-Attainment for assessed streams in Allegheny County. Appendix II-D shows the sources of non-attainment by township.

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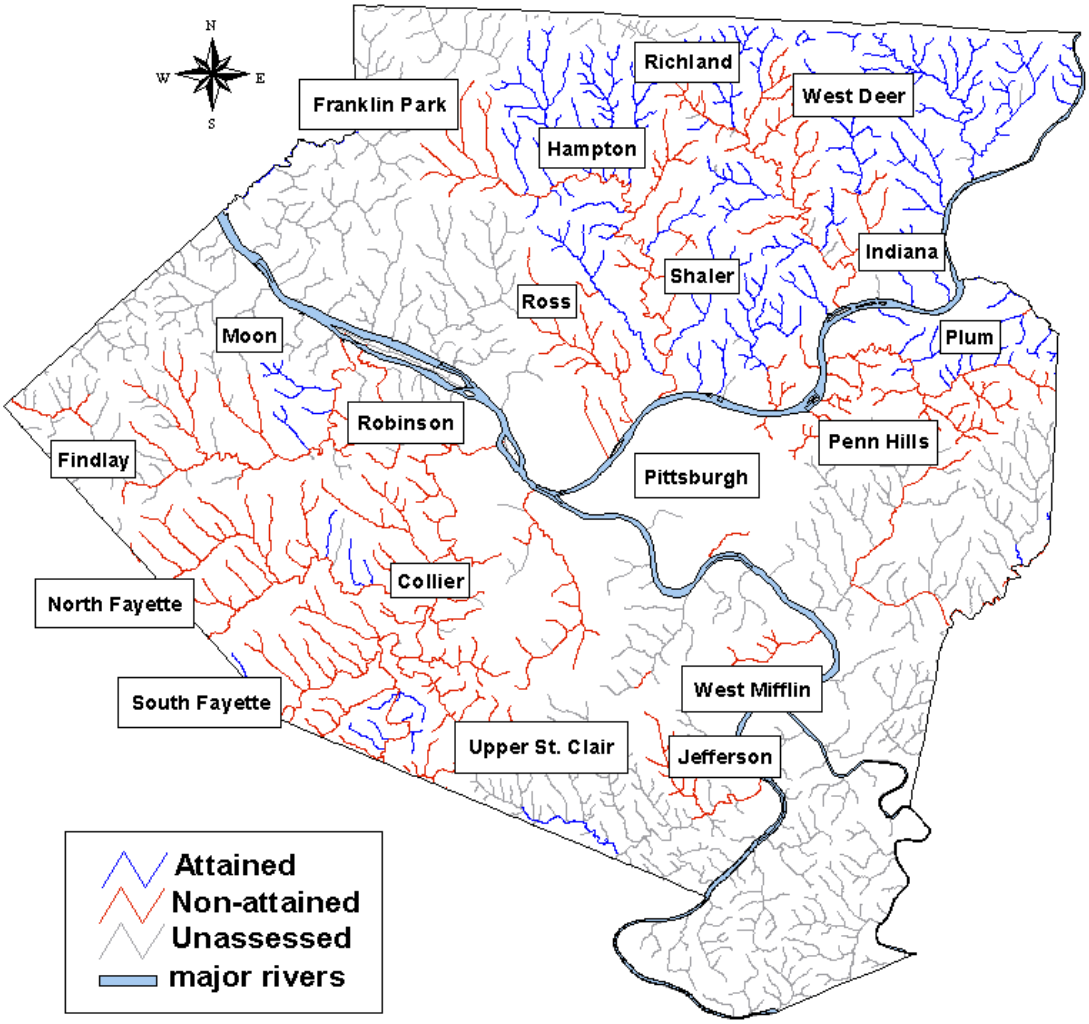
[15] Find advisories at: http://www.dep.state.pa.us/dep/deputate/watermgt/WC/Subjects/fishadvisory.htm

[16] For more detailed information on the assessment, quality, and management of water bodies in Pennsylvania, see EPA's Office of Water and the List of Impaired Waters for 1998 at: http://www.epa.gov/ow/states/PA/ and http://www.epa.gov/owowwtr1/tmdl/states/patmdltables.html

[17] The total number of miles impaired in Table II-2 (1,198) is almost triple the total length of non-attained streams (450). This is because a stream may be affected by more than one pollutant.

[18] Stream segments may be affected by one or more causes coming from more than one source.

Map II-1: Stream Water Quality Attainment In Allegheny County in 1999



MAJOR CAUSES OF NON-ATTAINMENT

Siltation

Siltation, or *sedimentation*, is the main pollutant of Allegheny's assessed streams. Table II-2 shows that siltation is the cause of 20% of the assessed streams that are not in attainment in the county. Silt[19] and other components of *sediment* are easily transported by moving currents but settle in still water. Excessive sedimentation clouds water, which reduces the amount of sunlight reaching aquatic plants, covers fish spawning areas and food supplies, and clogs the gills of fish. Also, contaminated sediment can reduce drinking water quality, discourage recreational uses of water, and can adversely impact aquatic communities.

[19] Silt is composed of sediment particles ranging from 0.004 to 0.06 mm in diameter irrespective of mineral type.

Table II-2: *Causes* of Non-Attainment in Allegheny County

Causes/Pollutants	Miles	%
Siltation (sedimentation)	238	20%
Nutrients	221	18%
Metals	205	17%
Salinity/TDS/Chlorides	86	7%
Organic Enrichment/Low D.O	79	7%
Turbidity	70	6%
Ph	70	6%
Suspended Solids	68	6%
Non-priority Organics	39	3%
Other Habitat Alterations	32	3%
Water/Flow Variability	22	2%
Flow alterations	20	2%
Oil and Grease	19	2%
Other Inorganics	11	1%
Unknown Causes	6	0.5%
Chlorine	4	0.3%
Pesticides	3	0.3%
Priority Organics	3	0.3%
Taste and Odor	2	0.2%
Total	**1198**	**100**

Table II-3: *Sources* of Pollutants in Allegheny County

Sources of Pollutants	Miles	%
Acid Mine Drainage	230	29%
UrbanRunoff/Storm Sewers	166	21%
Construction	45	6%
Habitat Modification	37	5%
Others	37	5%
Small Residential Runoff	37	5%
Removal of Vegetation	35	5%
Land Development	34	4%
Combined Sewer Overflow	29	4%
Bank Modifications	25	3%
On-Site Wastewater	17	2%
Agriculture	17	2%
Surface Mining	17	2%
Subsurface Mining	15	2%
Source Unknown	10	1%
Road Runoff	7	1%
Municipal Point Source	7	1%
Natural Sources	6	0.8%
Hydro-modification	6	0.7%
Golf Courses	5	0.6%
Industrial Point Source	3	0.4%
Petroleum Activities	3	0.3%
TOTAL	**788**	**100**

Silt Sources

Table II-4 shows a variety of sources of sediment. They include Urban Runoff/Storm Sewers, Acid Mine Drainage, and activities resulting in alteration of land cover such as Construction, Land Development, Habitat and Bank Modification, and Removal of Vegetation. Note that Agriculture and Road Runoff are only minor sources.

Table II-4: Sources of Siltation in Allegheny County

Source [20]	miles	%
Urban Runoff/Storm Sewer	50	18
Construction	45	17
Acid Mine Drainage	42	15
Land Development	34	13
Habitat Modification	32	12
Removal of Vegetation	25	9
Bank Modifications	17	6
Agriculture	13	5
Natural Sources	6	2
Small Residential Runoff	5	2
Road Runoff	3	1

Maps II-2a and II-2b show the assessed streams affected by siltation. The maps illustrate the relationship between "Non-Attainment" and land-use in Allegheny County. For instance, Map II-2a shows that sedimentation problems are largely in regions where the headwaters of streams are dominated by agricultural land use (i.e. Franklin, West Deer, South Fayette, Findlay). Map II-2a also shows strip mines concentrated in areas where siltation is a major cause of impairment (i.e. Findlay, Jefferson, West Mifflin). While many of the areas contiguous to silt impaired streams are agricultural, these are also areas (Map II-2b) with high residential development growth pressure or commercial and industrial areas (i.e. West Deer, Franklin Park, Findlay, South Fayette). In these areas, land development, construction, habitat modification, and vegetation removal can cause degradation.

Nutrients [21]

The term nutrient is used to describe elements, such as Nitrogen (N) and phosphorus (P), necessary for growth and metabolism of plants. Nutrients are essential to the health and continued functioning of ecosystems. However, nutrients can be present in water bodies in excessive amounts. When nutrient inputs exceed the capacity of organisms in a water body to utilize them, the water body progresses toward eutrophic conditions. Symptoms include an overabundance of plants and algae, algal blooms, low dissolved oxygen, fish kills, and decreased biological diversity.

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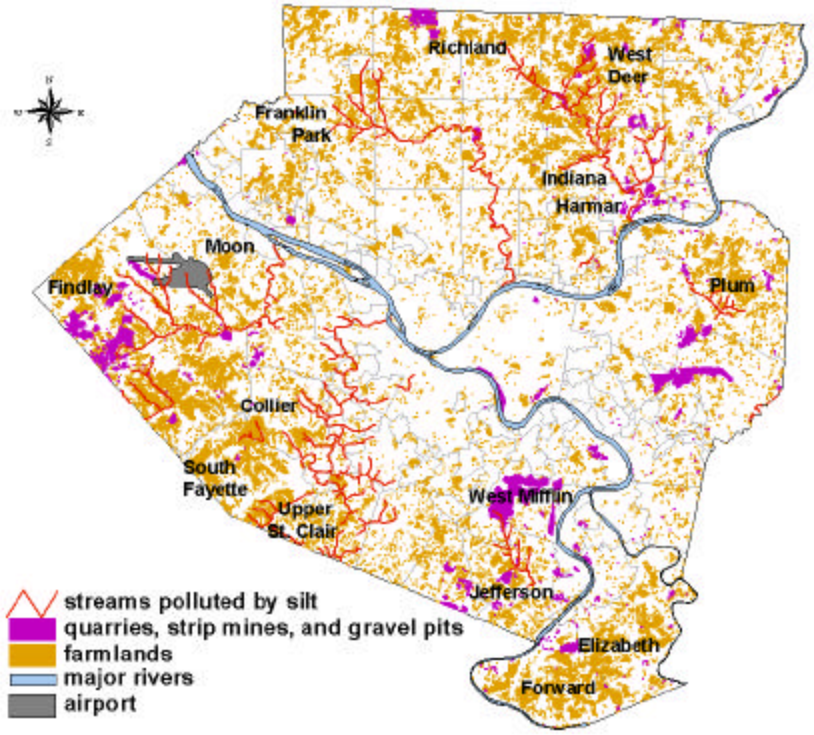
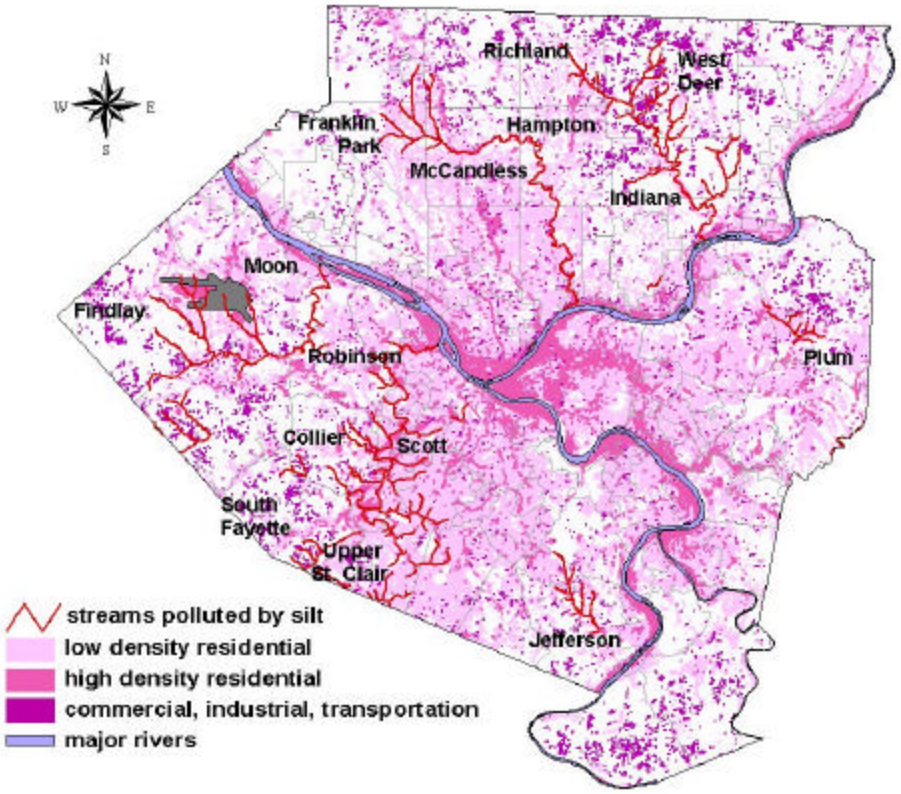
[20] Segments of a stream may be affected by siltation caused by more than 1 source. For example, a particular stream segment may be polluted by silt resulting from "Land Development" and "Construction" at the same time.

[21] Most of this section reproduces materials from US-EPA's *National Nutrient Guidance Manual:* Rivers and Streams (http://www.epa.gov/ost/criteria/nutrient/guidance/rivers/index.html) and the *Water Quality Criteria and Standards Plan* (http://www.epa.gov/OST/standards/criplan615.pdf).

Map II-2a: Assessed Streams Polluted by Silt and Farmlands and Other Uses



Map II-2b: Assessed Streams Polluted by Silt and Urban Uses



Nutrient enrichment frequently ranks as one of the top causes of water resource impairment. The EPA reported to Congress that of the aquatic systems surveyed and reported impaired, 40% of rivers, 51% of lakes, and 57% of estuaries had nutrients as a primary cause of impairment. Table II-2 shows that nutrients affect 18% of total Non-Attained stream length in Allegheny County.

Nutrient Effects

Nutrient impaired waters can cause problems ranging from annoyances to serious health concerns. Nuisance levels of algae and other aquatic vegetation can develop rapidly. High vegetation growth can interfere with aesthetic and recreational uses of streams. Taste and odor problems in drinking water can be caused by algal blooms. These blooms can produce toxins that affect animal and human health. Nitrates in drinking water can cause potentially fatal low oxygen levels in the blood when ingested by infants.

Nutrient impairment can cause problems other than those related to human health. Nutrient enriched waters commonly cause drinking water treatment filters to clog with algae and can contribute to the corrosion of intake pipes. High algal content in drinking water sources requires greater volumes of treatment chemicals, increased back-flushing of filters, and additional settling times to attain acceptable drinking water.

Adverse ecological effects associated with nutrient enrichment include reductions in dissolved oxygen (DO). Low DO can release toxic metals from sediments, contaminating habitats of local aquatic organisms. In addition, low DO can cause increased availability of toxic substances like ammonia and hydrogen sulfide, reducing acceptable habitat for aquatic organisms, including game fish. Thus, nutrient enrichment may alter the native composition and species diversity of aquatic communities.

Nutrient Sources

Sources of nutrients are fertilizers, sewage treatment plants, detergents, septic systems, combined sewer overflows, sediments, animal manure, and atmospheric deposition. Most nutrients in Allegheny County come from what are termed non-point sources. Table II-5 shows that Urban Runoff/Storm Sewers and Small Residential Runoff are the main sources, accounting for nearly 80% of the total stream-length affected by nutrients. In fact, all sources in Table II-5 are non-point sources; i.e., nutrients from municipal and industrial discharges are not a major source in Allegheny County.

Map II-3a and II-3b show surveyed streams in Allegheny County that are impaired by excessive nutrients. Map II-3a shows that many of the nutrient-impaired streams are located in areas where agricultural activities occur (i.e. West Deer, Plum, North and South Fayette). Map II-3b shows the same streams and their geographic relation to residential (i.e. Ross, Penn Hills, Shaler, Franklin Park), and to commercial and industrial areas (i.e. Plum, Findlay, North and South Fayette).

