NJ DEPARTMENT OF ENVIRONMENTAL PROTECTION (NJDEP)

NATIONAL ENVIRONMENTAL PERFORMANCE PARTNERSHIP SYSTEM (NEPPS):

SELF-ASSESSMENT OF NEW JERSEY'S ENVIRONMENT AND NJDEP PROGRAMS

AIR QUALITY

WATER QUALITY

DRINKING WATER

AUGUST 1995

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

ADR	Alternative Dispute Resolution
BMP	Best Management Practices
BOD	Biological Oxygen Demand
BSDW	Bureau of Safe Drinking Water
BWA	Bureau of Water Allocation
CAFRA	Coastal Area Facility Review Act
CEHA	County Environmental Health Act
CFR	Code of Federal Regulations
CSO	Combined Sewer Overflows
CWS	Community Water System
DSR	Division of Science and Research
DSW	Discharge to Surface Water
DWQ	Division of Water Quality
ECOS	Environmental Council of the States
EPA	United States Environmental Protection Agency
EPCRA	Federal Emergency Planning & Community Right-to-Know Act
GIS	Geographic Information System
GPS	Global Positioning System
HAA	Haloacetic Acid
IOC	Inorganic Compounds
LEV	Low Emissions Vehicle
LURP	Land Use Regulation Program
MCL	Maximum Contaminant Level
MLUL	Municipal Land Use Law
MOU	Memorandum of Understanding
MUA	Municipal Utilities Authority
NAAQS	National Ambient Air Quality Standards
NEPPS	National Environmental Performance Partnership System
NJDEP	New Jersey Department of Environmental Protection
NJGS	New Jersey Geological Survey
NJPDES	New Jersey Pollutant Discharge Elimination System
NO_x	Nitrogen Dioxide
NPS	Nonpoint source
NTNC	Nontransient, Noncommunity Water System
OEP	Office of Environmental Planning
OTC	Ozone Transport Commission
OTIS	Office of Telecommunications and Information Systems
OTR	Ozone Transport Region
PCBs	Polychlorinated Biphenyls
ppb	parts per billion
ppm	parts per million
POE	Point of Entry
RACT	Reasonably Available Control Technology
RCRA	Federal Resource Conservation and Recovery Act
RVP	Reid Vapor Pressure
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SOC	Semivolatile Organic Compounds

SWQS	Surface Water Quality Standards
TDS	Total Dissolved Solids
THM	Trihalomethane
TMDL	Total Maximum Daily Load
TNC	Transient, Noncommunity Water System
TRI	EPA Toxic Release Inventory
TSP	Total Suspended Particulate
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
WHPA	Well Head Protection Areas
WHPP	Well Head Protection Plan
WHWE	Water and Hazardous Waste Enforcement
WQBEL	Water Quality Based Effluent Limits

INTRODUCTION

1. Background

1.1 National Environmental Performance Partnership System (NEPPS)

As part of a national effort to revitalize environmental protection for the 21st century, the states and the federal Environmental Protection Agency (EPA) signed an agreement on May 17, 1995 to establish a new relationship referred to as the National Environmental Performance Partnership System (NEPPS). State involvement in the development of this new partnership was fostered by the Environmental Council of the States (ECOS), an organization of state Environmental Commissioners/Secretaries. The innovative state-federal partnership system is designed to strengthen protection of public health and the environment through enhanced application of the principle of management for environmental results. The agreement will foster the identification of state environmental priorities, and allow states to better direct federal resources to address those priorities.

Key components of the NEPPS approach include a heavy reliance on the development of clear environmental goals and indicators to gauge progress toward achievement of these goals. Increasing the use of environmental quality indicators in measuring agency performance is also intended to enhance accountability to the public. Accountability and public understanding of environmental conditions should be improved as more information becomes available regarding specific improvements in environmental quality.

In many respects, this new partnership approach represents a fundamental departure from the traditional process of federal oversight of state environmental programs. When the partnership agreements are fully implemented, they will replace the current EPA-state activity-based work plans. Work plans specifically define state activities and responsibilities required by EPA to receive federal grant funds for delegated programs. In the past, a recognized weakness of these work plans has been an over reliance on federal requirements associated with the quantity of agreed upon state activities (e.g., number of permits issued, number of inspections conducted), and an under reliance on state-specific priority setting and results-based reporting. With the new agreement process, emphasis will be placed on measures of performance that are more directly reflective of environmental outcomes and conditions. Another area of departure from the current work plan approach is that the agreement process will result in more flexible and reduced federal oversight in general, particularly for states with strong environmental programs. The oversight is expected to become more effective and efficient as

emphasis is shifted from prescriptive methodologies to assessments of performance-based outcomes. Additionally, the new partnership process will lead to a greater general opportunity for public involvement in environmental management.

National implementation of the NEPPS process is to occur gradually over the next several years. Each state is given the flexibility to determine whether it chooses to participate for the federal fiscal year 1996 (starting October 1, 1995). During this transitional year, states can elect to include whatever portions of their programs best suit their needs. States electing to participate in the 1996 pilot year were required to submit their intention to do so to their EPA Regional Administrators by July 1, 1995.

1.2 Self-Assessment and Performance Agreement

The Performance Partnership system involves the preparation and submission to EPA of two major documents. These reports are referred to as the Self-Assessment and the Performance Agreement documents (also sometimes referred to as the action plan).

Self-assessment. The new system is designed to place greater emphasis on a state's self-assessment of its environmental conditions, as well as the quality of its environmental programs. States are asked to provide information on the following: key environmental issues and opportunities; current program strengths and weaknesses; and an assessment of the state's program for fiscal accountability and an identification of areas where capacity building is deemed necessary. A meaningful state self-assessment is critical as the document, in concert with EPA's perspective on the state's environmental conditions and programs, lays the groundwork for the subsequent identification of environmental goals and actions necessary for maintaining and improving the state's environment. States electing to participate in NEPPS for fiscal year 1996 are requested to submit self-assessments to EPA in August 1995.

Performance Agreement. Informed by the results of the self-assessment, the performance agreement will eventually replace the work plan process, and will govern the actions taken by the states, as well as the evaluation of state performance. These agreements will be developed mutually between the states and the regional EPA offices. Performance agreements are to establish environmental goals, as well as environmental indicators to measure progress toward these goals. Although the focus in these agreements is to be on outcomes versus the traditional program activity measures, it is recognized that some level of activity-based reporting must be retained in order to assess the effectiveness of these actions. For fiscal year 1996, performance agreements will be signed by the participating states and their EPA Regional offices on or about October 1, 1995.

2. New Jersey Environmental Policy Context

Many of the fundamental concepts embodied in the NEPPS approach are coincident with broader policy initiatives currently being planned or implemented in the state of New Jersey. Although the Performance Partnership system is intended to govern those portions of state environmental programs which receive EPA funds for their operation, many of the basic philosophies in the federal-state partnership approach are already being investigated or implemented more widely in NJDEP. These philosophies are expected to continue to broadly and positively impact environmental policies in New Jersey for years to come. There are three aspects of the NEPPS approach that are notable in a general New Jersey environmental policy context: 1) long-range environmental planning involving goal setting. Such planning includes flexible approaches to achieving environmental goals which go beyond the traditional "command and control" regulatory methods; 2) development of environmental indicators to assess environmental conditions and to play an important role in performance assessment, and 3) resource allocation to high priority issues.