Table II-5: Sources of Nutrients

Source	Miles	%
Urban Runoff/Storm Sewer	133	55.1
Small Residential Runoff	37	15.3
Removal of Vegetation	16	6.6
On site Wastewater	15	6.2
Agriculture	14	5.8
Habitat Modification	14	5.8
Combined Sewer Overflow	4	1.7
Source Unknown	4	1.7
Road Runoff	3	1.2
Golf Courses	1	0.4
Bank Modifications	0.5	0.2

Metals and AMD

Metals in Allegheny County streams are mostly caused by Acid Mine Drainage (AMD). The EPA has singled out drainage from abandoned coal mines as the number one problem in the Appalachian region. An estimated 2,390 miles of streams in the Allegheny and Monongahela River Basins have been degraded by AMD to the point of not being able to support fish communities. This AMD problem is a consequence of more than 200 years of coal mining in the area.[22]

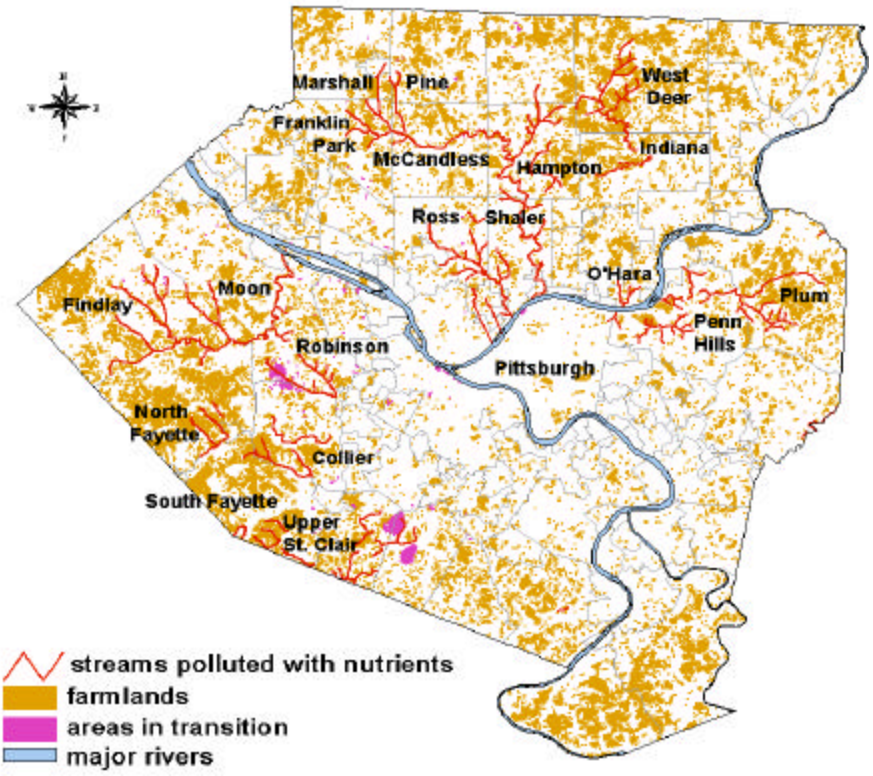
Acid drainage is water of high acidity (low pH) often containing iron, manganese, aluminum, and other metals. It is caused by exposing coal and bedrock to oxygen and moisture as a result of surface or underground mining operations. If produced in sufficient quantity, iron hydroxide and sulfuric acid may contaminate surface and ground water. Mine drainage effects on aquatic life vary widely, from elimination of all but the most tolerant algae and fish, to little or no effect. Acid water from AMD may cause excessive corrosion of navigation locks and dams, ships and barges, bridges and culverts, pipelines and plumbing. Damage to plumbing done by corrosive water represents a major expense to utilities and water users. Also, treatment of water supplies becomes more difficult and expensive.[23]

Table II-2 has shown that 17% of streams not in attainment are polluted by metals. These metals come from AMD. Map II-4 shows the relation between strip mines and metal contamination of streams (i.e. West Mifflin, Monroeville, Findlay, Harman. Abandoned deep mines, another source of AMD, are not shown in this map but permeate the southern area of the county.

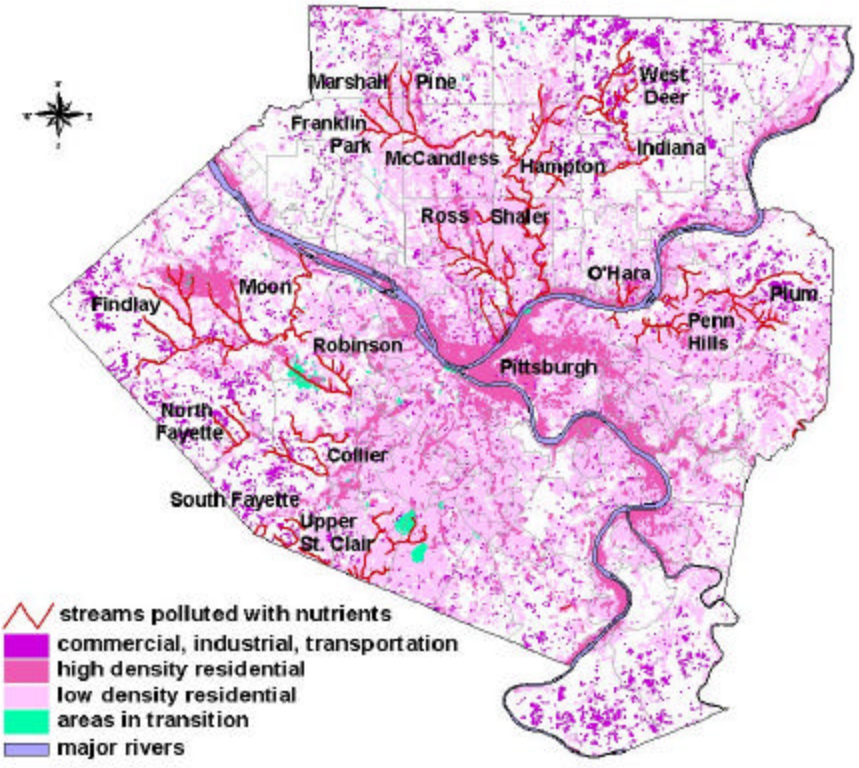
[22] Learn more about the effects of AMD in the Allegheny and Monongahela river basins at: http://wwwpah2o.er.usgs.gov/reports/wrir_99-4208.pdf

[23] Learn more about the Impacts of Mine Drainage on Aquatic Life, Water Uses, and Man-Made Structures at: http://www.dep.state.pa.us/dep/deputate/minres/districts/cmdp/chap04.html

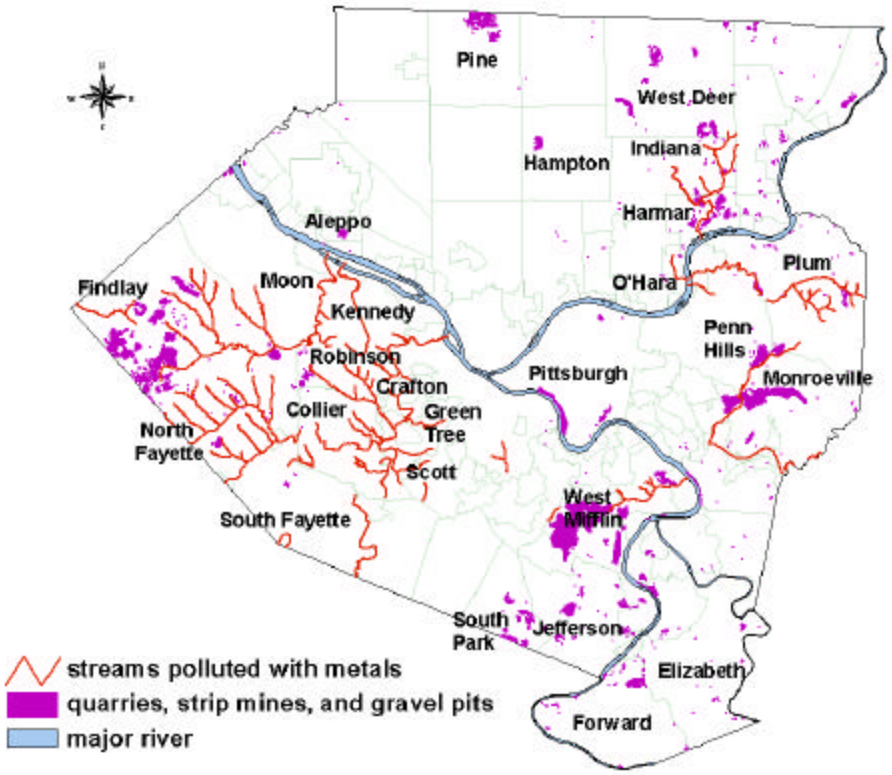
Map II-3a: Assessed Streams Polluted by Nutrients and Farmlands



Map II-3b: Assessed Streams Polluted by Nutrients and Urban Uses



Map II-4: Assessed Streams Polluted by Metals



The problem of stream pollution from AMD has been recognized as a major problem in the eastern United States for decades. There had not been a coordinated effort to address this problem until the *Appalachian Clean Streams Initiative* in 1994. This was a broad-based program to eliminate acid drainage from abandoned coal mines. Today the program is more focused, with a clear goal of cleaning up acid drainage problems using a combination of private and government resources.

The mission of the Appalachian Clean Streams Initiative is to facilitate and coordinate citizen groups, university researchers, the coal industry, corporations, the environmental community, and local, state, and federal government agencies that are involved in cleaning up streams polluted by acid drainage. Although eliminating acid drainage is now a federal government priority, the problem is so widespread and costly to solve that it can be eliminated only through combined public and private efforts. [24]

[24] The PA Department of Environmental Protection recently published a 400-page book entitled *Coal Mine Drainage Prediction and Pollution Prevention in Pennsylvania* (http://www.dep.state.pa.us/dep/deputate/minres/districts/CMDP/main.htm). Learn more about AMD see DEP's Mineral Resource Management; Bureau of District Mining Operations at: (http://www.dep.state.pa.us/dep/deputate/minres/districts/homepage.htm)

CONCLUSIONS

There are slightly more than 1400 stream and river miles in Allegheny County, of which only 750 have been assessed for meeting water quality standards. Surveyed streams in Allegheny County appear to be in worse condition than assessed streams of the US and Pennsylvania as a whole. For example, while 37% and 20% of assessed streams in the US and Pennsylvania were not in attainment of water quality standards for their designated uses, 60% of the assessed streams in Allegheny County are not in attainment for their uses. Most of these Non-attainment streams are located in the southwest region of the county.

There are at least 19 different *causes* of Non-attainment in Allegheny County. The main causes of Non-attainment are siltation, nutrients, and metals. Each of these pollutants impairs over 200 miles of assessed streams in the county, together accounting for nearly 60% of the Non-attainment miles. The *sources* of the pollutants that *cause* the Non-Attainment are mostly Acid Mine Drainage (AMD) and Urban Runoff/Storm Sewers. They account for 50% of stream miles in Non-Attainment.

Siltation, or sedimentation, is the main pollutant of Allegheny's assessed streams, accounting for 20% of the impairment in non-attaining streams. The sources of silt include Urban Runoff/Storm Sewers, Acid Mine Drainage, and activities resulting in alteration of land cover such as Construction, Land Development, Habitat and Bank Modification, and Removal of Vegetation. Sedimentation problems occur more in regions where the headwaters of streams are dominated by agricultural land use or strip mines, or are in areas with high residential, commercial and industrial development.

Nutrient enrichment is also one of the major causes of stream and river impairment. Nutrients impact 18% of streams not in attainment in Allegheny County. Nutrient impaired waters can cause problems that range from annoyances to serious health concerns. The sources of nutrients are fertilizers, sewage treatment plants, detergents, septic systems, combined sewer overflows, sediments, animal manure, and atmospheric deposition. Most nutrients in Allegheny County come from non-point sources such as Urban Runoff/Storm Sewers and Small Residential Runoff, which account for nearly 80% of the total stream miles adversely impacted by nutrients. Point sources, such as nutrients from municipal and industrial discharges, are not a major source in Allegheny County. Many of the nutrient-impaired streams are located in areas where agricultural activities occur as well as in residential, commercial, and industrial areas of the county.

Metals, another major pollutant of streams in Allegheny County, are mostly caused by Acid Mine Drainage (AMD). The EPA has singled out drainage from abandoned coalmines as the number one problem in the Appalachian region. An estimated 2,390 miles of streams in the Allegheny and Monongahela River Basins have been degraded by AMD to the point of not being able to support fish communities. Metals pollute 17% of the streams not in attainment in Allegheny County. Mine drainage effects on aquatic life vary widely, from elimination of all but the most tolerant algae and fish to no effect. Acid water from AMD may cause excessive corrosion of navigation locks and dams, ships and barges, bridges and culverts, pipelines and plumbing. Damage to plumbing done by corrosive water

represents a major expense to utilities and water users. Also, treatment of water supplies becomes more difficult and expensive.

Section I of this report, which focused on land use, has illustrated the strong relationship between land use and water quality. The relationship between tree cover across townships and within stream buffer areas and water quality attainment is highly suggestive of the impacts of landscape alteration on stream quality in Allegheny County. Activities that remove tree cover, and the loss of tree cover itself, are likely to have major impacts on siltation and nutrient loadings in county streams and rivers.

III. AIR QUALITY IN ALLEGHENY COUNTY[25]

INTRODUCTION

The emission of chemicals and other substances from industrial, vehicle and other emissions sources has considerable impact on the quality of air in industrialized and urbanized communities. In an attempt to improve and sustain air quality, Congress passed the Clean Air Act in 1963, amended in 1970 and 1990, to establish and enforce air quality standards. The Clean Air Act [26] established two types of national air quality standards: "Primary" standards to protect public health; and "Secondary" standards to protect public welfare, such as visibility, animal health, crops, vegetation, and buildings.

The US Environmental Protection Agency (EPA) has set National Ambient Air Quality Standards (NAAQS) for six principal pollutants, referred to as *criteria* pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), and sulfur dioxide (SO_2) (see Appendix III-A).

MONITORING

EPA requires the tracking of outside (ambient) air concentrations at selected monitoring sites throughout the country. Map III-1 shows these sites in Allegheny County. Appendix III-B provides more information on the pollutants monitored at each site.

ASSESSMENT

States are responsible for preparing and implementing *State Implementation Plans* (SIPs)[27] to achieve and maintain the air quality standards within their borders. As part of these plans, states are divided into Air Quality Control Regions (AQCR). Allegheny County is part of the *Pittsburgh-Beaver Valley* AQCR, which includes the counties of Allegheny, Armstrong, Beaver, Butler, Fayette, Washington and Westmoreland (see the *Southwest Group* in Map III-2). State and local air pollution control authorities establish SIPs for controlling air pollution within each region. SIPs must be approved by US-EPA. Under these plans, state and local authorities monitor the air quality in each AQCR. If the air quality in a region falls below the standard, EPA designates that region as a "Non-Attainment" area.[28] The area is then required to develop and implement plans to improve its air quality.

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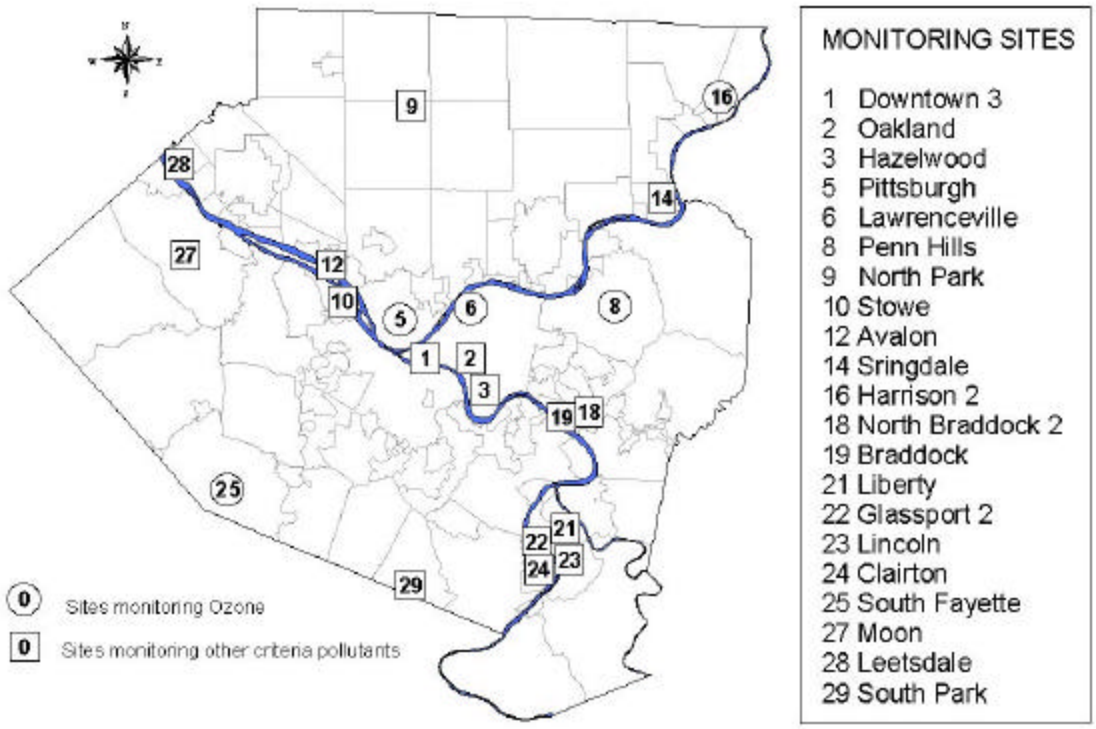
[25] Most of this report reproduces data and information made publicly available by the US Environmental Protection Agency (http://www.epa.gov/) and the Pennsylvania Department of Environmental Protection (http://www.dep.state.pa.us/).

[26] Check the Clean Air Act at http://www.epa.gov/oar/oaq_caa.html

[27] Check SIPs at: http://www.epa.gov/reg3artd/airqual/apd333.htm#sips

[28] Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant is in "Non-Attainment." If any of the monitoring sites in the region reports a violation of a pollutant standard, the whole region is considered as a "Non-Attainment" area for the pollutant.

Map III-1: Allegheny County Monitoring Sites



Source: ACHD, 1999 Air Quality Report

Map III-2: The Pittsburgh-Beaver Valley Air Quality Control Region (Southwest Group)

Source: PA Department of Environmental Protection (DEP)

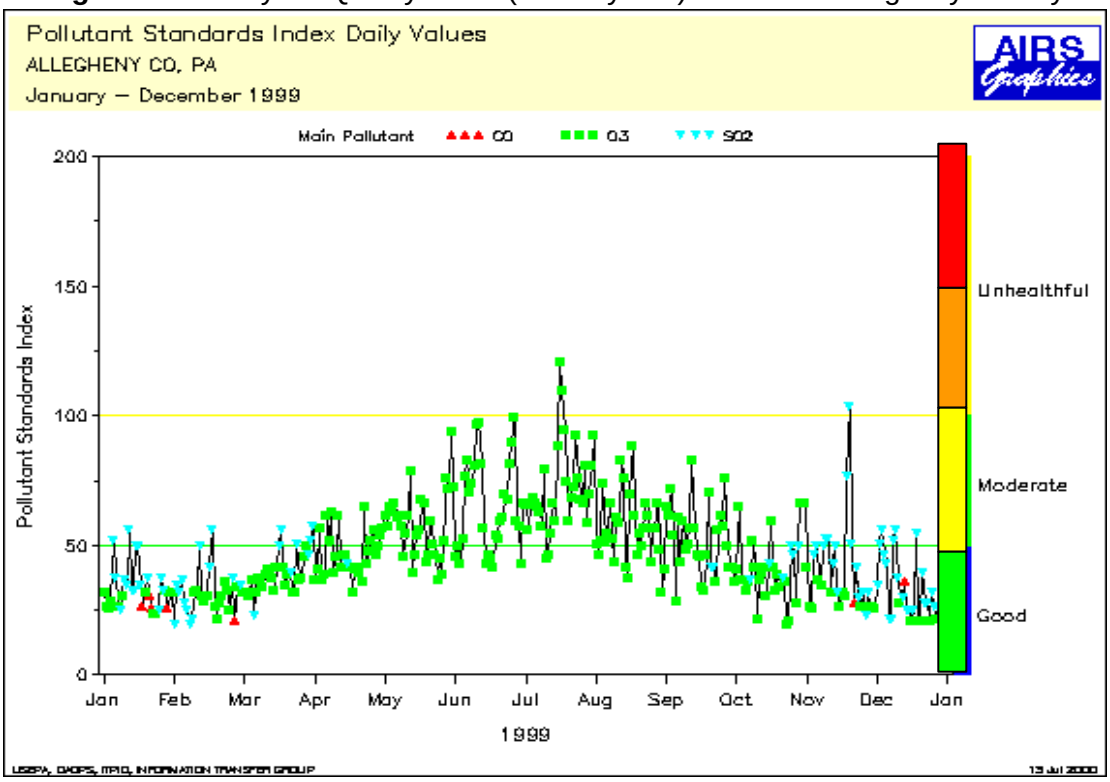
The *Air Quality Index* (AQI) (previously the *Pollutant Standard Index*) indicates the overall level of air quality in an area. It incorporates the levels of major air pollutants, including O_3, CO and PM. An AQI value is given for each monitoring site and pollutant.[29] The overall AQI for a site is the highest index value of any of the

[a]See current daily AQI ratings for Southwest Pennsylvania at: http://www.dep.state.pa.us/dep/deputate/airwaste/aq/aqm/psipitt.htm

pollutants. The AQI for Allegheny County in 1999 is shown in Figure III-1.[30] The index values mean the following:

Index	Color	Air Quality Description
0-50	Green	Good
51-100	Yellow	Moderate
101-150	Orange	Unhealthy for Sensitive Groups
151-200	Red	Unhealthy
201-300	Purple	Very Unhealthy
>300	Maroon	Hazardous

Figure III-1: Daily Air Quality Index (formerly PSI) Values for Allegheny County



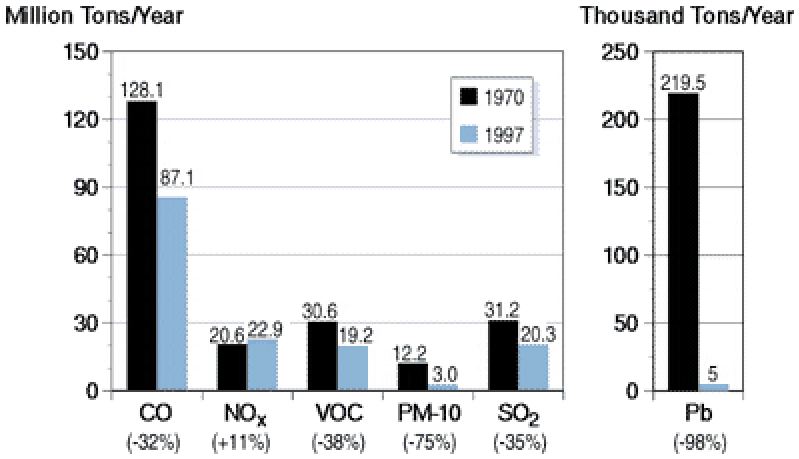
Source: EPA Office of Air Quality Planning & Standards/AIRS Data

CRITERIA POLLUTANTS

Criteria air pollutant levels in the US increased several hundred fold between 1900 and 1970. However, they have decreased nationally since 1970, which was roughly when the US Environmental Protection Agency was established. Figure III-2 shows national trends in pollutant volumes between 1970 and 1997. The exception to this trend is nitrogen oxides (NO_x), which have increased by 11% nationally.

[30] To obtain the maximum Air Quality Index (AQI) levels for each monitoring area of the County call **(412) 578-8179.**

Figure III-2: Comparison of 1970 and 1997 Emissions in the US



Source: EPA Office of Air and Radiation[31]

These improvements in air quality have occurred despite increases in population and economic growth. This implies that societal concerns, matched with appropriate legislation and administrative management, implementation and technological innovations can help achieve better environmental conditions.

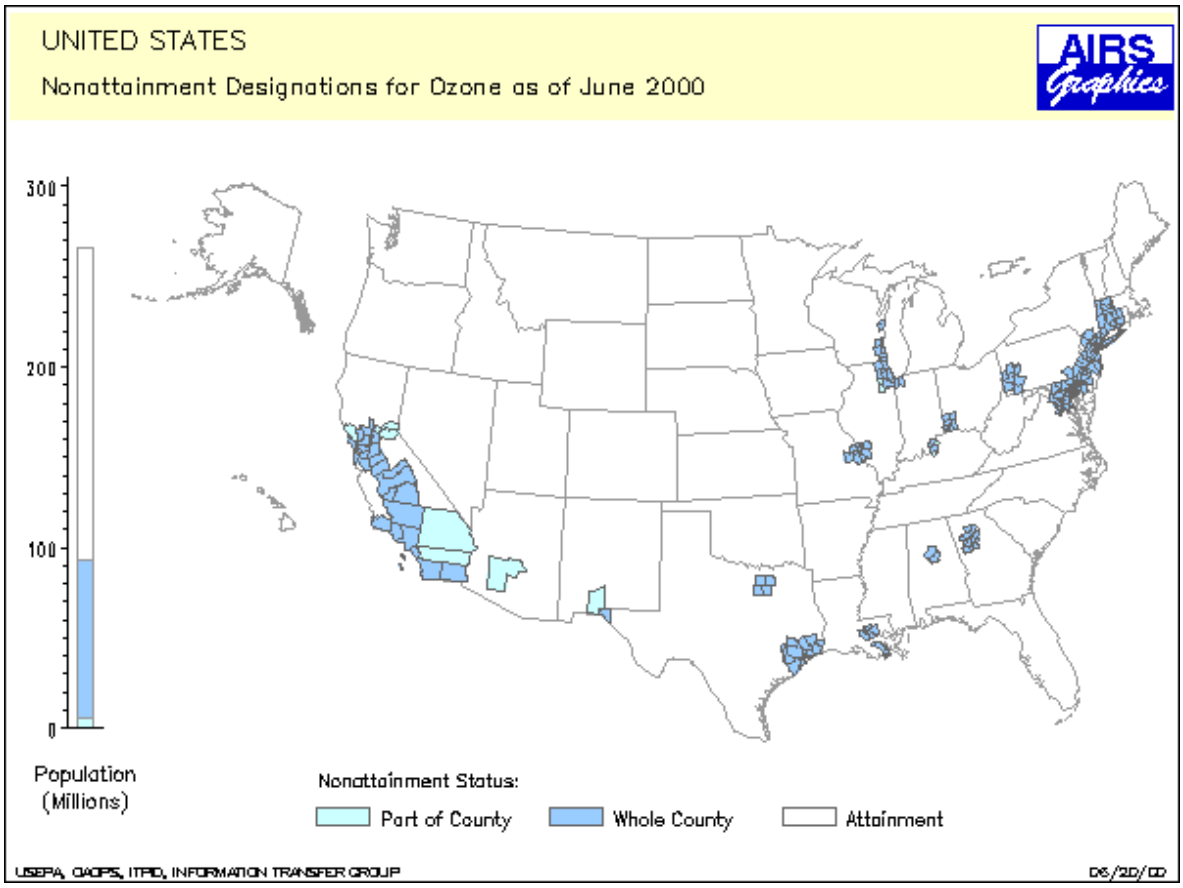
Criteria pollutants are discussed below. Since ozone (O_3) is the pollutant presenting the greatest problem in Allegheny County, this study focuses extensively on that pollutant. Figure III-1 shows that O_3 is the main pollutant during the warm season (April - October) in Allegheny County. During the cool season (October - March), carbon monoxide (CO) and sulfur dioxide (SO_2) are the main contributors to high AQI levels.

Ground Level Ozone (O_3)

Ground-level ozone is the primary constituent of smog. It continues to be a pervasive pollution problem throughout many areas of the United States, as Map III-3 shows. Ozone is not emitted directly into the air but is formed by the reaction of ozone "precursors," such as volatile organic compounds (VOCs) and Nitrogen Oxides (NO_x) in the presence of heat and sunlight. Ground-level ozone forms readily in the atmosphere, usually during hot summer weather. VOCs are emitted from a variety of sources, including motor vehicles, chemical plants, refineries, factories, consumer and commercial products (such as oil paints and lawn chemicals), and other industrial sources. Nitrogen oxides are emitted from motor vehicles, power plants, and other combustion sources.

[31] At: http://www.epa.gov/oar/aqtrnd97/brochure/summ.html

MAP III-3: Non-Attainment Areas for Ozone in the United States



Source: EPA Office of Air Quality Planning and Standards

Changing weather patterns contribute to yearly differences in ozone concentrations. O_3 and its precursor pollutants can be transported into an area from pollution sources hundreds of miles upwind, as may be the case for the Pittsburgh region.

Ground level ozone must be differentiated from *stratospheric* ozone. The former is concentrated 0-10 miles above sea level.[32] The latter is found in the stratosphere, 10- 30 miles above sea level. While ground level O_3 is harmful to living organisms, the stratospheric layer of ozone protects the earth from harmful ultraviolet radiation (UV-b) from the sun.[33]

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[32] The upper limit of the troposphere is at about 10 miles above the Equator and 5 miles above the poles.

[33] Over the past two decades, this protective shield has been damaged. Each year, an "ozone hole" forms over the Antarctic, and ozone levels fall to 70 percent below normal. Even over the United States, ozone levels are 5 percent below normal in the summer and 10 percent below normal in the winter. In humans, UV-b radiation is linked to skin cancer, including melanoma, the form of skin cancer with the highest fatality rate. It also causes cataracts and suppression of the immune system.

The effects of UV-b radiation on plant and aquatic ecosystems are not well understood. However, the growth of certain food plants can be slowed by excessive UV-b radiation. In addition, some scientists suggest that marine phytoplankton, which are the base of the ocean food chain, are already under stress from UV-b radiation. This stress could have adverse

Health and Environmental Effects of Ozone

Short-term (1-3 hours) and prolonged (6-8 hours) exposures to ozone have been linked to a number of health effects. For example, increased hospital and emergency room visits for respiratory problems have been associated with ambient ozone exposures. Repeated exposure to ozone can make people more susceptible to respiratory infection, resulting in lung inflammation, and can aggravate pre-existing respiratory diseases such as asthma. Other health effects attributed to ozone include significant decreases in lung function and increased respiratory symptoms such as chest pain and coughing, generally occurring while individuals are engaged in moderate to heavy exertion. Children active outdoors during the summer when ozone levels are high are at risk of experiencing these effects. Other at-risk groups include adults who are active outdoors (e.g., outdoor workers), and individuals with pre-existing respiratory diseases such as asthma and chronic obstructive lung disease. In addition, longer-term exposures to moderate levels of ozone present the possibility of irreversible changes in the lungs, which could lead to premature aging of the lungs and chronic respiratory illnesses.[34]

Ground level ozone also affects vegetation and ecosystems, leading to reductions in agricultural and commercial forest yields as well as reduced growth and survivability of tree seedlings. Excessive Ozone may lead to increased plant susceptibility to disease, pests, and other environmental stresses such as harsh weather. In long-lived species, these effects may become evident only after several years or even decades, thus having the potential for long-term effects on forest ecosystems. Ground-level ozone damage to the foliage of trees and other plants also can decrease the aesthetic value of ornamental species as well as the natural beauty of parks and recreation areas.[35]

Ozone Standards

EPA first established ozone standards in 1971. It set a 1-hour maximum limit of 0.12 parts per million (ppm).[36] This standard was revised in 1979 and 1993 and was considered to be adequate to protect human health. Since that time, over 3,000 new studies on ozone have been published. Many of these new studies show that ozone can cause adverse health effects at levels below the current primary standard (0.12 ppm). For this reason, EPA revised the national ambient air quality standards (NAAQS) for ozone and has sought to replace the 1-hour 0.12 ppm standard with a new 8-hour 0.08 ppm standard, whereby the average ozone level over an 8 hour period should not exceed this level. To be in compliance with the 1-hour standard, a region cannot have more than a total of 3 exceedances among its monitors over a 3 years period.

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consequences for human food supplies from the oceans. Because phytoplankton absorbs CO2 from the atmosphere, significant harm to phytoplankton populations could also increase global warming.

[34] Learn more about health effects at: http://www.epa.gov/airnow/health/smog1.html#3

[35] Learn more about the environmental effects at: http://www.epa.gov/ebtpages/airairpoenvironmentaleffects.html

[36] One drop of water in a full bathtub is analogous to one part per million.

National Trends in Ozone Levels

Ambient ozone trends in the US are influenced by year-to-year changes in meteorological conditions and VOC and NO_x in the atmosphere. In order to address ozone pollution, EPA has traditionally focused its control strategies on reducing emissions of VOC in Non-Attainment areas. However, EPA and the states have recognized a need for an aggressive program to reduce regional emissions of NO_x. National trends in emissions of NO_x and VOC underscore the importance of this new approach. Between 1988 and 1997, VOC emissions decreased 20 percent while NO_x emissions decreased only 1 percent. However, there are large areas of the US in "Non-Attainment" status for ozone, as Map III-3 shows. The Southwest Pennsylvania region is one of them. Nearly one-third of the US population lives in an ozone Non-Attainment area.