2.1 Long-range Environmental Plan

At NJDEP Commissioner Robert Shinn's direction, NJDEP initiated development of an environmental master plan in 1994. The initial phase of this long-term plan relies heavily on the integration of data regarding natural resources, monitoring, research, regulated entities and other departmental information into NJDEP's Geographic Information System (GIS). The goal of this phase of the master plan is to have all geographically-based departmental data accessible through GIS so information can be displayed and analyzed by decisionmakers both within and outside of NJDEP. Other long-range planning elements that are beginning to influence departmental policies and procedures include aspects of the Netherlands "Green Plan"[1] approach to environmental management. The Dutch process emphasizes the cooperative development of long-range environmental goals, with increased flexibility for the regulated community to develop innovative approaches to meet the agreed upon goals and standards. On May 19, 1995, Governor Whitman's office co-sponsored, with New Jersey Future, a "Sustainable State Leadership Conference" of environmental stakeholders from throughout New Jersey in which she called for a long-range environmental plan. This conference included discussions among the participants on specific environmental goals for New Jersey.

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[1]Formal name of the "green plan" is the Dutch National Environmental Policy Plan (NEPP), implemented in 1989.

Similarly, the NEPPS process seeks the setting of goals and milestones for the federally delegated portions of NJDEP's programs. As can easily be understood, for many environmental goals, it would be an artificial process to attempt to separate out aspects of the goals that are addressed by EPA federally funded programs versus state funded programs. Therefore, there is considerable overlap between statewide efforts to develop long-range environmental goals and the NEPPS process. Also, in both cases, action plans to achieve the goals need to be designed.

2.2 Environmental Indicators

A principle component of NEPPS is the increased use of environmental indicators to evaluate program effectiveness and plan program activities. Environmental indicators are direct or indirect measures of environmental quality that are used to assess the status and trends of environmental conditions. Ideal indicators for a state are generally those that are: direct measures of environmental quality, human health effects or ecological effects; can reliably measure progress toward goals; and are regularly collected over time with a wide distribution across the state. Examples of indicators that have been discussed would be: the percentage of the state population served by public community drinking water supplies with no violations of maximum contaminant level standards, or annual number of exceedances in New Jersey of the ambient air standard for ozone.

The Environmental Protection Agency has been advocating the increased application of environmental indicators in environmental management since the late 1980's. The EPA Office of Policy, Planning and Evaluation has sponsored several national indicator conferences, and has authored reports recommending a number of indicators for various EPA program areas, the latest entitled "Draft Interim 1995 Indicators Report." Additionally, EPA has sponsored the establishment of the State Environmental Goals and Indicators Project at the Florida Center for Public Management, Florida State University to assist state programs in developing environmental indicator systems. In July 1995, this indicators program prepared a document entitled "Prospective Indicators for State Use in Performance Agreements" which contains information on indicators which the states may choose to incorporate in their agreements with EPA.

New Jersey has taken a number of steps to develop environmental indicators for the state. By 1992, NJDEP senior managers had formally recommended that agency performance measures should shift from activity-oriented metrics to environmental indicators. As a result, NJDEP's Division of Science and Research working with numerous programs throughout NJDEP, initiated a study of one of the primary sources of data for environmental indicators - New Jersey's environmental monitoring programs. The project entitled, "Evaluation of New

Jersey Ambient Monitoring Programs and Development of Environmental Indicators" represents the first multimedia compilation of information about all of the state's monitoring programs. Approximately 90 New Jersey networks, both within and external to NJDEP, have been identified to date, and candidate indicators for these monitoring programs have been compiled into an indicator database. Statistical analyses of long-term temporal data for determination of trends are also ongoing as part of this research study. NJDEP's Policy and Planning program also sponsored two 1993 workshops to increase awareness of the indicators concept and begin developing suggestions for appropriate indicators with members of the environmental, regulated and academic communities.

Commissioner Shinn is committed to moving NJDEP towards the use of environmental outcomes and indicators as the preferred means of judging departmental performance wherever possible. This is a departure from the reliance in the past on measurements of activity, such as the number of permits or fines that were issued. New Jersey plans to eventually develop environmental indicators for all of its environmental programs, not just those reliant on EPA-funding which fall under the NEPPS agreement. Such an Environmental Indicator System should be a comprehensive plan that is intimately tied to the state's environmental goals, and involves all relevant state (e.g., Department of Health, Office of State Planning) and local government agencies, as well as other environmental stakeholders.

2.3 Resource Allocation to High Priority Issues

The NEPPS approach is designed to foster the allocation of resources (dollars and/or staff) to the highest priority problems across media and program lines. One consideration to be used by EPA in judging the strength of a state program would be the existence of a multi-year, cross-media strategic plan. EPA has proposed that the numerous media-specific EPA grants now received by the states may eventually be combined into Performance Partnership Grants allowing the states greater flexibility in their use of federal dollars to address their most critical issues.

Over the past two years, NJDEP's philosophies regarding priority setting and resource allocation have generally mirrored this NEPPS approach. NJDEP has reduced its fiscal dependency on fees and fines by going "on budget" for fiscal year 1996, which began on July 1, 1995. These formerly dedicated monies are now deposited into the state's General Fund. Such a shift will allow NJDEP greater flexibility in allocating resources to high priority issues. With greater flexibility comes greater responsibility to comprehensively set priorities in a clearly defensible manner. Commissioner Shinn has already begun efforts in cross-program priority setting. A potential systematic

priority setting process referred to as a comparative risk project is also currently being evaluated for application in New Jersey. This approach is supported by EPA, and has been initiated in over forty state and local governments across the country. The comparative risk process is an approach which combines the best available scientific information and judgment, state-of-the-art risk assessment methods, and public values to rank environmental problems. The outcome of such a priority setting effort would clearly benefit New Jersey's NEPPS process, as the resultant priorities could help guide the state's development of environmental goals.

3. New Jersey's NEPPS Participation

Commissioner Shinn serves on the Executive Committee of the Environmental Council of the States which crafted the NEPPS system cooperatively with EPA. As described above, there are many points of ideological agreement between the NEPPS approach and the new directions in environmental management being pursued in New Jersey. On June 29, 1995, NJDEP notified EPA Region II of its intent to participate in the NEPPS process for fiscal year 1996. In July 1995, NJDEP publically announced its participation in the pilot year of this new oversight system (see letter and press release contained in the Appendix). New Jersey programs which will be included in this first year of the program will be air quality, water quality (freshwater watersheds and ground water), and drinking water. Other NJDEP programs which receive EPA funding, will be included in subsequent years of the NEPPS process. New Jersey is expected to be one of approximately 15 states (as of July 1995) who will be venturing into the development and implementation of the inaugural partnership agreements for fiscal year 1996.

NEW JERSEY'S SELF-ASSESSMENT PROCESS

1. Scope for Fiscal Year 1996 Pilot

Commissioner Shinn's letter to EPA Regional Administrator Jeanne Fox expressed NJDEP's interest in entering into a performance partnership agreement for the air pollution control, drinking water and water quality programs. A single performance partnership agreement will be negotiated for the air pollution control program delegated by EPA to NJDEP under the Section 105 of the 1970 Clean Air Act (42 U.S.C. §7401 et. seq.); for the National Pollutant Discharge Elimination System delegated to NJDEP under Section 402 of the Clean Water Act (33 U.S.C. §1251 et. seq., and regulations at 40 CFR 122, 123 and 124); and for primacy of enforcement responsibility of the Safe Drinking Water Act (42 U.S.C. §300 et. seq., regulations at 40 CFR §141 and 142).