Trends in Ozone Levels in Allegheny County

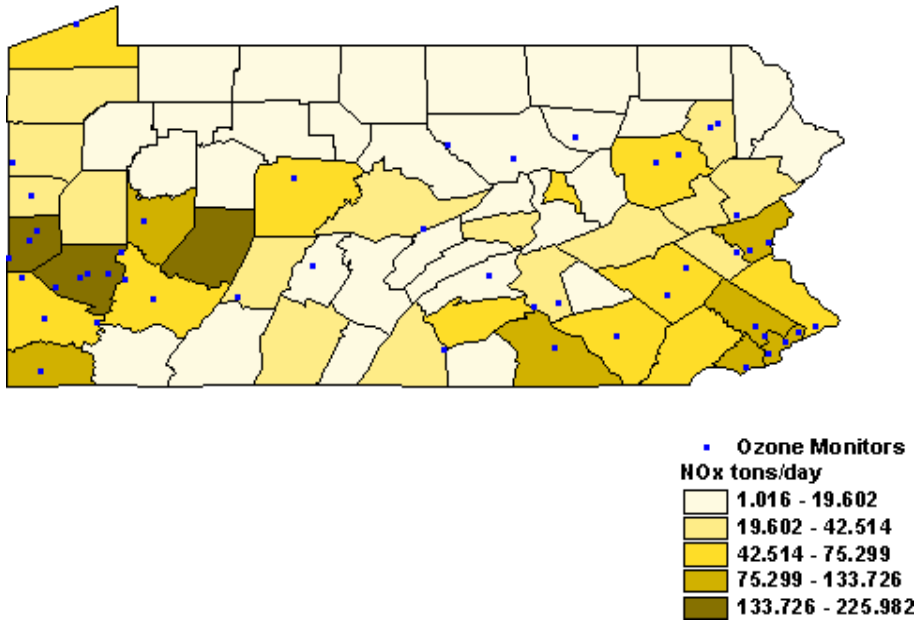
The *Pittsburgh-Beaver Valley* Air Quality Control Region (AQCR), which includes Allegheny, Armstrong, Beaver, Butler, Fayette, Washington, and Westmoreland Counties, is currently designated in moderate "Non-Attainment" for ozone. The causes for high levels of ozone in the region may be attributed to the transport of ozone from other regions as well as the emissions of ozone precursors in the region itself. Maps III-4a and III-4b show the high 1996 levels of NO_x and VOC emissions, respectively, in the region and state.

Monitored air quality data recorded in the Pittsburgh-Beaver Valley AQCR met the ozone NAAQS from 1990-1994. As a result, the Commonwealth of Pennsylvania submitted an attainment re-designation request. However, during the 1995 ozone season ambient air quality monitors in the AQCR recorded 17 exceedances of the 1-hour ozone standard: one monitor recorded seven exceedances, another recorded four. Since monitored data did not meet the ozone NAAQS, the area was not eligible for re-designation.

In 1999, the state proposed a re-designation of the Pittsburgh-Beaver Valley area due to attainment of the ozone standard for the 1996-1998 period. However, the standard was again violated in 1999, as Table III-1 shows. Harrison Township and Penn Hills had 5 and 4 exceedances, respectively, over the 3-year period (1997-1999), making the average over the three year period greater than the standard limit of one exceedance per year. The AQCR is again in Non-Attainment status as of June 2000, even though a Final Rule has not been issued by EPA.

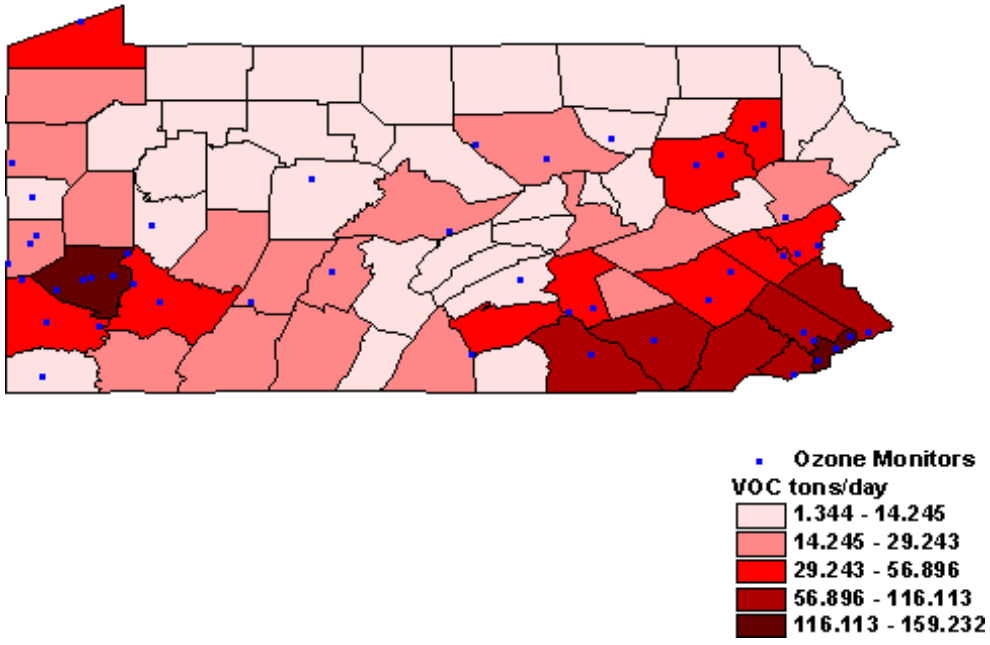
As Table III-1 shows, the Penn Hills and Harrison sites had the greatest number of exceedances in Allegheny County for the period 1997-1999, while South Fayette and Pittsburgh had the lowest. Even though attention should be paid to reducing the number of exceedances in Penn Hills and Harrison, it is equally important to prevent the other monitoring areas from reaching higher levels, especially since emissions from one area may be transported downwind and cause exceedances elsewhere. For example, emissions in Pittsburgh may cause exceedances in Penn Hills.

Map III-4a
1996 NOx Emissions From Manmade Sources



Source: PA/DEP, Proposal for Designation of 8-hour Ozone Areas, July 2000.

Map III-4b
1996 VOC Emissions From Manmade Sources



Source: PA/DEP, Proposal for Designation of 8-hour Ozone Areas, July 2000.

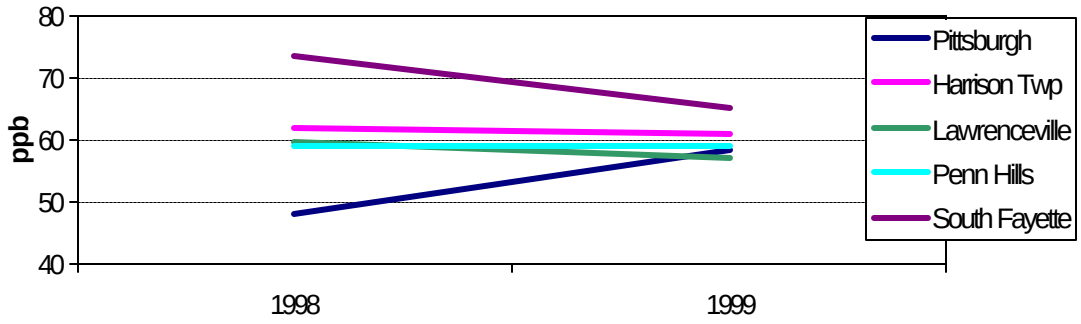
Table III-1: 1-Hour Ozone Standard Exceedances in Allegheny County

Year	Pittsburgh	Harrison Twp.	Lawrenceville	Penn Hills	South Fayette
1999	1	2	2	2	0
1998	0	0	0	0	1
1997	0	3	1	2	0

Source: PASDA; Ozone Action[37]

The Pittsburgh site must be given special attention. Figure III-3 shows the average annual 1-hour maximum ozone levels by site for 1998 and 1999. Only the Pittsburgh site shows an increase in average ozone levels between the two years. We do not know why this is the case. However, increased economic activity in downtown Pittsburgh could increase vehicle emissions, which could contribute to increased ozone levels.

Figure III-3: Ozone Levels in Allegheny County
Mean 1-hour Max for Each Year



Source: PASDA; Ozone Action

Attainment of the current 1-hour standard in the region, however, does not mean Attainment for ozone in the future. According to EPA's proposed rules, once an AQCR meets the 1-hour standard it would then have to comply with the new, more stringent 8-hour standard (provided that the Supreme Court rules in favor of EPA). The 8-hour standard was far from being reached during the 1998-1999 period in the Pittsburgh-Beaver Valley AQCR. Table III-2 shows the number of times each year that a monitor exceeded the 0.085 ppm level. While implementation of the 8-hour standard is somewhat complicated, this implies it will be quite difficult for the region to attain this standard. Appendix III-C illustrates the extensive exceedances of the 8-hour standard for the Pittsburgh monitoring site in 1999.

Table III-2: 8-Hour Ozone Standard Exceedances in Allegheny County

Year	Pittsburgh	Harrison Twp	Lawrenceville	Penn Hills	South Fayette
1999	16	12	9	10	15
1998	6	18	15	17	23

Source: PASDA; Ozone Action

[37] Web page: http://www.dep.state.pa.us/dep/deputate/airwaste/aq/theme/ozone.htm

The Pittsburgh-Beaver Valley AQCR is still in Non-Attainment status as of June 2000. This is of special concern since it is one of the most densely populated areas in the state. To address the ozone problem, Pennsylvania has convened local representatives to develop an approach for meeting the standard. The Pennsylvania Ozone Stakeholders Working Groups were created to make recommendations for Clean Air Plans that would result in Attainment. Besides reductions in local emissions, the plan contemplates reductions in emissions from states west and south of Pennsylvania.[38]

Carbon Monoxide (CO)

Carbon monoxide (CO) is a colorless, odorless and potentially poisonous gas, formed when carbon in fuel is not burned completely. It is a component of motor vehicle exhaust, which contributes 60% of all CO emissions nationwide. High concentrations of CO generally occur in areas with heavy traffic congestion. As much as 95% of all CO emissions in urban areas may come from automobiles. Other sources of CO emissions include industrial processes, non-transportation fuel combustion, and natural sources such as wildfires. Peak CO concentrations typically occur during the colder months of the year when CO automotive emissions are high.

Health and Environmental Effects of CO

Carbon monoxide enters the bloodstream through the lungs and reduces oxygen delivery to the body's organs and tissues. The health threat from CO is most serious for those who suffer from cardiovascular disease. At much higher levels of exposure, CO can be poisonous and even healthy individuals may be affected.[39] Visual impairment, reduced work capacity, reduced manual dexterity, poor learning ability, and difficulty in performing complex tasks are all associated with exposure to elevated CO levels.

National Trends in CO Levels

Long-term improvements in CO prevailed in monitored areas of the US between 1988 and 1997. Ambient CO concentrations decreased 38% and the number of exceedances of the national standard decreased 95%. Long-term air quality improvement in CO occurred despite a 25% increase in vehicle miles traveled in the United States during this 10-year period. However, several areas of the US remain in non-attainment, as Map III-5 shows.

Pennsylvania and Allegheny County Trends in CO Levels

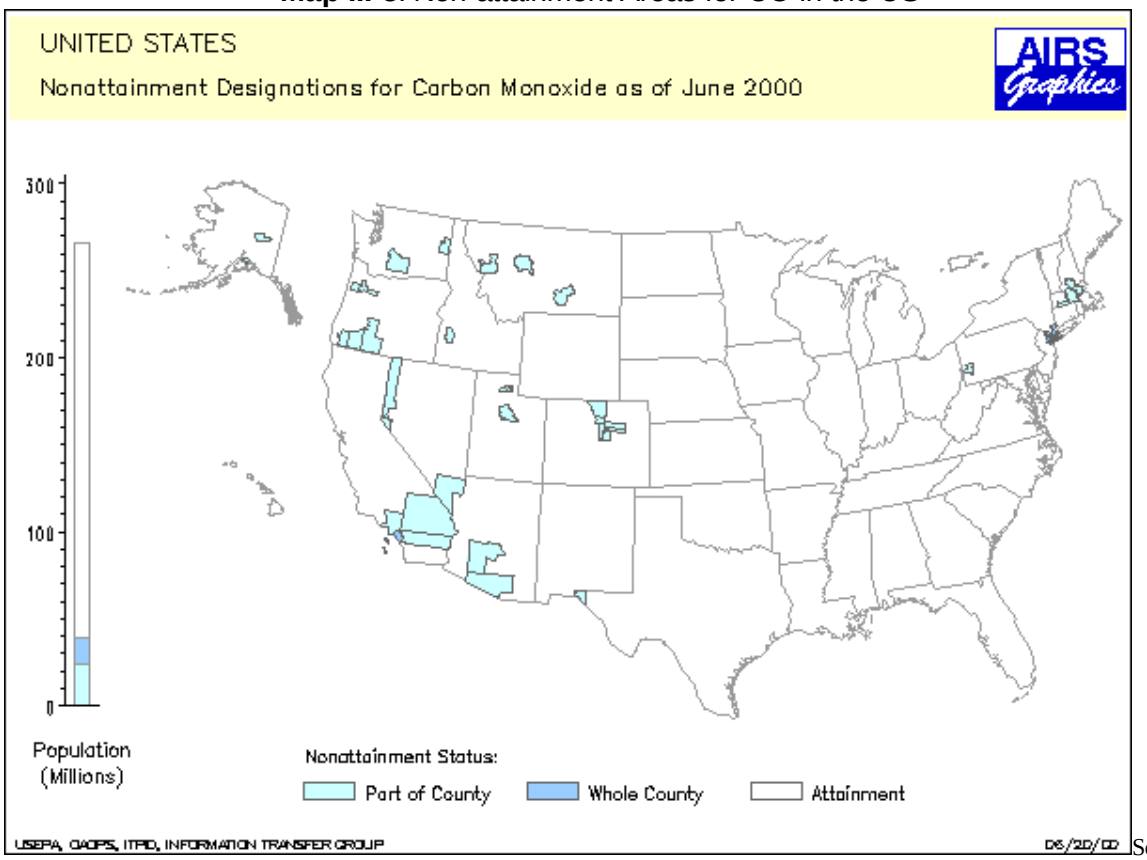
Levels of CO have been decreasing during 1986-1995 in Pennsylvania, except for the Monongahela Valley region, which has experienced a slight increase over the decade. Allegheny County has been unofficially designated as a “not-

[38] Find out how you can help to reduce ozone levels in your community at: http://www.dep.state.pa.us/dep/deputate/airwaste/aq/oad/indvtips.htm. Also, check the Ozone forecast for Southwestern Pennsylvania: http://www.dep.state.pa.us/dep/deputate/airwaste/aq/oad/oad_forecast.htm

[39] See how to protect your family at: http://www.epa.gov/iaq/pubs/coftsht.html

classified" Non-Attainment area by the EPA.[40] Nonetheless, the Allegheny County Health Department (ACHD)[41] reports annual maximum levels below the 1-hour and 8-hour standards for its two CO monitoring sites in Allegheny County, both located in downtown Pittsburgh. According to the ACHD's data, Allegheny County has been in attainment for CO since 1989.[42]

Map III-5: Non-attainment Areas for CO in the US



Source : EPA Office of Air Quality Planning and Standards/AIRS

Nitrogen Dioxide (NO_2)

Nitrogen dioxide (NO_2) is a reddish brown, highly reactive gas that is formed in the ambient air through the oxidation of nitric oxide (NO). Nitrogen oxides (NO_x), the term used to describe the sum of NO, NO_2 and other oxides of nitrogen, play a major role in the formation of ozone. The major sources of man-made NO_x emissions are combustion processes, such as those in vehicles and power plants. Home heaters and gas stoves also produce substantial amounts of NO_2 in indoor settings.

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[40] A CO not-classified area is an area designated as a carbon monoxide non-attainment area as of the date of enactment of the Clean Air Act Amendments of 1990 and did not have sufficient data to determine if it is meeting or is not meeting the carbon monoxide standard.

[41] At http://www.county.allegheny.pa.us/achd/index.asp

[42] Find out about the current levels of CO in locations across Pennsylvania at: http://www.dep.state.pa.us/dep/deputate/airwaste/aq/aqm/pollt.html. And learn more about CO at: http://www.epa.gov/iaq/co.html

Health and Environmental Effects of NO_2

Short-term exposures (e.g., less than 3 hours) to high nitrogen dioxide (NO_2) concentrations may lead to changes in airway responsiveness and lung function in individuals with pre-existing respiratory illnesses and to increases in respiratory illnesses in children. Long-term exposures to NO_2 may lead to increased susceptibility to respiratory infection. Atmospheric transformation of NO_x can lead to the formation of ozone and nitrogen-bearing particles that are associated with adverse health effects.