These programs were selected in consideration of future potential Performance Partnership Grants in addition to representing major departmental programs with cross media issues. Development of the performance partnership agreement for these programs in this pilot project year will precipitate meaningful future negotiations with EPA, serving as a model for NJDEP's remaining programs and their movement into a performance partnership agreement and grant, as appropriate.

2. Approach and Content

In order to conduct the program self-assessments, and to develop environmental indicators and negotiate performance partnership agreements, NJDEP created three cross-program work groups; Air Quality, Water Quality, and Drinking Water. Additionally, NJDEP charged a Steering Committee with representatives from across NJDEP to oversee the development of the self-assessment and the performance partnership agreement as well as making recommendations for future departmental directions associated with the NEPPS process.

Each work group is headed by two (2) co-chairpersons; one representing the media-specific program and the other from NJDEP's Policy and Planning programs. This approach allowed for consideration of media-specific issues in addition to reviewing the science and planning elements of the program. Membership of each work group was assembled to ensure that all units currently involved in these delegated programs were represented. A list of the members of each work group is included in the Appendix.

2.1 Resource-based Evaluations

In completing program self-assessments for air quality, drinking water and water quality, it is NJDEP's position,

consistent with the basic premise of NEPPS, that an evaluation solely limited to the federally delegated aspects of its programs presents an incomplete assessment of the overall impact of NJDEP's efforts to maintain and improve the quality of New Jersey's environment. Given the above, each assessment is resource-based to provide a more thorough and useful evaluation of the current quality of the state's air and water quality, and NJDEP's programs designed to protect them. In acknowledging environmental issues and departmental efforts beyond the scope of delegated programs, NJDEP hopes to encourage, and facilitate future dialogue regarding resource-based initiatives; NJDEP does not intend for these non-delegated programs to become the subject of federal oversight.

Of all NJDEP's programs, the self-assessment for the water quality programs clearly presents the most complex challenge, involving multiple, interrelated program functions and responsibilities. The matrix (Table FW-1) contained within the water quality self-assessment identifies the myriad of departmental programs and functions potentially involved. When conducting a program assessment for water quality, a resource-based assessment would ideally involve consideration of all types of waters - rivers, streams, lakes, ground waters, tidal waters, estuaries and coastal areas. Also, NJDEP's Land Use Regulation Program (LURP), which administers the requirements of such statutes as the Wetlands Protection Act and the Coastal Area Facilities Review Act programs should be included. However, the extremely compressed time frame for this pilot process did not allow for NJDEP to include all of these areas in the evaluation for this inaugural year. Therefore, to perform reasonably complete resource-based evaluations, NJDEP chose to cover rivers, streams, lakes and ground water for fiscal year 1996. Water quality programs associated with areas beyond these freshwaters will be part of future resource-based assessments.

Although NJDEP does not, at this time, offer a full evaluation of all its programs, this self-assessment does specifically provide an assessment of NJDEP's ground water efforts. The ground water component of the water quality assessment, for the most part, is not subject to federal delegation and oversight. Again, this discussion is included, not to initiate federal oversight and review but as a part of NJDEP's comprehensive review for the resource-based water assessment. Groundwater quality clearly impacts surface water quality, and restoration of groundwater quality is a major objective of NJDEP's site remediation program.

2.2 Coastal and Estuarine Programs

As mentioned earlier, this self-assessment document did not include thorough evaluations of programs administered by LURP. However, it is important to emphasize in this self-assessment

that the coastal and estuarine programs are considered departmental priorities. Significant effort, both funding and personnel, has been invested in these programs. NJDEP is actively participating in the New York/New Jersey Harbor Estuary and the Delaware Estuary Programs. Furthermore, NJDEP efforts continue to address environmental impacts to all tidal areas throughout New Jersey. These programs, although not included in this self-assessment, are currently being assessed consistent with NJDEP's resource-based evaluation approach.

2.3 Format

Consistent with the NEPPS document, distributed with the May 17, 1995 ECOS/EPA agreement, NJDEP has developed its first year self-assessment utilizing the following format:

- Resource and program description
- Key environmental issues/problems
- Current program strengths and weaknesses
- Fiscal accountability and capacity building needs

2.4 Basis for Partnership Agreement/Action Plan

These program self-assessments, in concert with EPA's perspective on New Jersey's environmental conditions and program performance, will provide a foundation from which to negotiate NJDEP's performance partnership agreement with EPA. The identification of key environmental issues, and program strengths and weaknesses should focus the development of goals/milestones, indicators and activity measures for the partnership agreements. For incorporation into these agreements, NJDEP will consider its work on development of representative state environmental indicators, as well as those indicators proposed by EPA's Office of Policy, Planning and Evaluation, and those recently suggested by the State Environmental Goals and Indicators project described earlier.

2.5 Need for Yearly Updates and Revisions

Again, as stated in the NEPPS document, one of the basic premises of this new environmental partnership is that it will encourage continuous improvement and foster excellence in state and federal environmental programs. An important component of an approach which directs limited public resources towards improvements in environmental results is the recognition that existing policies and management efforts must be continuously reviewed and updated to ensure environmental results. In redirecting departmental efforts and evaluating results, as necessary, NJDEP's partnership agreement will also be subject to continuing revision and updating over time.

2.6 Public Outreach and Involvement

NJDEP's performance partnership agreement, while negotiated with EPA, should also be subject to review by its environmental partners identified in its Mission Statement (i.e., the general public, business, environmental communities and all levels of government). NJDEP plans to initiate active public outreach and involvement in the review of the performance partnership agreement entered into with EPA for the pilot year of NEPPS.

The performance partnership agreement for federal fiscal year 1996 will have limited public involvement due to the compressed timeframe for development of this pilot year agreement. However, once finalized NJDEP intends to provide opportunities for public comment on the pilot year agreement in addition to including interested parties in the development of an environmental indicators system. It is envisioned that a public outreach effort will commence in the fall of 1995.

As part of the public outreach effort, NJDEP will seek the input from all levels of government, business and industry, environmental community groups, and the general public. The NJDEP will also utilize its newly established "Green and Gold Task Force". The mission of the Green and Gold Task Force is to recommend decision-making principles for improving the regulatory programs of NJDEP and for implementing the NJDEP mission statement and the newly emerging strategies for environmental protection, such as this NEPPS effort. This NJDEP advisory board, comprised of environmental, business and industrial representatives, has been created as a sounding board to aid the department in streamlining and making the process of doing business in NJDEP straight forward, while not compromising environmental principles. This task force is one of several tools NJDEP is employing to streamline regulatory processes, utilize partnerships, and learn more about how the regulated community can assist in meeting environmental goals. It is, therefore, ideal to involve the Green and Gold Task Force in the review of the New Jersey performance agreements, including the evaluation of environmental goals and environmental indicators selected for these agreements.

PROFILE OF NEW JERSEY

In order to put general characteristics of New Jersey in context, a profile of the state is provided. New Jersey is the 5th smallest state in the nation[1], with 7,419 square miles of land area. It is bordered by Delaware to the south, Pennsylvania to the west, New York to the north, and the Atlantic Ocean to the east. The state is home to the Pinelands National Reserve which, at more than 1 million acres, is the largest tract of unbroken wilderness in the eastern United States. Additionally, the state has 800,000 acres of public open space and 800 species of native wildlife (including unique animals such as the Pine Barrens tree frog, which is rarely found outside of New Jersey). New Jersey also boasts 1,303 square miles total water area including waterways, coastal wetlands & bays, freshwater lakes & ponds, & the Atlantic Ocean Coastline. In addition, New Jersey's agricultural community produces over 80 varieties of fruits, vegetables, & other commodities annually.

New Jersey faces numerous environmental challenges related to the legacy of its industrial revolution, the nature of its economy, the paradox of its high population density combined with its sprawling land development patterns, and its legal/political jurisdictional fragmentation. With a population of 7,730,188, the state has a population density in excess of 1,000 people/square mile[4], making it the most densely populated state in the United States. The high population density places considerable stress on the environment in certain parts of the state in terms of the impacts from land use changes and nonpoint source pollution, including mobile sources. Of the 7,419 square miles of land area in the state, there are 35,000 miles of roads which are traveled not only by the 5.6 million passenger cars which are registered in New Jersey[5] but also by visitors from neighboring states. These high numbers contribute to the fact that New Jersey is at a non-attainment status for ground-level ozone.

New Jersey boasts a rich industrial history - in fact, a wide variety of industries continue to make their home in the state including mining, construction, durable/nondurable manufacturing (New Jersey ranks 10th nationally in this category and 14th in exports by state of origin[6]), transportation and utilities, wholesale trade, retail trade, finance/insurance/real estate, and services (including agriculture).[7] Among these businesses are approximately 700 manufacturing industries (pharmaceuticals, agricultural fertilizers, solvents, cleaners & paints) and over 15 industries falling into the petroleum refinery category (gasoline, motor oil, asphalt & lubricants) - posing additional potential stresses to the state's air, water, & natural resources. In addition, New Jersey has over 6500 active

hazardous waste cleanup sites (including 107 Superfund sites), 25 operating landfills, approximately 1400 wastewater treatment plants (approximately 500 municipal & 900 industrial), 7 electric and natural gas distribution utility companies, 4 nuclear reactor facilities, and 5 major coal-fired power plants.

In order to respond to these challenges, New Jersey has sought to implement innovative environmental policies and programs - efforts which have resulted in the state receiving national recognition as a leader in this area (for instance, the 1991-1992 Green Index ranked New Jersey 2nd, nationally, as having the best overall environmental policies and programs in place.[8]) Examples of some of New Jersey's more notable efforts include: a comprehensive mandatory recycling program; the first state program to monitor and regulate toxic synthetic organic contaminants in public water supplies; adoption of measures to provide certainty, timeliness and flexibility, where needed, to accomplish the duel goals of site remediation and economic vitality (a fund was established to provide grants and loans to municipalities for the remedial process; loans are available to private parties who are unable to obtain funding from the private lending community)[9]; the adoption of a facility-wide permitting process (New Jersey issued the nation's first such permit in December 1994 to the Schering Corporation[10]); and one of the most effective state environmental research and technical support programs in the country (the National Governors' Association, in 1988, cited NJDEP's Division of Science and Research as one of the three best state environmental research programs in the country[11]) which has continued to meet NJDEP's critical regulatory information needs, and offer innovative solutions to New Jersey's environmental challenges.

1 1992 Wold Almanac
2 U.S. Bureau of Census, 1991
3 NJ Facts - Flying the Colors, 1988
4 U.S. Bureau of Census, 1991
5 U.S. Department of Transportation, Highway Statistics, 1991
6 U.S. Bureau of Census, 1991
7 NJ Department of Labor, 1994
8 1991-1992 Green Index
9 NJDEP 1994 Annual Report
10 NJDEP 1994 Annual Report
11 National Governors' Association, Capitol Ideas, 1988

CROSS-PROGRAM ISSUES

In developing the Self-Assessment, it became clear that there are a number of areas that are common to the programs under review and should be described as cross-program issues. Included are discussions on information management, pollution prevention, enforcement and fiscal accountability/resource availability.

1. Information Management: Fundamental for NEPPS

The NEPPS process provides an opportunity for EPA and NJDEP to develop environmental indicators to measure performance, and for the state to conduct self-assessments of key environmental regulatory programs. This new planning process offers a chance to utilize information to help shape priorities and then employ flexibility to address changing or emerging priorities as needed.

The successful implementation of the NEPPS process relies heavily on data to conduct both the self-assessment, and to support the development and management of environmental indicators. NJDEP recognizes the importance of information management in the overall management of environmental resources. As NJDEP moves toward management of NJ resources using more holistic, cross media approaches the integration of data bases and computer technology becomes increasingly important. The information needed to support complex decisions must be timely, of known quality, and relevant. Information management, therefore, will be an integral component of each of the NJDEP programs participating in the NEPPS.

1.1 Successes and Weaknesses

Over the past several years NJDEP has been working to modernize its approach to information management. Many program specific activities have been undertaken and completed. Several initiatives are discussed within individual program assessments, but it is important to also note the following department-wide efforts which are ongoing:

* NJDEP has established an Office of Information Resources Management to coordinate the integration of computer systems and information across the agency.

* a departmental computer network infrastructure is in place to allow the various LANs to be linked.

* department-wide use of GIS technology, and development of a significant statewide geographic database.

However, much work remains before the goal of comprehensive integration of information resources is reached. To help guide these efforts, NJDEP recently issued a Request For Proposals to

perform a comprehensive evaluation of the agency's activities, including an evaluation of the need to re-engineer its regulatory and information handling processes. The contractor (A.T. Kearney) for this work has now been retained and has begun this process. Modernization needs to be an ongoing priority to keep pace with changes in computer technology and the increased efficiencies that wise investment can bring to environmental protection.

1.2 Cross Cutting Data/Information Priorities

The self-assessment process has led to the recognition of the following four priority areas for action during this planning period.

* **Data Collection** NJDEP data collection efforts need to support the development of environmental indicators. Emphasis should be placed on collecting data that is relevant to measuring environmental change.

* **Electric Data Transfer** NJDEP needs to more fully utilize available services (e.g., electronic bulletin board) for electronic transfer of analytical data. By employing such measures, increased efficiency would be achieved and transcription errors would be reduced.

* **Data Analysis and Assessment** Greater emphasis needs to be placed on data analysis and assessment. NJDEP should devote resources to understand trends in information over time and to equate those changes with environmental impacts and improvements.

* **Coordinate Locations for Regulated Facilities** NJDEP acknowledges the importance of obtaining coordinate locations for all regulated facilities in NJ. The coordinates will form a key component of an integrated departmental facility database. Efforts underway to acquire accurate locations using GPS technology should be continued.

* **Update Land Use/Land Cover Data** NJDEP needs to update the land use/land cover data layer that resides on the GIS. The statewide data forms an accurate baseline for land use characteristics as they existed in 1986, based on interpretation of aerial photography. To conduct trend analyses, the information needs to be updated based upon newly acquired aerial photography.