Nitrogen oxides also contribute to the formation of acid rain. Nitrogen oxides contribute to a wide range of environmental effects, including potential changes in the composition of some species of vegetation in wetland and terrestrial systems. High levels can also lead to reduced visibility, acidification of freshwater bodies, eutrophication (i.e., explosive algae growth leading to a depletion of oxygen in the water), and increases in levels of toxins harmful to fish and other aquatic life.

National Trends in NO_2 Levels

Over the past decade, ambient NO_2 concentrations in the US decreased 14% nationally. In the last decade, NO_x (which include NO_2 and other oxides nitrogen) emission levels have remained relatively constant, declining only 1%. As of June 2000, all areas of the US are in attainment for NO_2.

Pennsylvania and Allegheny County Trends in NO_2 Levels

NO_2 levels have remained relatively constant over the last decade in Pennsylvania. All areas of the state are at or below 50% of the air quality standard. No site exceeded the air quality standard for NO_2 in Pennsylvania in 1995, and no site in Allegheny County currently exceeds the standard.

Although there is no air quality standard for NO_x, per se, the level of this pollutant is of concern due to its role in contributing to the formation of ozone. NO_x is continuously monitored in Pennsylvania by the same instruments used for measuring NO_2. Measurements show a relatively steady decrease across the state in NO_x levels over the 10-year period between 1986 and 1995.[43]

Particulate Matter (PM-10 and PM-2.5)

Particulate matter (PM) is the general term used for a mixture of solid particles and liquid droplets found in the air. Some particles are large or dark enough to be seen as soot or smoke. Others are so small they can be detected only with an electron microscope. These particles come in a wide range of sizes: "fine" particles are less than 2.5 micrometers in diameter and “coarse-size” particles are smaller than 10 micrometers. They originate from many different stationary and mobile sources as well as from natural sources. Fine particles (PM-2.5) result from fuel combustion in motor vehicles, power generation, and industrial facilities, as well as from residential fireplaces and wood stoves. Coarse particles (PM-10) are generally emitted from sources such as unpaved roads, materials handling, crushing and grinding operations, and windblown dust.

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[43] Learn more about NO_x at: http://www.epa.gov/acidrain/noxpg.html

Health and Environmental Effects of Particulates

PM can be inhaled as both fine and coarse particles. These particles can accumulate in the respiratory system and are associated with numerous health effects. Exposure to coarse particles is primarily associated with the aggravation of respiratory conditions, such as asthma. Fine particles are most closely associated with heart and lung disease, increased respiratory symptoms and disease, decreased lung function, and even premature death. Sensitive groups at greatest risk include the elderly, children, and individuals with cardiopulmonary disease such as asthma. In addition to health problems, PM is the major cause of reduced visibility in many parts of the United States. Airborne particles can cause damage to paints and building materials.

Particulate Matter Standards

There are two sets of standards for particulates: one for particulate matter with a diameter of 10 microns or more (PM-10), and one for "fine" particulate matter measuring 2.5 microns or less (PM-2.5). A review of scientific data indicates that it is the smaller particles that are largely responsible for the health effects of greatest concern and for visibility impairment. Beginning in 2002, EPA will designate Non-Attainment areas for the new PM-2.5 standards. Appendix III-D shows the old and new PM standards.

National Trends in PM-10 Levels

Between 1988 and 1997, average PM-10 concentrations in the US decreased 26%. Human activities, such as fuel combustion, industrial and agricultural processes, and transportation sources, accounted for 6% of the total PM-10 emissions nationwide. Between 1988 and 1997, PM-10 emissions from these sources decreased 12%. Despite the reductions, there are several Non-Attainment areas in the US, as Map III-6 shows.

Pennsylvania and Allegheny County Trends in PM-10 Levels

PM-10 levels have remained fairly constant across the state during the 1988-1997 period. There were no sites in the Commonwealth that violated the PM-10 standard in 1995. However, on June 2000, the area including Liberty, Lincoln, Port Vue, and Glassport Boroughs and the City of Clairton were designated as Non-Attainment areas by the EPA.

According to the Allegheny County Health Department, Allegheny County met the PM-10 for the period 1997-1999.[44] The new standard for PM-2.5 was violated at some monitoring sites. However, none of the sites can be reliably evaluated for PM-2.5 since too few scheduled samples have been recorded during this period.[45]

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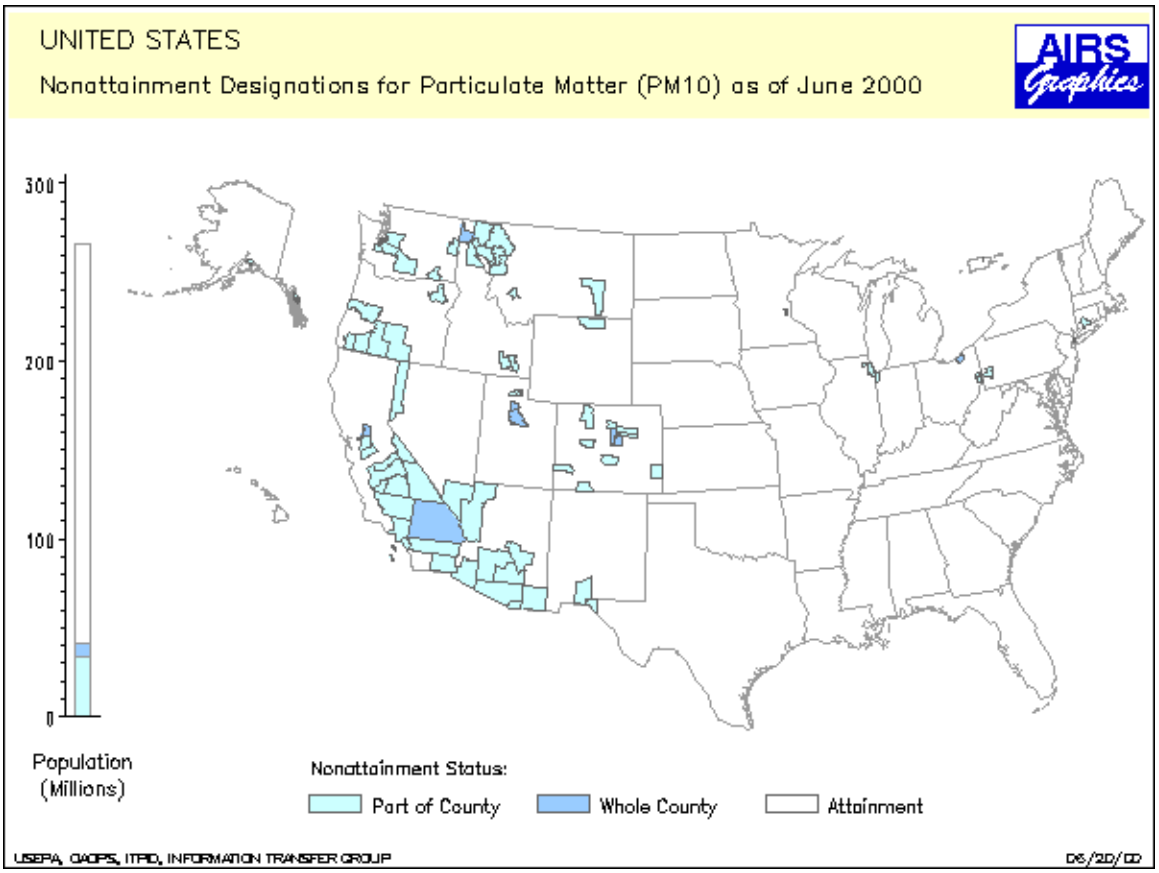
[44] ACHD. Air Quality 1999 Annual Report. Pp 22-23.

[45] ACHD. Air Quality 1999 Annual Report. p 26.

Learn more about PM at: http://www.dep.state.pa.us/dep/deputate/airwaste/aq/standards/pm/pm.htm

Map III-6: Non-attainment Areas for PM-10 in the US



Source: EPA Office of Air Quality Planning and Standards/AIRS

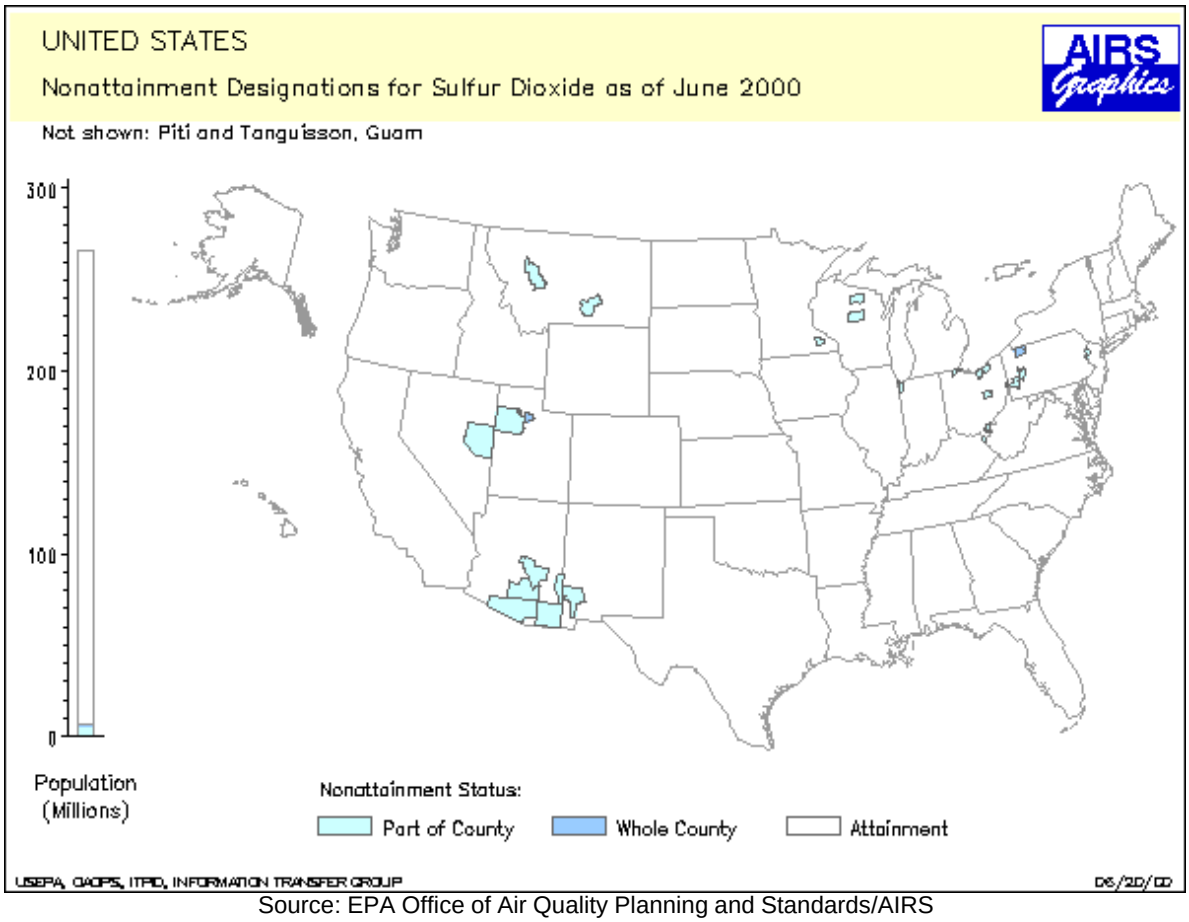
Sulfur Dioxide (SO_2)

Sulfur dioxide belongs to the family of sulfur oxide gases. These gases are formed when fuel containing sulfur (coal and oil) is burned and during metal smelting and other industrial processes. Most SO_2 monitoring stations are located in urban areas. The highest monitored concentrations of SO_2 are recorded in the vicinity of large industrial facilities, such as coal-fueled electric utilities.

Health and Environmental Effects of SO_2

High concentrations of SO_2 can result in temporary breathing impairment for asthmatic children and adults who are active outdoors. Short-term exposures of asthmatic individuals to elevated SO_2 levels during moderate exertion may result in reduced lung function. This may be accompanied by wheezing, chest tightness, or shortness of breath. Other effects that have been associated with longer-term exposures to high concentrations of SO_2 and particulates, include respiratory illness and aggravation of existing cardiovascular disease. The subgroups of the population that may be affected under these conditions include individuals with cardiovascular disease or chronic lung disease, as well as children and the elderly.

Map III-7: Non-attainment Areas for SO_2 in the US



Source: EPA Office of Air Quality Planning and Standards/AIRS

Together, SO_2 and NO_x are the major precursors to acidic deposition (acid rain). Acid rain is associated with the acidification of soils, lakes, and streams, accelerated corrosion of buildings and monuments, and reduced visibility.[46] Sulfur dioxide also is a major source of PM-2.5, which is a significant health concern as well as a pollutant impairing visibility.

National Trends in SO_2 Levels

Between 1988 and 1997, national SO_2 concentrations decreased 39% and SO_2 emissions decreased 12%. Sulfur dioxide emissions from electric utilities decreased 12% between 1994 and 1997. These recent reductions are due, in large part, to controls implemented under EPA's Acid Rain Program. There are still several areas of the US exceeding the current standards, as Map III-7 shows.

Pennsylvania and Allegheny County Trends in SO_2 Levels

Sulfur dioxide levels have improved slightly or remained the same over the last decade for the state as a whole. The 1995 averages continue to be well below the ambient air quality standard. All sites in the Commonwealth met the standards

[46] Learn more about Acid Rain at: http://www.epa.gov/acidrain/ardhome.html

in 1995. As of June 2000, however, the EPA reported 4 areas in Non-Attainment: Armstrong, Warren/ Conewango Townwhip, Hazelwood, and Warren County (see Map III-7). The Allegheny County Health Department reported Allegheny County levels of SO_2 well below standards for the period 1998-99. Only Glassport violated the standard in 1999.[47]

Lead (Pb)

In the past, leaded-fuel sources were the major contributor to Pb emissions. As a result of EPA's regulatory efforts to reduce the content of Pb in gasoline during the 1980's, contributions from the transportation sector have declined over the past decade. Today, metal processing is the major source of Pb emissions. The highest air concentrations of Pb are found in the vicinity of non-ferrous (i.e. aluminum, zinc, copper, etc) and ferrous (i.e. steel and iron) smelters and battery manufacturers.

Health and Environmental Effects of Lead

Exposure to Pb occurs mainly through inhalation of air and ingestion in food, water, soil, or dust. It accumulates in the blood, bones, and soft tissues. Lead can adversely affect the kidneys, liver, nervous system, and other organs. Excessive exposure to Pb may cause seizures, mental retardation, and behavioral disorders. Even at low doses, Pb exposure is associated with damage to the nervous systems of fetuses and young children, resulting in learning deficits. Recent studies also show that Pb may be a factor in high blood pressure and subsequent heart disease. Lead can also be deposited on vegetation, presenting a hazard to children playing outside, to grazing animals and, by moving up the food chain, to humans.

National Trends in Pb Levels

Between 1988 and 1997, ambient Pb concentrations decreased 67% nationally, and total Pb emissions decreased 44%. Since 1988, Pb emissions from highway vehicles have decreased 99% due to the phase-out of leaded gasoline. The large reduction in Pb emissions from transportation sources has changed the nature of this pollutant problem in the United States. There are still violations of the Pb air quality standard in some areas of the US. They tend to occur near large industrial sources such as lead smelters. Nonetheless, Pb is now a minor problem in the US.

Pennsylvania and Allegheny County Trends in Pb Levels

Lead levels have remained relatively constant over the last decade in Pennsylvania after initial dramatic improvements due to the use of lead-free gasoline and industrial emission controls. The lead standard was not exceeded at any monitoring site in Pennsylvania in the last decade.[48]

[47] ACHD. 1999 Air Quality Annual Report. p 9.
[48] Learn more about Pb at http://www.epa.gov/ttn/uatw/hlthef/lead.html.

CONCLUSIONS

Air Quality has improved dramatically during the last three decades in the US. With the exception of NO_x, emissions of criteria air pollutants in the US have fallen between 1970 and 1997. This improvement may be attributed to the enactment and enforcement of the Clean Air Act and its amendments. Even though there are hundreds of thousands of pollutants released into the air, the EPA has focused on six "criteria" pollutants, which represent the more significant threats to the health of people as well as to animals, plants, and the environment. The EPA has determined different standards for each pollutant. These standards have been gradually met across the country, but there are still areas of Non-Attainment for each of these "criteria" pollutants.

The Pittsburgh-Beaver Valley Air Quality Control Region is one of several regions in the country that still experiences levels of pollutants above standards. Ozone (O_3) is indeed the most problematic pollutant in this area. Most of Southwestern Pennsylvania, which includes Allegheny County, has not been able to meet the old 1-hour standard, not to mention the proposed more stringent 8-hour standard. However, the average annual maximums of O_3 declined across Allegheny County, except for the monitoring site located in the City of Pittsburgh, which increased between 1998 and 1999.

While it is likely that regions upwind of the Pittsburgh region contribute to regional violations of ozone standards, the region itself generates sufficient volumes of NO_x and voltaic organic compounds (voc), which are necessary for ozone creation. Also, excessive emissions in some areas of the region, such as the city of Pittsburgh, can cause Non-Attainment of ozone standards at monitors downwind, such as Penn Hills.

Unofficially, Allegheny County is also in Non-Attainment for Carbon Monoxide (CO). However, data collected by the Allegheny County Health Department in downtown Pittsburgh show no violation of the standards since 1998, which would make the area in attainment.

EPA reports the areas of Liberty, Lincoln, Port Vue, Glassport Boroughs, and the City of Clairton in Non-Attainment for course Particulate Matter (PM-10) during 1998-99. The Allegheny County Health Department, on the other hand, collected readings showing no violations of the PM-10 standard during the period 1997-99, but do show violations of the new small particle PM-2.5 standard in some monitoring sites.

The Allegheny County Health Department reports that levels of SO_2 in the county are within the standards. However, the monitoring site in Glassport reported a violation of the standard in 1999. The EPA reports only Armstrong County in Non-Attainment status for SO_2 in Southwestern Pennsylvania.

Finally, monitoring of Lead (Pb) and Nitrogen Dioxide (NO_2) has reported no violations in Allegheny County, nor elsewhere in the Southwestern Pennsylvania region. As a consequence, the region is in Attainment for these pollutants.

APPENDICES

APPENDIX I-A: Distribution of Land Uses Within Township/Borough/Municipality

Townships/ Boroughs	Tree Cover				Agriculture		Urban			Others		
	DECD	EVGR	MIX	WET	CROP	PAST	LRES	HRES	CIT	EWET	TRAN	QMG
Aleppo	60	2	18	-	2	3	7	0	1	-	-	5
Aspinwall	19	1	3	-	0	1	60	14	1	1	-	-
Avalon	31	2	5	-	-	0	55	7	0	0	-	-
Baldwin Borough	36	0	8	-	1	4	47	3	1	0	-	0
Baldwin Township	30	-	7	-	0	2	55	5	1	-	-	-
Bell Acres	70	2	13	0	2	8	4	1	1	0	0	0
Bellevue	21	2	5	-	0	0	63	8	0	0	-	-
Ben Avon	33	8	9	-	0	-	48	2	-	0	-	-
Ben Avon Heights	32	16	24	-	-	3	24	-	-	-	-	-
Bethel Park	29	1	13	-	2	6	40	3	1	-	5	-
Blawnox	21	5	4	-	2	1	48	18	0	0	-	-
Brackenridge	6	1	1	-	0	4	76	11	0	0	-	-
Braddock	2	2	0	-	-	-	31	63	-	2	-	-
Braddock Hills	38	0	9	-	0	5	42	4	1	-	-	0
Bradfordwoods	59	5	20	-	1	1	13	0	1	-	-	-
Brentwood	22	0	5	-	0	2	64	6	0	-	-	-
Bridgeville	15	1	8	-	0	2	65	9	0	-	-	-
Carnegie	18	1	7	-	1	2	59	12	0	-	-	-
Castle Shannon	21	0	6	-	1	3	61	7	1	-	0	-
Chalfant	16	-	5	-	-	1	78	1	-	-	-	-
Cheswick	20	2	8	-	1	1	59	8	0	0	-	0
Churchill	29	1	14	-	0	17	36	2	1	-	-	0
Clairton	18	2	2	0	1	1	42	25	0	5	-	3
Collier	54	1	8	0	7	7	15	5	2	0	1	0
Coraopolis	24	0	6	-	1	1	52	16	1	0	-	-
Crafton	23	2	8	-	1	1	58	6	0	-	-	-
Crescent	62	1	12	0	1	1	18	2	1	-	-	3
Dormont	6	0	3	-	0	1	72	18	0	-	-	-
Dravosburg	43	1	4	-	1	1	38	6	1	1	-	3
Duquesne	10	1	1	-	0	1	43	38	0	1	-	5
East Deer	65	1	5	-	3	2	15	5	1	1	-	2
East McKeesport	31	-	5	-	0	0	57	7	-	-	-	-
East Pittsburgh	16	0	0	-	1	0	35	48	0	-	-	-
Edgewood	29	0	7	-	-	0	51	13	0	-	-	-
Edgeworth	46	8	16	-	0	2	24	3	0	-	-	-
Elizabeth Borough	15	3	4	-	0	1	62	14	0	0	-	0
Elizabeth Township	57	1	10	-	6	12	10	0	3	-	-	0
Emsworth	27	4	11	-	0	2	48	6	0	1	-	-
Etna	20	0	2	-	1	1	47	27	2	-	-	-
Fawn	70	2	7	-	8	5	3	0	4	-	-	1
Findlay	50	1	5	0	7	8	12	5	3	0	0	8
Forest Hills	29	0	10	-	0	1	54	4	1	-	-	-
Forward	56	1	7	-	13	12	3	0	5	0	-	2
Fox Chapel	51	3	23	-	1	10	11	0	1	-	-	-
Franklin Park	54	2	15	-	2	9	17	0	1	-	0	0
Frazer	74	1	7	-	5	6	2	0	4	-	-	0

Townships/ Boroughs	Tree Cover				Agriculture		Urban			Others		
	DECD	EVGR	MIX	WET	CROP	PAST	LRES	HRES	CIT	EWET	TRAN	QMG
Glassport	42	2	5	-	2	1	28	16	0	1	-	3
Glenfield	67	1	7	-	3	1	14	3	1	0	2	0
Green Tree	27	2	10	-	1	2	44	12	1	-	1	-
Hampton	52	2	15	-	4	8	15	2	2	-	-	1
Harmar	57	1	4	0	3	1	17	5	2	1	-	9
Harrison	49	2	7	-	3	3	27	6	1	1	-	2
Haysville	80	0	6	-	0	0	6	6	0	-	-	1
Heidelberg	4	-	3	-	0	1	74	16	1	-	-	-
Homestead	6	1	1	-	-	-	31	61	0	0	-	-
Indiana	68	1	9	-	4	6	7	1	3	-	-	1
Ingram	14	1	7	-	-	0	75	3	0	-	-	-
Jefferson	62	0	7	0	10	4	11	2	2	0	-	2
Kennedy	44	1	12	-	1	4	33	3	0	0	0	-
Kilbuck	75	1	12	-	1	4	6	1	1	0	-	-
Leet	66	1	15	-	1	4	12	0	0	-	-	-
Leetsdale	27	3	3	1	2	1	32	31	0	0	-	1
Liberty	42	2	6	-	1	1	44	4	0	-	-	-
Lincoln	75	1	11	-	1	2	6	1	0	0	-	2
McCandless	39	3	17	-	2	8	27	3	1	-	0	-
McDonald	19	1	19	-	2	8	48	2	0	-	-	0
McKeesport	25	1	4	-	1	1	48	19	0	0	-	0
McKees Rocks	7	1	1	-	0	1	51	39	0	0	-	-
Marshall	60	3	8	-	7	7	11	1	3	-	0	-
Millvale	34	1	4	-	0	0	35	20	3	2	0	-
Moon	50	1	12	0	3	7	19	6	1	0	0	0
Mount Lebanon	19	2	12	-	0	3	60	4	0	-	0	-
Mount Oliver	9	-	4	-	0	4	63	19	1	-	-	-
Munhall	17	1	4	-	0	2	59	15	1	0	-	-
Mun. of Monroeville	53	0	7	-	2	3	25	3	1	-	-	6
Neville	8	4	1	-	3	2	30	47	1	4	-	-
North Braddock	38	1	3	-	0	1	34	21	0	2	-	1
North Fayette	49	1	7	0	17	10	9	1	4	0	-	2
North Versailles	55	1	8	-	2	2	24	7	1	0	-	1
Oakdale	17	2	15	-	8	10	44	4	1	-	-	0
Oakmont	27	2	10	-	1	2	46	12	0	0	-	-
O'Hara	45	1	12	-	2	5	27	5	1	0	-	0
Ohio	70	1	10	-	3	4	11	1	1	-	0	0
Osborne	53	4	16	0	0	2	22	2	0	-	-	-
Penn Hills	44	1	11	-	1	5	33	3	1	-	-	2
Pennsbury Village	32	1	10	-	-	-	56	1	0	-	-	-
Pine	59	2	9	-	6	10	6	1	4	-	0	4
Pitcairn	42	0	7	-	1	2	38	10	1	-	-	-
Pittsburgh	29	1	4	-	1	2	43	19	1	0	0	1
Pleasant Hills	30	0	9	-	2	5	40	6	1	-	-	7
Plum	58	1	8	-	7	7	13	1	3	0	-	1
Port Vue	31	1	4	-	1	1	54	4	0	-	-	3

Township/Borough	Tree Cover				Farmlands		Urban			Others		
	DECD	EVGR	MIX	WET	CROP	PAST	LRES	HRES	CIT	EWET	TRAN	QSMG
Rankin	14	1	1	-	0	0	46	36	0	1	-	-
Reserve	60	0	7	-	1	3	27	1	2	-	0	-
Richland	52	3	15	-	5	11	9	1	3	-	0	0
Robinson	49	1	11	0	3	5	23	4	1	0	2	1
Ross	44	1	11	-	1	4	32	5	1	-	0	-
Rosslyn Farms	48	2	15	-	1	0	26	7	1	-	0	-
Scott	21	1	9	-	1	3	57	7	1	-	0	-
Sewickley	25	6	8	-	0	1	50	9	1	-	-	-
Sewickley Heights	59	2	18	0	2	15	2	0	1	-	-	0
Sewickley Hills	69	2	10	-	3	7	6	-	3	-	-	0
Shaler	39	1	13	-	1	3	39	3	1	0	0	0
Sharpsburg	12	3	1	-	0	0	35	47	0	2	-	-
South Fayette	44	1	11	0	8	17	13	2	4	0	0	0
South Park	51	1	6	-	6	8	22	2	1	-	0	4
South Versailles	65	5	14	-	2	1	12	0	1	-	-	0
Springdale Borough	13	2	3	0	2	1	58	18	0	3	-	0
Springdale	67	1	5	-	3	2	15	1	3	1	-	2
Stowe	30	3	7	-	0	1	34	23	0	1	0	-
Swissvale	22	1	3	-	0	0	53	20	1	-	-	-
Tarentum	34	2	4	-	1	2	43	13	1	1	-	0
Thornburg	40	1	17	-	0	15	25	1	1	-	-	-
Trafford	84	0	5	-	0	-	8	1	-	-	-	-
Turtle Creek	25	0	4	-	1	0	52	17	0	-	-	0
Upper St. Clair	28	1	18	-	4	11	34	1	1	-	2	-
Verona	15	2	4	-	0	1	57	22	0	0	-	-
Versailles	26	1	4	-	1	1	53	14	0	-	-	0
Wall	73	-	11	-	1	0	12	2	-	-	-	0
West Deer	58	1	7	-	11	11	4	0	7	-	-	2
West Elizabeth	16	4	1	-	6	0	42	25	1	4	-	-
West Homestead	24	2	6	-	0	0	36	32	0	-	-	-
West Mifflin	38	0	5	-	1	3	28	3	1	0	-	21
West View	21	1	8	-	0	1	63	6	0	-	-	-
Whitaker	17	1	4	-	1	1	61	14	1	0	-	-
Whitehall	20	1	10	-	1	9	55	3	1	-	0	-
White Oak	63	1	10	-	2	3	19	1	1	-	-	0
Wilkins	41	0	8	-	1	3	32	2	1	-	-	13
Wilkinsburg	25	0	5	-	0	1	54	14	1	-	-	-
Wilmerding	25	1	5	-	0	0	39	29	0	-	-	0

DECD = Deciduous Species
EWET = Emergent Wetlands
HRES = High Intensity Residential
CIT = Commercial/Indust/Transport
CROP = Row Crops
EVGR = Ever Green Species
TRAN = Transitional Areas
QMG = Quarry/Mine/Gravel
LRES = Low Intensity Residentia
PAST = Pastures/Hay
MIX = Mixed Stands
WWET= Woody Wetlands

Zero (0) values indicate a percentage lower than 0.5% but greater than 0.00%. A dash (-) sign indicates no area whatsoever for a particular use.

APPENDIX I-B: Population Trends and Land Uses in Allegheny County

Township/Borough	Population 2000	Pop. Density 2000*	Pop. Change 1990-2000**	Forests %	Farmland %	Urban %	Others %
Aleppo	1,039	573	-16.6	80	6	9	5
Aspinwall	2,960	8443	2.8	22	2	75	1
Avalon	5,294	8272	-8.5	38	0	62	0
Baldwin Borough	19,999	3462	-8.8	44	5	51	0
Baldwin Township	2,244	4147	-9.5	37	3	61	0
Bell Acres	1,382	266	-3.8	85	9	5	0
Bellevue	8,770	8595	-3.9	28	1	71	0
Ben Avon	1,917	4665	-8.5	50	0	50	0
Ben Avon Heights	392	2328	5.1	73	3	24	0
Bethel Park	33,556	2869	-0.8	43	8	44	5
Blawnox	1,550	4300	-4.7	31	3	66	0
Brackenridge	3,543	6744	-6.4	9	4	87	0
Braddock	2,912	4858	-37.8	4	0	94	2
Braddock Hills	1,998	2054	-1.4	47	6	47	0
Bradfordwoods	1,149	1277	-13.5	84	2	14	0
Brentwood	10,466	7235	-3.3	27	3	70	0
Bridgeville	5,341	4937	-1.9	24	2	74	0
Carnegie	8,389	5067	-9.6	26	2	72	0
Castle Shannon	8,556	5258	-6.3	28	4	69	0
Chalfant	870	5497	-9.3	21	1	79	0
Cheswick	1,899	3770	-3.7	30	2	67	1
Churchill	3,566	1624	-8.2	44	17	39	0
Clairton	8,491	3018	-12.1	22	2	68	8
Collier	5,265	371	8.8	63	15	21	1
Coraopolis	6,131	4675	-9.1	31	1	68	0
Crafton	6,706	5914	-6.7	33	2	64	0
Crescent	2,314	1118	-7.1	74	2	21	3
Dormont	9,305	12599	-4.8	9	1	90	0
Dravosburg	2,015	1858	-15.2	47	3	46	4
Duquesne	7,332	3955	-14.0	12	1	81	6
East Deer	1,362	577	-12.6	71	5	21	3
East McKeesport	2,343	5946	-12.5	36	1	64	0
East Pittsburgh	2,017	5162	-6.6	16	1	83	0
Edgewood	3,311	5599	-7.5	36	0	64	0
Edgeworth	1,730	1124	3.6	70	2	28	0
Elizabeth Borough	1,609	4379	-0.1	22	1	76	0
Elizabeth Township	13,839	611	-5.9	68	18	14	0
Emsworth	2,598	4165	-10.2	42	2	54	1
Etna	3,924	5249	-6.6	23	1	76	0
Fawn	2,504	195	-7.7	79	13	7	1
Findlay	5,145	162	14.3	57	15	20	8
Forest Hills	6,831	4380	-6.9	39	2	59	0
Forward	3,771	196	-2.7	64	25	9	2
Fox Chapel	5,436	691	2.2	77	11	12	0