* **Utilize IRC Services** NJDEP needs to maintain, expand and fully use the services offered by the NJDEP Information Resource Center (IRC). The assessment of environmental data for development and interpretation

of environmental indicators requires that the data collected be put into context. Such context can only be provided through literature sources, government reports, conventional databases or Internet subject searching - all services provided to NJDEP by the IRC.

2. Pollution Prevention

The accurate tracking of the flows of toxic substances, other materials, and energy is vital to a thorough understanding of the true causes of pollution. A clear picture of the causes of pollution is necessary to its prevention. At a basic level, pollution prevention is an activity whose goal is the improvement in efficiency of industrial production. As such, it requires a focus on the flows of energy and materials through industrial facilities, and a means of measuring changes in these flows relative to production. In a larger sense, pollution prevention also applies to commercial, agricultural, and consumer activities involving the flows of materials and energy and the interaction of these flows with the environment. Measurement of throughput of materials and energy, which can also be termed "industrial metabolism", is a critical component of pollution prevention. Without such measurement, it is very difficult to link impacts on the environment or human health (i.e., pollution) to the activities which are the causes of these impacts.

New Jersey has an active pollution prevention program that applies to approximately 750 industrial facilities covered by federal SARA 313 (Form R) reporting requirements. Covered facilities in standard industrial classification (SIC) codes 26, 28, 30, 33, and 34 were required to prepare pollution prevention plans and submit summaries of those plans to the NJDEP's Office of Pollution Prevention (OPP) by July 1, 1994. Preliminary analysis of these summaries by OPP indicates that some have developed aggressive goals to reduce their use or nonproduct output of hazardous substances over the next five years. Further, on-site reviews of the pollution prevention plans of a subset of these facilities have revealed that many have identified cost-saving options through their planning efforts. The OPP is also developing facility-wide permits for 18 facilities that have volunteered to participate in a pilot program. The goal of this program is the integration of each facility's environmental requirements into a single, binding document.

Current pollution prevention efforts will be bolstered by the progress made by NJDEP in information assessment and management. Examples of areas calling for improvements include both the narrow focus of the Right-to-Know and Pollution Prevention programs on large industrial facilities and certain (TRI-listed) chemicals only and the lack of information on quantities of problematic substances used and released by smaller

facilities and entering the environment through use and disposal of consumer products.

To be most useful, information collected by NJDEP should have a multi-media aspect, i.e., be able to track the sources, transformations, and ultimate fate of a given substance or parameter regardless of its movements in and through air, water, and soil. Information collection efforts also must not place undue burden on reporting entities. The reporting burden can be reduced by streamlining existing reporting requirements and, in some cases, replacing them with new, more appropriate measures. Redundant reporting elements must be eliminated (e.g., overlapping data elements in environmental release and related permit-monitoring programs), appropriate thresholds established, and reporting must be limited to items that are truly relevant to human health and environmental protection. In some cases, these changes will require federal actions.

The reporting of facility-wide industrial throughput (the input/output budget on a chemical-by-chemical basis) and of quantities of nonproduct output and use of hazardous substances per unit of production can serve as models for the development of information collection which is useful in tracking, and encouraging, pollution prevention. These data collection elements are embodied in New Jersey's Release and Pollution Prevention Report and Pollution Prevention Plan Summaries.

3. Enforcement/Compliance

NJDEP is integrating several new strategies into its compliance and enforcement program in Federal FY1995-1996 that reflect the program's sharper focus on improving compliance and, thereby reducing risks to human health and natural resources. These new strategies are outlined below.

3.1 Compliance Assistance

Providing compliance assistance to regulated entities, especially small businesses that have limited financial ability to otherwise obtain such assistance and to business entities of all sizes subject to new or substantially revised requirements, may be the single most effective action Enforcement can take to improve compliance and thereby protect human health and natural resources. Enforcement currently provides compliance assistance on a modest scale. For example, the Hazardous Waste Enforcement Program began a pilot initiative last year to help "new" generators of hazardous waste comply with regulations for the storage, transportation, treatment and disposal of hazardous waste, which are lengthy and technical in nature. Under the pilot program, NJDEP obtains, from EPA, the names and locations of businesses that register as new generators of hazardous waste. Then, Enforcement staff contact a facility representative from

each entity on the list and schedule an on-site meeting. During the site visit, Enforcement personnel provide the facility with copies of state hazardous waste regulations, a generator guide to the regulations, information concerning waste minimization practices, sample manifest and tracking logs, and phone numbers for relevant NJDEP personnel. Enforcement staff also tour the facility and its operations, discuss waste management practices, opportunities for waste minimization and potential problems in other media areas. This pilot initiative was limited to generators located in the central region, but is being expanded to include all four regions. Enforcement is also planning to implement a similar initiative in the water enforcement program for entities that are issued new or modified NJPDES permits. In addition, Enforcement is considering ways to provide compliance assistance on a broader scale.

3.2 Voluntary Compliance Program

Voluntary environmental compliance efforts, such as periodic audits and self-policing programs, performed by regulated entities help improve compliance and thereby protect human health and natural resources. Accordingly, NJDEP is finalizing a policy to encourage regulated entities to perform voluntary environmental audits and implement self-policing programs by establishing a fair, consistent and predictable policy regarding NJDEP's enforcement response to violations that are discovered, reported and corrected as a result of a voluntary audit or self-policing program. A final policy is expected to be in place by the end of the Summer. Enforcement presently considers the waiver of penalties for violations that are voluntarily disclosed by a company to NJDEP on a case-by-case basis.

3.3 Grace Periods for Minor Violations

NJDEP considers the suspension of penalties during a compliance grace period for minor types of violations of environmental laws to be an effective, sensible and fair method for obtaining compliance and ensuring the health and safety of the public and the protection of natural resources. Upon the discovery of a minor violation of an environmental law, NJDEP ordinarily suspends the imposition of monetary sanction and provides a period of time for the violator to correct the violation and achieve compliance. If compliance is achieved within the specified period of time, no monetary penalty would be imposed; if compliance is not achieved, NJDEP may impose a penalty for the violation which is retroactive to the date that the violation was first discovered. NJDEP currently affords grace periods under its Air Quality, NJPDES and RCRA programs.

3.4 Proportional Penalty Assessments

Presently, a strict application of the penalty rules in most

programs often leads to the assessment of penalties that are out of proportion to the nature and seriousness of the violations in a given case. The perception that penalties are excessive and unreasonable increases the likelihood that such penalties will be vigorously contested. Litigating these cases substantially increases the costs for both NJDEP and the regulated entity. NJDEP has been systematically reviewing penalty regulations for each program, especially for minor and intermediate type violations, so that penalties more accurately reflect the nature and seriousness of a violation in a given case.

3.5 Early Settlement and ADR

In 1994, NJDEP Commissioner Shinn established an Office of Dispute Resolution. The purpose of this office is to resolve cases in which the intercession of a neutral third party would substantially enhance the likelihood of resolving the matter in a fair and timely manner. The Office is involved in both permitting and enforcement cases, including matters that have been referred to the Office of Administrative Law as a contested case, as well as problems or disputes that are not yet the subject of a formal administrative proceeding. Through mediation and other alternative mechanisms, NJDEP is able to solve problems and obtain compliance faster and at loss cost than could be achieved through litigation.

4. Fiscal Accountability/Resource Availability

4.1 Fiscal Accountability

NJDEP has a system in place to adequately account for salary and non-salary expenditures at the level deemed appropriate for the Performance Partnership Agreement. The New Jersey Comprehensive Financial System (NJCFS), the statewide accounting system, permits the use of an eight-digit Job Number and four-digit activity Code for all financial transactions. NJDEP utilizes the Job Number to identify either the grant, project, site or program for which costs are being incurred. The Activity Code identifies the function or task being performed on behalf of the coded Job Number.

NJDEP also maintains its own detailed Cost Accounting System that allocates employee salaries on the basis of Bi-weekly Time Reports which are required to be submitted by each employee. The employee codes the Time Report in half-hour increments to the appropriate Job Numbers and Activity Codes. After employee certification of the Time Report, the immediate supervisor also certifies as to the accuracy of the time distribution.

After data entry and an editing process, the salary date contained in the system is reconciled to the Department of

Treasury NJCFS. This occurs through a zero balancing process whereby the salary payments made by Treasury are allocated within NJDEP's Cost Accounting System to the Job Numbers and Activity Codes recorded on the Bi-Weekly Employee Time Reports.

Non-salary records are loaded into the Cost Accounting System directly from a Department of Treasury tape of NJCFS non-salary transactions containing the account number, Job Number, and Activity Code information coded on the NJCFS accounting and procurement documents. Non-salary data by account number, Job Number and Activity Code information is also available through ad hoc NJCFS FOCUS reports.

NJDEP utilizes the Cost Accounting System and the New Jersey Comprehensive Financial System to account for all programs and federal grants awarded to NJDEP. Therefore, NJDEP attests that the capability exists to insure financial accountability for the Performance Partnership Agreement at whatever level of detail that is determined to be appropriate.

4.2 EPA Funding and Resource Availability

In FY1995, NJDEP received approximately 12.4 percent or $29.4 million of its total operating budget from federal agencies. Of that amount, approximately $23.1 million or 78 percent of those federal funds are attributed to EPA grants.

The majority, or 70 percent, of EPA funds were comprised of the following areas:

Air Pollution	6.0 Million
Safe Drinking Water	4.0 "
Water Pollution	2.2 "
UST	1.5 "
Non Point Sources	1.3 "
RCRA	1.1 "

Although EPA's federal budget for fiscal year 1996 has not been adopted, estimates are that reductions may be seen in such areas as Water Pollution and Air. Total federal operating funding for 1996 is currently estimated at $30 million.

NJDEP has also witnessed a decline in overall dollars available on the state side as well as a decline in staffing. Specifically, the FY1996 budget was reduced some $11.5 million with the majority of that decrease due to the reduction in the support areas of NJDEP. In terms of staff reduction, NJDEP has seen its personnel drop from 3,707 employees in January 1994 to a current level of 3,430. These decreases are attributable to attrition as well as recent reductions in force experienced by the Agency. Given these resource reductions, NJDEP has begun a budget process which will align its future resources with the

highest priority programs of the Agency.

5. Capacity Building

It is premature to perform a complete evaluation of the need for capacity building in a program self-assessment without the benefit of an agreed upon action plan. Although formally negotiated program work plans exist, the NEPPS process will move NJDEP away from the traditional regulatory oversight by EPA. It would be more appropriate, once the Performance Partnership document has been negotiated, to assess NJDEP's capacity building requirements, specifically pertaining to staffing. While staffing requirements need to be developed in consideration of the Performance Partnership Agreement, NJDEP has briefly evaluated the need for capacity building in several other key functions below.

As noted earlier, the NJDEP has experienced a significant staff reduction. While experiencing reductions in staff, workloads have disproportionally increased creating further stresses on the organization as a whole. The NJDEP continues to refocus it resources on those issues that clearly impact the environment while reducing regulatory oversight on issues with less environmental impact. In spite of the successes articulated herein, the NJDEP continues to review efforts to ensure that its resources are efficiency and effective invested. As described earlier, NJDEP has contracted with A.T. Kearney, Inc. to review and evaluate current operations and procedures in the department, with the intent of streamlining and consolidating operations and procedures for a more efficient organization.

NJDEP programs in Air Quality, Drinking Water and Water Quality additionally need to be re-engineered to maximize use of computers, and other program tools to reduce resource needs. Integration of databases, enhanced computer programming and training are generic needs for the entire organization to meet its regulatory obligations. Utilization of GIS, Electronic Data Transfer, and access to regional/national databases through Internet is necessary throughout NJDEP.

Comprehensive water/airshed management requires integration and coordination of all key functions related to water and air resources management within a common resource-based, geographic focus. Integration of programs for point source control, nonpoint source management along with implementation of partnerships at local, regional and national levels as part of an overall resource-based management process is essential to provide a high quality of life for the residents of New Jersey.

AIR QUALITY SELF-ASSESSMENT

GLOSSARY

ADR	Alternative Dispute Resolution
CEHA	County Environmental Health Act
LEV	Low Emission Vehicle
MOU	Memorandum of Understanding
NAAQS	National Ambient Air Quality Standards
NO_x	Nitrogen Dioxide
OTC	Ozone Transport Commission
OTR	Ozone Transport Region
RACT	Reasonably Available Control Technology
RVP	Reid Vapor Pressure
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
TRI	EPA Toxic Release Inventory
TSP	Total Suspended Particulate
VOC	Volatile Organic Compounds

Note: All figures are at the end of the Air Quality section.

1. Description of Air Quality in the State

1.1. Air Quality Monitoring

Air quality in New Jersey is continuously tracked by the state's Air Monitoring Network. Figure AQ-1.1 shows the location of the sites in the current network. Sites have been selected to meet one of four basic objectives: to determine population exposure; to measure maximum pollutant levels; to determine background levels or levels transported into the state from other areas, and; to determine the impact of a source or group of sources. Most sites are located to determine population exposure and/or maximum pollutant levels. A small number of sites are considered sufficient to determine background conditions and source impact monitoring is usually considered the responsibility of the facility involved (there are a number of industry operated sites in the state). Since it is not feasible to monitor in all areas of the state that might be of concern, sites have to be selected to be representative of areas of a similar nature. They also tend to remain in the same location when possible so that long term trends can be established. This does lead to some gaps in the network which are discussed in more detail under program weaknesses. The state's network is made up of three components.

The Continuous Air Monitoring Network consists of 29 automated ambient-air monitoring stations. The system collects and stores ambient data for sulfur dioxide, carbon monoxide, ozone, nitrogen oxides and smoke shade (an indicator of levels of particulate matter in the air). Six of the stations also monitor one or more of the following meteorological parameters: wind direction and speed, temperature, solar radiation, relative humidity and barometric pressure. The meteorological data aid in understanding the movement and formation of the pollutants.

The Air Sampling Network obtains 24-hour samples of inhalable particulates from the air at least once every six days. Twenty-four inhalable particulate (PM10) sampling stations and eight stations which collect samples for lead analysis are in operation. The inhalable samples are weighed to determine particulate concentrations, and samples from selected sites are analyzed for benzo(a)pyrene, sulfates, nitrates and metals.