Township/Borough	Population 2000	Pop. Density 2000*	Pop. Change 1990-2000**	Forests %	Farmland %	Urban %	Others %
Franklin Park	11,364	837	12.4	71	11	18	0
Frazer	1,286	137	-7.3	82	12	6	0
Glassport	4,993	2841	-10.6	49	2	44	4
Glenfield	236	275	17.4	76	4	18	2
Green Tree	4,719	2246	-3.8	39	3	57	1
Hampton	17,526	1093	12.6	69	11	18	1
Harmar	3,242	526	3.1	63	4	24	9
Harrison	10,934	1482	-7.0	57	6	34	3
Haysville	78	387	-22.0	87	0	12	1
Heidelberg	1,225	4653	-1.1	8	2	90	0
Homestead	3,569	6076	-14.6	8	0	92	0
Indiana	6,809	385	13.0	79	11	10	1
Ingram	3,712	8522	-4.8	22	0	78	0
Jefferson	9,666	583	1.4	69	13	15	3
Kennedy	7,504	1382	3.3	58	5	37	0
Kilbuck	723	282	-18.8	88	5	7	0
Leet	1,568	984	-9.4	82	5	13	0
Leetsdale	1,232	1187	-11.2	33	2	63	1
Liberty	2,670	1848	-2.7	50	2	48	0
Lincoln	1,218	241	2.6	87	3	7	2
McCandless	29,022	1748	0.8	60	10	31	0
McDonald	415	2034	-6.3	40	10	50	0
McKeesport	24,040	4675	-7.6	30	2	67	0
McKees Rocks	6,622	6301	-13.9	9	1	90	0
Marshall	5,996	385	49.5	71	14	15	0
Millvale	4,028	5839	-7.2	39	1	58	2
Moon	22,290	941	13.5	64	10	26	0
Mount Lebanon	33,017	5457	-1.0	33	4	63	0
Mount Oliver	3,970	11715	-4.6	13	5	82	0
Munhall	12,264	5291	-6.8	22	2	75	0
Munic. Monroeville	29,349	1482	0.6	60	5	29	6
Neville	1,232	763	-3.2	13	6	77	4
North Braddock	6,410	4101	-8.9	42	1	55	2
North Fayette	12,254	489	28.5	57	27	14	2
North Versailles	11,125	1365	-9.6	64	4	31	1
Oakdale	1,551	2990	-11.5	34	18	48	0
Oakmont	6,911	4193	-0.7	39	3	58	0
O'Hara	8,856	1246	-2.6	59	7	33	1
Ohio	3,086	448	25.5	80	7	12	0
Osborne	566	1234	0.2	73	2	25	0
Penn Hills	46,809	2463	-9.1	55	7	36	2
Pennsbury Village	738	12706	-4.7	43	0	57	0
Pine	7,683	458	89.8	70	16	11	4
Pitcairn	3,689	6890	-9.7	49	2	49	0
Pittsburgh	334,563	5963	-9.5	34	2	62	1
Pleasant Hills	8,397	3084	-5.5	40	7	47	7

Township/Borough	Population 2000	Pop. Density 2000*	Pop. Change 1990-2000**	Forests %	Farmland %	Urban %	Others %
Plum	26,940	941	5.2	68	14	17	1
Port Vue	4,228	3857	-8.9	36	2	59	3
Rankin	2,315	5031	-7.5	17	1	82	1
Reserve	3,856	1936	-0.3	67	4	30	0
Richland	9,231	635	7.3	70	16	14	0
Robinson	12,289	835	13.5	61	8	28	3
Ross	32,551	2266	-2.8	56	5	38	0
Rosslyn Farms	464	767	-3.9	65	1	34	0
Scott	17,288	4374	1.0	31	4	65	0
Sewickley	3,902	4019	-5.6	39	1	60	0
Sewickley Heights	981	134	-0.3	80	16	4	0
Sewickley Hills	652	263	4.8	81	10	9	0
Shaler	29,757	2662	-2.5	53	5	43	0
Sharpsburg	3,594	6784	-4.9	16	0	82	2
South Fayette	12,271	603	18.8	56	25	19	0
South Park	14,340	1563	0.3	57	14	25	4
South Versailles	351	373	-31.8	84	3	13	0
Springdale Borough	3,828	3828	-4.1	18	3	76	3
Springdale	1,802	794	1.4	74	5	18	3
Stowe	6,706	3345	-12.7	40	1	58	1
Swissvale	9,653	7787	-9.3	26	1	74	0
Tarentum	4,993	3868	-12.0	40	3	57	1
Thornburg	468	1049	1.5	57	16	27	0
Trafford	31	172	-65.6	90	0	9	0
Turtle Creek	6,076	6200	-7.3	30	1	69	0
Upper St. Clair	20,053	2053	1.8	47	15	36	2
Verona	3,124	5509	-4.2	20	1	78	0
Versailles	1,724	3322	-5.3	32	1	67	0
Wall	727	1640	-14.8	84	1	15	0
West Deer	11,563	400	1.7	66	22	11	2
West Elizabeth	565	2441	-10.9	22	7	68	4
West Homestead	2,197	2414	-11.9	32	0	68	0
West Mifflin	22,464	1584	-5.0	43	4	32	21
West View	7,277	7209	-5.9	30	1	69	0
Whitaker	1,338	4390	-5.5	22	2	76	0
Whitehall	14,444	4397	0.0	31	9	59	0
White Oak	8,437	1267	-3.7	74	5	21	0
Wilkins	6,917	2637	-8.8	49	4	34	13
Wilkinsburg	19,196	8332	-8.9	30	1	69	0
Wilmerding	2,145	4746	-3.5	31	1	68	0
Summary	1,281,666	1,750	-4.1	57.0	10.5	28.3	4.2

* Density is persons per square mile

** as a percentage of population in 1990

APPENDIX II-A

Sources and Causes of Impairment in Pennsylvania's Rivers and Streams (1999)

Sources	Miles	%	Causes	Miles	%
Agriculture	2736	7.7	Siltation	3016	8.5
Abandoned Mine Drainage	2711	7.6	Metals	2536	7.1
Urban Runoff/Storm Sewers	1014	2.9	Nutrients	1705	4.8
Source Unknown	759	2.1	pH	1391	3.9
Habitat Modification	424	1.2	Organic Enrichment/Low D.O.	845	2.4
Small Residential Runoff	259	0.7	PCB	678	1.9
Other	259	0.7	Cause Unknown	549	1.5
Municipal Point Source	242	0.7	Water/Flow Variability	537	1.5
Road Runoff	209	0.6	Other Habitat Alterations	506	1.4
Industrial Point Source	180	0.5	Flow Alterations	498	1.4
Removal of Vegetation	148	0.4	Suspended Solids	416	1.2
Atmospheric Deposition	135	0.4	Chlordane	311	0.9
Construction	134	0.4	Turbidity	223	0.6
Onsite Wastewater	113	0.3	Other Inorganics	166	0.5
Land Development	112	0.3	Excessive Algal Growth	121	0.3
Combined Sewer Overflow	73	0.2	Salinity/TDS/Chlorides	117	0.3
Hydro-modification	55	0.2	Thermal Modifications	57	0.2
Flow Regulation/Modification	53	0.1	Non-priority Organics	41	0.1
Channelization	50	0.1	Unionized Ammonia	41	0.1
Upstream Impoundment	47	0.1	Oil and Grease	36	0.1
Natural Sources	43	0.1	Unknown Toxicity	30	0.1
Bank Modifications	42	0.1	Mirex	23	0.1
Subsurface Mining	24	0.1	Priority Organics	21	0.1
Draining or Filling	21	0.1	Pesticides	20	0.1
Golf Courses	18	0.1	Pathogens	16	0.0
Package Plants	17	0.0	Taste and Odor	15	0.0
Highway Road Bridge Construction	13	0.0	Color	11	0.0
Surface Mining	8	0.0	Chlorine	11	0.0
Petroleum Activities	6	0.0	Noxious Aquatic Plants	3	0.0
Land Disposal	4	0.0	Filling and Draining	2	0.0
Erosion from Derelict Land	4	0.0			
Silviculture	3	0.0			

APPENDIX II-B

Attainment of Clean Water Act Standards by Township in Allegheny County

Township/Borough*	Total Length (miles)	Assessed %	in attainment %	not in-attainment %
Bell Acres	19.2	39.4	100.0	0.0
Cheswick	2.8	62.5	100.0	0.0
East Deer	12.0	50.7	100.0	0.0
Harrison	17.8	78.9	100.0	0.0
Leet	9.6	47.9	100.0	0.0
Leetsdale	3.6	35.5	100.0	0.0
Sharpsburg	6.2	47.1	100.0	0.0
South Park	30.7	15.8	100.0	0.0
Springdale	17.1	61.9	100.0	0.0
Tarentum	6.1	41.0	100.0	0.0
Frazer	23.7	100.0	91.5	8.5
Fox Chapel	20.9	98.4	88.5	11.5
Pine	41.2	75.2	88.3	11.7
Richland	38.8	78.1	73.0	27.0
McCandless	41.8	84.3	66.2	33.8
West Deer	64.9	99.2	65.5	34.5
Etna	7.0	100.0	62.7	37.3
O'Hara	23.1	79.4	57.9	42.1
Indiana	49.4	97.2	56.2	43.8
Plum	76.9	75.7	54.2	45.8
Harmar	18.4	65.8	51.7	48.3
Hampton	39.6	99.2	49.1	50.9
Moon	64.6	36.4	37.6	62.4
Ross	36.1	60.6	30.6	69.4
Shaler	26.7	91.4	25.7	74.3
South Fayette	51.4	100.0	14.8	85.2
Oakmont	5.1	100.0	14.4	85.6
Upper St. Clair	27.9	99.9	12.7	87.3
Collier	45.2	95.7	10.4	89.6
Franklin Park	34.3	33.5	9.6	90.4
Mpty of Monroeville	58.2	38.0	8.0	92.0
Penn Hills	53.1	58.7	2.6	97.4
Bethel Park	21.0	26.9	2.5	97.5
Pitcairn	6.6	3.7	0.0	100.0
Blawnox	2.1	26.5	0.0	100.0
Wilmerding	2.4	55.3	0.0	100.0
Wilkins	8.2	40.6	0.0	100.0
West View	3.8	76.1	0.0	100.0
Brentwood	2.7	19.3	0.0	100.0
Duquesne	8.4	20.6	0.0	100.0
Castle Shannon	4.6	87.2	0.0	100.0
West Mifflin	27.9	33.3	0.0	100.0

Township/Borough	Total Length (miles)	Assessed %	in attainment %	not in-attainment %
Marshall	35.0	8.8	0.0	100.0
Pittsburgh	72.5	41.7	0.0	100.0
North Versailles	26.7	15.9	0.0	100.0
Scott	12.6	91.5	0.0	100.0
McDonald	1.9	100.0	0.0	100.0
Bridgeville	5.4	100.0	0.0	100.0
Carnegie	3.4	100.0	0.0	100.0
Crafton	1.6	100.0	0.0	100.0
Green Tree	2.8	100.0	0.0	100.0
Heidelberg	2.4	100.0	0.0	100.0
Oakdale	5.4	100.0	0.0	100.0
Reserve	5.6	100.0	0.0	100.0
Rosslyn Farms	4.1	100.0	0.0	100.0
Thornburg	3.8	100.0	0.0	100.0
Verona	1.4	100.0	0.0	100.0
North Fayette	55.6	90.3	0.0	100.0
Jefferson	50.6	22.7	0.0	100.0
Findlay	80.7	39.3	0.0	100.0
Robinson	43.4	81.3	0.0	100.0
Pleasant Hills	5.4	53.2	0.0	100.0
Neville	17.6	19.6	0.0	100.0
Mount Lebanon	9.4	88.6	0.0	100.0
Kennedy	14.0	46.8	0.0	100.0
Clairton	12.8	12.8	0.0	100.0
Whitehall	3.8	49.9	0.0	100.0
Millvale	6.1	67.8	0.0	100.0
Bradfordwoods	4.1	61.9	0.0	100.0
Coraopolis	6.7	21.4	0.0	100.0
Baldwin	23.2	13.6	0.0	100.0
Turtle Creek	7.8	37.2	0.0	100.0
McKees Rocks	5.1	40.6	0.0	100.0

* Townships listed are only those with some length of streams assessed.

APPENDIX II-C
Causes of Non-Attainment by Township in Allegheny County*
(see end of table for abbreviations)

TOWNSHIP/ BOROUGH	Not Attained (mi)	Not Attained %	CHL	UNK	FLW ALT	MET	NON ORG	NUT	OE/ LDO	OIL GRS	OTH HAB ALT	OTH INOR	PEST	pH	PRIO ORG	SAL TDS CHL	SILT	SUSP SLDS	TAST ODO	TURB	FLW VAR
Baldwin	3.1	14				L			H												H
Bethel Park	5.5	26			L			H	L		L						H			H	L
Blawnox	0.5	26	H									H	H								
Bradford woods	2.5	62						H									H				
Brentwood	0.5	19							H												H
Bridgeville	5.3	100				L			L							L	H	L		H	L
Carnegie	3.4	100				H										H	H	H			
Castle Shannon	4.0	87							H												H
Clairton	1.6	13							H		H				H						
Collier	38.8	86		L		H		L	L							L	H	L		L	L
Coraopolis	1.4	21				H	H	H	H					H			H				
Crafton	1.6	100				H										H	H	H			
Duquesne	1.7	21				H															
Etna	2.6	37						H									H				
Findlay	31.7	39				H	H	H	H					H			H				
Fox Chapel	2.4	11						H	H								L				
Franklin Park	10.4	30						H									H				
Frazer	2.0	8			H	H										H	H			H	
Green Tree	2.8	100				H			L							H	H	H			L
Hampton	20.0	50						H									L				
Harmar	5.8	32			H	H										H	H			H	
Heidelberg	2.4	100				H										H	H	H			
Indiana	21.1	43			H	L		L								L	H	L		H	
Jefferson	11.5	23						L	L		H				L		H	H			
Kennedy	6.5	47				H								L		H	H	H			

TOWNSHIP/ BOROUGH	Not Attained (mi)	Not Attained %	CHL	UNK	FLW ALT	MET	NON ORG	NUT	OE/ LDO	OIL GRS	OTH HAB ALT	OTH INOR	PEST	pH	PRIO ORG	SAL TDS CHL	SILT	SUSP SLDS	TAST ODO	TURB	FLW VAR
Marshall	3.1	9						H									H				
McCandless	11.9	28						H	L		L						H				
McDonald	1.9	100				H															
McKees Rocks	2.1	41				H										H	H	H			
Millvale	4.1	68						H													
Moon	14.7	23				H	H	H	H					H			H				
Mount Lebanon	8.4	89				L			L							L	H	H		L	L
Monroeville	20.4	35				H		L						H			L				
Neville	3.4	20				H	L	L	L					H			L				
North Fayette	50.2	90		L		H	L	L	L					L			L				
North Versailles	4.2	16				H								H							
O'Hara	5.4	100				H		L	L												
Oakdale	4.3	86				H		L		H		H									
Oakmont	7.7	33				H		L	L	H		H									
Penn Hills	30.4	57	L			L		H	L	L	L	L	L	L			L				
Pine	3.6	9						H									H				
Pitcairn	0.2	4				H								H							
Pittsburgh	30.2	42	L			L	L	L	L		L		L			L	L	L	L		H
Pleasant Hills	2.9	53									H						H	H			
Plum	26.7	35				H		L		L		L		L			L				
Reserve	5.6	100						H													
Richland	8.2	21						L			L						H			L	
Robinson	35.3	81		L		H	L	H	L					L		L	L	L			
Ross	15.2	42						H	L	L	L										
Rosslyn Farms	4.1	100				H										H	H	H			
Scott	11.5	91				H										H	H	H		L	
Shaler	18.1	68						H	L								L				
South Fayette	43.8	85				L		L	L							H	L	L		H	
Thornburg	3.8	100				H										H	H	H			
Turtle Creek	2.9	37				H								H							

TOWNSHIP/ BOROUGH	Not Attained (mi)	Not Attained %	CHL	UNK	FLW ALT	MET	NON ORG	NUT	OE/ LDO	OIL GRS	OTH HAB ALT	OTH INOR	PEST	pH	PRIO ORG	SAL TDS CHL	SILT	SUSP SLDS	TAST ODO	TURB	FLW VAR
Upper St. Clair	24.3	87			L	L		L	L		L					L	H	L		H	L
Verona	1.4	100				H				H		H									
West Deer	22.2	34			L	L		H								L	H	L		L	
West Mifflin	9.3	33				H					L						L	L			
West View	2.9	76						H		H	H										
Whitehall	1.9	50							H												H
Wilkins	3.3	41				H								H							
Wilmerding	1.3	55				H								H							
Total	640.6**																				

* Includes only townships with more than 1 stream mile assessed

** This total is greater than the total in Table 1 (450.3 mi) because several streams serve as borders between townships/boroughs and are, therefore, counted double.