The Acid Precipitation Sampling Network collects weekly precipitation samples at three stations. At the Washington Crossing State Park station, samples are also collected after every storm event. The samples are analyzed in the laboratory for acidity, conductivity, and concentrations of various ions, such as nitrate, calcium, sulfate, potassium, sodium, magnesium, ammonium and chlorides. The NJDEP also operates a National Dry Deposition Monitoring Site in the park which measures a number of parameters used to estimate the acidic burden being placed on New Jersey ecosystems in the form of particles or gases, as opposed

to precipitation.

In addition to the six criteria air pollutants, the NJDEP also monitors pollutants for which air quality standards have not been set (Ncn-criteria Pollutants). At present, data are collected on selected metals, benzo(a)pyrene, sulfates and nitrates. All air quality data are summarized and published on a annual basis by NJDEP in an Air Quality Report.

1.2. Air Emissions and Trends

Since the passage of the 1970 Clean Air Act, the Air Program effort has focused on reducing levels of air pollutants for which National Ambient Air Quality Standards (NAAQS) have been set. There are currently six such pollutants: sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter (PM-10), lead (Pb), carbon monoxide (CO), and ozone (O_3). Substantial improvement in the levels of most of these contaminants in the air has been achieved, as can be seen in Figures AQ-1.2.1, AQ-1.2.2 and AQ-1.2.3 which show data from the highest reading site each year relative to the health standards. Air pollution concentrations quickly dropped after NJDEP adopted rules controlling particulate emissions in 1971 and 1972, and sulfur emissions dropped in 1966 through 1969. Lead concentrations decreased rapidly after the federal regulations regarding unleaded gasoline were implemented. The two most persistent criteria pollutant problems have been carbon monoxide and ozone. Carbon monoxide levels have been substantially reduced but there are still occasional exceedances of the health standard at some monitoring sites in urbanized areas in the northeastern part of the state. Ozone levels have also shown improvement but exceedances of the ozone health standard are still routinely recorded on hot sunny summer days. Nonetheless, the number of unhealthful days (as defined by the Pollutant Standard Index) recorded each year has steadily been declining. In 1983 when NJDEP first began summarizing annual air quality index ratings, there were 93 unhealthful days or about 1 out of every four days. In 1994, there were 12 unhealthful days or about 1 day in 30 (see Figure AQ-1.2.4).

A variety of federal, state and local efforts have been responsible for the improvements in air quality. Today, motor vehicles and fuels are cleaner burning and emissions from industrial sources have been stringently controlled. But measures of the six criteria pollutants do not tell the whole story. These six pollutants were targeted not only because they had known adverse health effects but also because control measures which reduce them often have the added benefit of reducing levels of many other air pollutants as well.

It has been recognized that levels of toxic air pollutants may have health effects at very low levels. Most of these are

not routinely monitored or are at concentrations below the sensitivity of current instrumentation. Consequently, while efforts have been implemented to control toxic pollutants, it remains difficult to assess their impact by strictly relying on air quality monitoring. Assessment of inventory data is therefore an important alternative environmental indicator. Data gathered for the RTK program between 1987 and 1993 show significant reductions in emissions of toxics into the air. Overall these emissions are down over 50% from about 44 million pounds in 1987 to around 21 million pounds in 1993.

1.3. Air Pollution Sources in New Jersey

There are a wide variety of air pollution sources in New Jersey. These can generally be categorized as mobile sources (such as cars and trucks), stationary industrial and commercial sources (such as chemical factories, sewage treatment plants, and utility power plants), and miscellaneous sources (such as use of consumer products and home oil or wood combustion for heating). Examples of some of these sources are listed below.

- New Jersey has the highest traffic density in the nation with 5.1-million passenger cars registered and 59-billion miles driven annually. New Jerseyans purchase 3.25-billion gallons of gasoline each year. Motor vehicles generate almost twice as much ozone-causing pollutants (volatile organic compounds and nitrogen oxides) as any other single source category in New Jersey.

- There are 945 major source facilities operating in New Jersey, including over 200 chemical manufacturing plants ranging from pharmaceuticals to agricultural fertilizers to solvents, cleaners and paints. There are an additional 15,000 regulated area source facilities ranging from smaller industrial sources to dry cleaners.

- New Jersey is served by seven electric and natural gas distribution utility companies. Power sources range from the state's four nuclear reactor facilities to cogeneration plants. The five major New Jersey coal-fired power plants collectively burn about 3.5 million tons of coal annually and emit about 8,700 tons of NO_x each month.

- New Jersey has two major petroleum refining regions -- one along the Delaware River in Camden and Gloucester Counties and the other adjacent to Newark Bay and the Arthur Kill (River) in Middlesex, Essex and Union counties. There are 30 petroleum refineries in New Jersey producing gasoline, motor oil, asphalt and lubricants.

The sources that contribute to ground level ozone production

have been extensively studied in New Jersey. The resulting inventory shows that Mobile Sources contribute almost half of the ozone precursors emitted in New Jersey (see Figure AQ-1.1).

1.4. Partners in Protecting the Air Resource

Since the reorganization of NJDEP in 1991, the media-specific divisions within the department, like Water, Air and Hazardous Waste have been replaced by a functional structure; Policy & Planning, Environmental Regulation, and Enforcement. Primary responsibility for protecting and improving air quality in New Jersey now resides in the three elements described below. However, not all aspects of the air pollution problem are regulated by NJDEP's Air Program. The application of pesticides is regulated by a separate part of the agency as is any type of radiological air pollution. The Release Prevention program identifies companies which handle extraordinarily hazardous substances and ensures that procedures are in place to prevent the occurrence of accidental chemical releases.

Cross-media impacts such as acid rain may be regulated by the air program while others such as mercury in fish may be jointly managed with several parts of NJDEP. Some aspects of air pollution such as indoor air quality do not have a statutory base within NJDEP, but components of indoor air pollution are regulated by the federal OSHA and the state Department of Health. There are also other agencies that assist NJDEP in carrying out its goal of improving air quality. Local agencies assist with enforcement or monitoring activities, the Clean Air Council advises the Commissioner on air pollution related issues, the Department of Health assists with health advisories and evaluating standards, and the Delaware Valley Citizens Council for Clean Air issues health precautions and disseminates general information on air pollution.

1.4.1 Air Quality Permitting

The responsibility for reviewing new and modified air pollution sources to ensure that they comply with state air quality regulations and do not adversely affect air quality resides in the Air Quality Permitting Program. In addition to evaluating permit applications, staff in this program also: 1) review air quality modeling and risk assessments which predict ground level air contaminant concentrations and health effects of those air contaminants from major stationary sources; 2) oversee the measurement of air contaminant emissions from stationary sources, by both stack testing and continuous emission monitoring; and 3) implement the Federal Operating Permit program.

1.4.2 Air Quality Enforcement

The responsibility of air pollution enforcement lies within the Division of Enforcement Field Operations' Air and Environmental Quality Enforcement (AEQ) program. The primary objective of the air pollution enforcement program is to insure compliance with federal and state air pollution control laws, codes, rules and permits. Enforcement works cooperatively with the planning and permitting parts of the air program to ensure the required emission standards are met to improve air quality.

1.4.3 Air Quality Management

This program monitors New Jersey's air quality, surveys major stationary source emissions (Emission Statement Program), estimates emissions from all sources, and plans, strategizes and implements control requirements for mobile sources. It is also responsible for developing the air pollution control strategies that are mandated by the Federal Clean Air Act, including the preparation of state regulations and the State Implementation Plan (SIP).