CHL	= Chlorine	NUT	= nutrients	SAL/TDS/CH	= salinity/TDS/chlorine
UNK	= Unknown cause	OE/LDO	= Low Dissolved Oxygen	SILT	= siltation
FLW ALT	= Flow alteration	PEST	= pesticides	TURB	= turbidity
NON-ORG	= non-organics	PRIO ORG	= priority organics	FLW VAR	= flow variation

L = **Low**: less than 50% of the stream length in "non-attainment" is being affected by the particular "cause/pollutant"

H = **High:** more than 50% of the stream length in "non-attainment" is being affected by the particular "cause/pollutant"

APPENDIX II-D
Sources of Non-Attainment by Township in Allegheny County
(A "Source" is the origin of the "Cause," which is the pollutant itself)
(see end of table for abbreviations)

TOWNSHIP/ BOROUGH*	Non-Attainment (miles)	SOURCES																				
		AMD	URS	OTH	CON	HAM	LND	RMV	RRF	CSO	BKM	OSW	SSM	UNK	AGR	SRF	HYM	MPS	NAT	GLF	IPS	PET
Baldwin	3.1	L	H							H												
Bethel Park	5.5		L			H				L							L					
Bridgeville	5.3	L				H											L					
Carnegie	3.4	H																				
Castle Shannon	4.0		H							H												
Collier	38.8	H	L			L						L	L	L			L					
Findlay	31.7	H	H	H																		
Franklin Park	10.4		H				H		L													
Hampton	20.0		H				L		L													
Harmar	5.8	H			H								H									
Indiana	21.1	L			H				L				L	L								
Jefferson	11.5							H	L		H							L			L	
Kennedy	6.5	H																				
Marshall	3.1		H				H		H													
McCandless	11.9		H				H	L	L		L											
Millvale	4.1		H																			
Moon	14.7	H	H	H																		
Mount Lebanon	8.4	L	L			L				L												
Monroeville	20.4	H	L					L	L		L											
Neville	3.4	H	L	L																		
North Fayette	50.2	H	L	L						L				L					L			
North Versailles	4.2	H																				
Oakdale	5.4	H	L							L												
Oakmont	4.3	H	H																			
O'Hara	7.7	H	H																	L		

TOWNSHIP/ BOROUGH*	Non-Attainment (miles)	SOURCES																				
		AMD	URS	OTH	CON	HAM	LND	RMV	RRF	CSO	BKM	OSW	SSM	UNK	AGR	SRF	HYM	MPS	NAT	GLF	IPS	PET
Penn Hills	30.4	L	H			L												L		L		
Pine	3.6		H				H															
Pittsburgh	30.2	L	H			L				H								L				
Plum	26.7	H	H							L		L										L
Reserve	5.6		H																			
Richland	8.2		H		H										L							
Robinson	35.3	H	H	L								L		L								
Ross	15.2		H					L			L											
Rosslyn Farms	4.1	H																				
Scott	11.5	H				L																
Shaler	18.1		H				L		L			L										
South Fayette	43.8	H	L		L	L	L			L		L			L	L				L		
Thornburg	3.8	H																				
Upper St. Clair	24.3	L			L	H											L					
West Deer	22.2	L			H			L					L	L	L							
West Mifflin	9.3	H						L			L											
Wilkins	3.3	H																				

* The township/boroughs listed are only those with 3 or more miles of streams in "non-attainment".

SOURCE

MPS	= Municipal Point Source	AMD	= Acid Mine Drainage	RRO	= Road Runoff	SSM	=Sub-surface Mining
CON	= Construction	OSW	= On-Site Wastewater	BKM	= Bank Modification	SRF	= Surface Mining
HAM	= Habitat Modification	URSS	= Urban Runoff/Storm Sewer	RMV	= Removal of Vegetation	UNK	= Unknown
HYM	= Hydro-modification	CSO	= Combined Sewer Overflow	PET	= Petroleum Activities	LND	= Land Development
GLF	= Golf Courses	OTH	= Others	IPS	= Industrial Point Source	AGR	= Agriculture

L = **Low:** less than 50% of the stream length in "non-attainment" is affected by causes/pollutant coming from the particular *source*

M = **High:** more than 50% of the stream length in "non-attainment" is affected by causes/pollutant coming from the particular *source*

APPENDIX II-E

Causes of Non-Attainment by Source in Allegheny County

(A "Source" is the origin of the "Cause," which is the pollutant itself)

CAUSES	SOURCES																			
	MPS	CON	HAM	HYM	GLF	AMD	OSW	URS	CSO	OTH	RRO	BKM	RMV	PET	IPS	SSM	SRF	UNK	LND	AGR
Chlorine	X																			
Flow alterations		X	X	X																
Metals						X														
Non-priority Organics	X								X	X										
Nutrients			X		X		X	X	X	X	X	X	X							X
Oil and Grease								X			X									
Organic Enrichment/Low D.O.	X				X	X	X	X												
Other Habitat Alterations		X	X	X								X	X							
Other Inorganics								X												
Pesticides					X															
PH						X								X						
Priority Organics															X					
Salinity/TDS/Chlorides						X										X	X			
Siltation		X	X			X		X		X	X	X	X						X	X
Suspended Solids		X	X			X						X	X							
Taste and Odor	X								X											
Turbidity		X	X			X											X			
Unknown Causes																		X		
Water/Flow Variability	X			X				X	X											

SOURCES

MPS= Municipal Point Source
OSW= On-Site Wastewater
UNK= Unknown
GLF= Golf Courses
AMD= Acid Mine Drainage
BKM= Bank Modification
HYM= Hydro-modification
IPS= Industrial Point Source
RRO= Road Runoff
SRF= Surface Mining
CSO= Combined Sewer Overflow
AGR= Agriculture
SSM= Sub-surface Mining
HAM= Habitat Modification
PET= Petroleum Activities
URS= Urban Runoff/Storm Sewer
CON= Construction
RMV= Removal of Veget.
LND=Land Development
OTH= Others.

APPENDIX III-A
National Ambient Air Quality Standards (NAAQS)

POLLUTANT	STANDARD VALUE*		STANDARD TYPE
Carbon Monoxide (CO)			
8-hour Average	9 ppm	(10 mg/m^3)	Primary
1-hour Average	35 ppm	(40 mg/m^3)	Primary
Nitrogen Dioxide (NO_2)			
Annual Arithmetic Mean	0.053 ppm	(100 $\mu g/m^3$)	Primary & Secondary
Ozone (O_3)			
1-hour Average	0.12 ppm	(235 $\mu g/m^3$)	Primary & Secondary
8-hour Average	0.08 ppm	(157 $\mu g/m^3$)	Primary & Secondary
Lead (Pb)			
Quarterly Average	1.5 $\mu g/m^3$		Primary & Secondary
Particulate (PM 10) *Particles with diameters of 10 micrometers or less*			
Annual Arithmetic Mean	50 $\mu g/m^3$		Primary & Secondary
24-hour Average	150 $\mu g/m^3$		Primary & Secondary
Particulate (PM 2.5) *Particles with diameters of 2.5 micrometers or less*			
Annual Arithmetic Mean	15 $\mu g/m^3$		Primary & Secondary
24-hour Average	65 $\mu g/m^3$		Primary & Secondary
Sulfur Dioxide (SO_2)			
Annual Arithmetic Mean	0.03 ppm	(80 $\mu g/m^3$)	Primary
24-hour Average	0.14 ppm	(365 $\mu g/m^3$)	Primary
3-hour Average	0.50 ppm	(1300 $\mu g/m^3$)	Secondary

* Parenthetical value is an approximately equivalent concentration.

Source: The EPA Office of Air Quality Planning and Standards (OAQPS) at http://www.epa.gov/airs/criteria.html

APPENDIX III-B

Allegheny County Air Monitoring Network

No.	Monitoring site	SO_2	CO	NO_x	O_3	PM10	PM2.5	Pb
PITTSBURGH AREA								
1a	DOWNTOWN[49]		C					
1b	FLAG PLAZA	C		C		C		I
1c	POINT PARK		C					
2	OAKLAND 3					C		
3	HAZELWOOD 2	C				C	I	
5	PITTSBURGH[50]				C	I		
6	LAWRENCEVILLE[51]			C	C		I	
REST OF THE COUNTY								
8	PENN HILLS				C			
9	NORTH PARK					I	I	
10	STOWE	C				CI	I	
11a	NEVILLE							
11b	NEVILLE2							
12	AVALON	C				CI		I
13a	NATRONA 8							
13b	NATRONA 9							
14	SPRINGDALE					I	I	
16a	HARRISON				C			
16b	HARRISON 2						I	
18a	NORTH BRADDOCK	C				I	I	
18b	NORTH BRADDOCK 7							
19	BRADDOCK					CI		I
21	LIBERTY	C				CI	I	
22a	GLASSPORT	C						
22b	GLASSPORT 4					CI		
23	LINCOLN					C		
24a	CLAIRTON	C				C		
24b	CLAIRTON4					I		
25	SOUTH FAYETTE	C			C	I	I	
26	COLLIER							
27	MOON					I	I	
28	LEETSDALE					I	I	
29	SOUTH PARK						I	
Total		9	2	2	5	23	12	3

Source: ACHD. 1999 Air Quality Report. p. 6

C = Continuously sampled I = Intermittently sampled

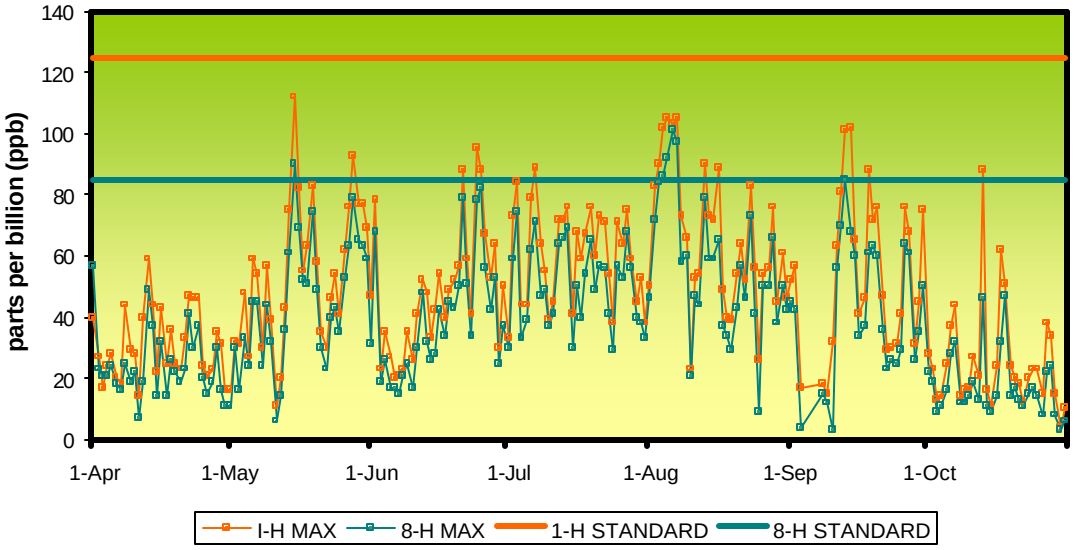
[49] Located at the Court House.

[50] Located at the Carnegie Science Center, North Side Pittsburgh.

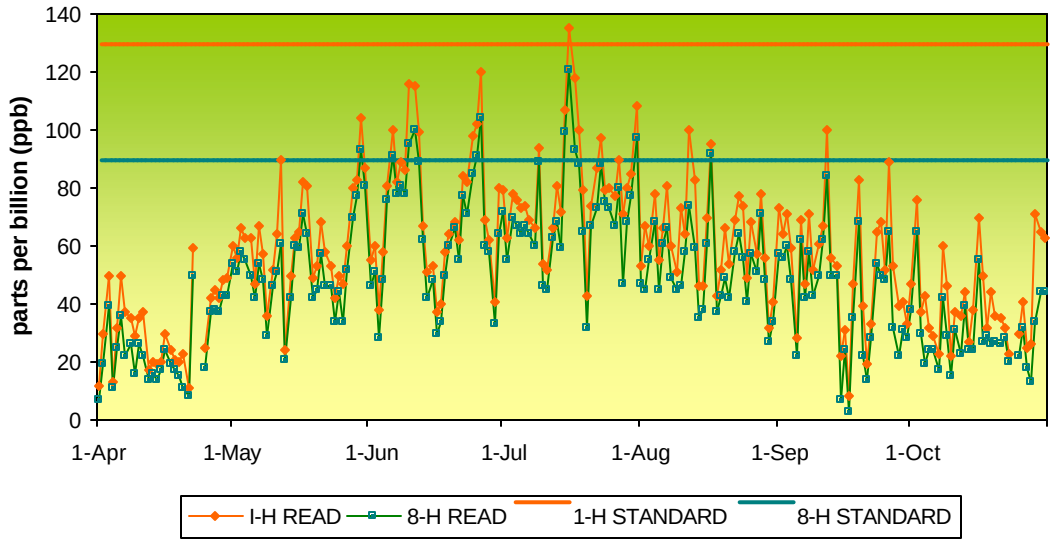
[51] Located at the Clack Health Center.

APPENDIX III-C
Daily Ozone Maximums at the Pittsburgh Monitoring Site (1998-1999)

Pittsburgh Daily Ozone Level (1998)



Pittsburgh Daily Ozone Level (1999)



APPENDIX III-D
Current and Revised Standards for Particulate Matter

CURRENT STANDARD			REVISED	
Particulate Matter Up to 10 Microns in Diameter (PM_{10})	Annual 50 $\mu g/m^3$	To attain this standard, the arithmetic average of the 24-hour samples for a period of 1 year, averaged over 3 consecutive years, must not exceed 50 $\mu g/m^3$.	Annual 50 $\mu g/m^3$	Same as existing standard for PM_{10}.
	24-hour 150 $\mu g/m^3$	To attain this standard, the concentration of samples taken for 24-hour periods at each monitor within an area must not exceed 150 $\mu g/m^3$, more than once per year, averaged over 3 years.	24-hour 150 $\mu g/m^3$	To attain this standard, the 99th percentile[c] of the distribution of the 24-hour concentrations for a period of 1 year, averaged over 3 years, must not exceed 150 $\mu g/m^3$ at each monitor within an area.
Particulate Matter Up to 2.5 Microns in Diameter ($PM_{2.5}$)		No current standard.	Annual 15 $\mu g/m^3$	To attain this standard, the 3-year average of the annual arithmetic mean of the 24-hour concentrations from single or multiple population oriented monitors[d] must not exceed 15.0 $\mu g/m^3$.
		No current standard.	24-hour 65 $\mu g/m^3$	To attain this standard, the 98th percentile of the distribution of the 24-hour concentrations for a period of 1 year, averaged over 3 years, must not exceed 65 $\mu g/m^3$ at each monitor within an area.

[b] The new approach of focusing on actual monitored concentrations rather than the number of days on which the standard is exceeded (regardless of the magnitude of the exceedance) better accounts for the effects on public health.

[c] The revised 24-hour PM_{10} standard is very similar to the current standard. However, by using the 99th percentile concentration approach, the revised standard better accounts for the effects on public health and inherently compensates for missing data. In this way, it reduces or eliminates the need for complex procedures that now are needed to adjust for missing samples. Thus, the revised approach for the 24-hour PM_{10} standard simplifies the data handling requirements.

[d] The focus on population-oriented monitors stems from the health information that formed the basis for the annual $PM_{2.5}$ standard. This information relates area-wide health statistics to area-wide air quality as measured by one or more monitors.

APPENDIX III-E
Implementation of the 8-hour Ozone Standard

Implementation of the more stringent 8-hour standard faces legal challenges. In December of 1998, the American Trucking Association, Inc. and other "small business petitioners" challenged the constitutionality of the Clean Air Act, on which the revised standards for ozone and Particulate Matter are based. In addition, it was argued, that EPA revision of the O_3 and PM *NAAQS* violated the National Environmental Policy Act (NEPA), the Unfunded Mandates Reform Act (UMRA), and the Regulatory Flexibility Act (RFA). It was also argued that the choice of the new standards was "arbitrary and capricious" and that they would hurt business.

On May 14, 1999, the U.S. Court of Appeals for the District of Columbia Circuit issued an *opinion* regarding the new NAAQS for ozone and particulate matter. The Court agreed on some key claims and halted EPA's intentions to implement the new NAAQS. EPA then asked the U.S. Department of Justice to appeal this decision and to take all judicial steps necessary to overturn the decision. On June 28, 1999, the federal government filed a petition for rehearing key aspects of the case in the U.S. Court of Appeals for the D.C. Circuit. The court responded on October 29, 1999 and denied EPA's petition.

On January 28, 2000, the Department of Justice filed a petition seeking Supreme Court review of the decision. The decision of the Supreme Court is pending as of June 2000. On October 20 1999, and as a consequence of the legal impediments for the implementation of the new standard, EPA proposed reinstating its 1-hour standard for ozone in nearly 3,000 counties across the U.S. The reinstatement is intended to ensure public health protection while EPA appeals the court ruling on the new NAAQSs. The EPA, however, is expecting a favorable decision by the Supreme Court and is planning to designate areas for this new ozone standard by early 2001.