1.4.4 Local Government Programs

There are eighteen (18) county and local health agencies that conduct compliance investigations and respond to citizen complaints of air pollution. The County Environmental Health Act (CEHA) authorizes NJDEP to delegate some enforcement activities to department-certified county and local health agencies. These agencies primarily conduct investigations of smaller air pollution sources such as gas stations and dry cleaners, as well as small facilities such as office buildings, apartment houses, small commercial facilities with small boilers, and similar small point sources, and report alleged violators to NJDEP.

2. Key Environmental Issues

2.1. Designated Nonattainment Areas

Since the passage of the 1970 Clean Air Act, the Air Program effort has focused on reducing levels of air pollutants for which National Ambient Air Quality Standards (NAAQS) have been set. While the state is now in compliance with the NO_2 and lead NAAQS, there are still areas where we have not attained the NAAQS for the other criteria pollutants: CO, O_3, particulate and SO_2. Some designations are based on monitoring data, some on dispersion model results and some on both. Once an area is classified as nonattainment, a clear demonstration that air quality over that region is below the standard must be made before the designation can be changed. Monitoring data alone are usually not sufficient, as it tends to represent only a portion of the area. Designated nonattainment areas, by pollutant, are described below.

2.1.1 Carbon Monoxide

Five counties and several municipalities are designated as not attaining the carbon monoxide NAAQS. Figure AQ-2.1 shows the location of these nonattainment areas. Monitoring data in many of these areas indicate that the NAAQS are currently being met, and NJDEP is in the process of having these areas redesignated to attainment.

2.1.2 Ozone

The entire state has been designated as non-attainment for the ozone NAAQS. The CAA of 1990 established degrees of nonattainment based on monitored levels. Depending on the severity of the classification, different control programs are mandated (e.g., enhanced inspection/maintenance, employer trip reduction). Further, all northeastern states in the ozone transport region face additional mandates. The designations for each county in New Jersey are shown in Figure AQ-2.2.

2.1.3 Particulates

Although EPA switched from a Total Suspended Particulate (TSP) NAAQS to an inhalable particulate (PM10) NAAQS several years ago, there are several municipalities in New Jersey that are still nonattainment with respect to the TSP standard. These are shown in Figure AQ-2.3. NJDEP has petitioned EPA to have these designations removed. The entire state is in attainment of the PM10 standard.

2.1.4 Sulfur Dioxide

As part of the air quality impact review when the Warren County Municipal Waste Incinerator was proposed, a contravention of the sulfur dioxide standard was identified in Warren County, based on dispersion modeling results. Therefore, a portion of Warren County was designated nonattainment for SO_2 (see Figure AQ-2.4.).

2.2. Toxic Air Contaminants

Air toxics have been defined in several different ways but in general they are pollutants with known health effects. Lists of such contaminants have been developed for regulatory purposes and can contain hundreds of compounds.

3. Recent Successes

3.1. Maintaining Air Quality (Baseline Program)

As discussed in section 1.4, there are many programs in NJDEP working either directly or indirectly to maintain and improve the quality of the air in New Jersey. Some of these ongoing activities are listed below.

* Inspection and Maintenance of Mobile Sources
* Compliance Inspections
* Development of the State Implementation Plans for CO and Ozone
* Ambient Air Monitoring
* New Source Review, including federal New Source Performance Standards
* Implementation of the federal Prevention of Significant Deterioration Program
* Implementation of the Clean Air Act Amendments of 1990
* Adoption of strict Mercury emission standards for municipal incinerators

3.2. State Implementation Plan for Ozone

NJDEP, in November 1993, submitted the second of three required revisions to its State Implementation Plan (SIP) for ozone to the Environmental Protection Agency (EPA). This submittal outlines how New Jersey will achieve a required 15 percent reduction from 1990 levels in volatile organic compound emissions by 1996, as required under the Clean Air Act Amendments of 1990. Some of NJDEP's activities in support of the SIP are described below.

3.2.1 OTC Agreements

The Ozone Transport Commission was created by the Clean Air Act Amendments of 1990 to coordinate the regional development of control plans for ground level ozone (the primary constituent in smog) in the Northeast and Mid-Atlantic States. Connecticut, Delaware, the District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania Rhode Island, Vermont, and Virginia are represented on the OTC.

The OTC has worked together over the last several years to develop a regional strategy for ozone reduction, covering both stationary sources, such as power plants, and mobile sources, such as highway motor vehicles.

On September 27, 1994, the Ozone Transport Commission (OTC) initiated a major agreement to cut the emissions of power plants and other major stationary sources of NOx pollution throughout the Northeast and Mid-Atlantic States.

The agreement, in the form of a Memorandum of Understanding (MOU), recognizes that further reductions in nitrogen oxides (NOx) emissions are needed to enable the entire Ozone Transport

Region (OTR) to meet health-based ozone ambient standards. According to this agreement, the regional program will reduce NOx emissions from power plants and other sources, and would be implemented in conjunction with other measures States have taken to control ozone pollution.

Phase I of this Agreement includes the federal requirement for sources in nonattainment areas to install reasonably available control technology by May 1995. The states voluntarily agreed to further reduce the rate of nitrogen oxide emissions from base year levels in certain zones of the OTR; 55% by May 1999 in the Outer Zone, 65% by May 1999 in the Inner Zone, and 75% by May 2003 in the Inner and Outer Zones (Inner Zone states are N. VA, DC, DE, NJ, CT, RI, MA, and parts of NY, PA, and NH; Outer Zone states are NY and PA; the Northern Zone states, which are exempt, are MA, VT, and parts of of NH and NE NY). States can modify the MOU to reflect modeling results and analysis no later than 1998.

The OTC recommended to the EPA that a regional Low Emission Vehicle (LEV) program be implemented to reduce motor vehicle emissions. EPA approved this recommendation, which will require the States to submit their LEV SIP amendment by February 15, 1996.

3.2.2 Promoting Cleaner Fuels

The department and other state agencies, in partnership with several New Jersey utilities, are working to convert a portion of the state's vehicle fleet to cleaner fuels through the Alternative Fuels Demonstration Project. In 1993, a compressed natural gas fueling station, donated by Public Service Electric and Gas, was opened at the Department of Transportation. New Jersey Natural Gas also has installed a fueling station at Island Beach State Park and loaned NJDEP one compressed natural gas vehicle for use at that facility.

3.2.3 Diesel Emission Testing

This past June, Governor Whitman signed legislation establishing a new enhanced emissions testing program for heavy duty diesel trucks and buses.

After a 6 month demonstration program, the department will set more stringent emission standards for diesel trucks and buses, while the Division of Motor Vehicles and New Jersey State Police will establish an enforcement program and penalty structure for truck drivers whose vehicles do not meet these new standards. The new diesel emission test will be used on both in-state and out-of-state truck traffic traveling on New Jersey highways.

3.2.4 CO Redesignation

NJDEP is requesting the EPA to redesignate to clean air status Camden County and nine (9) cities. The air quality data in these areas clearly demonstrate that the areas meet the health standards for carbon monoxide. A clean air maintenance plan included in the request demonstrates the State's commitment to ensure these areas continue to meet the health standards.

3.2.5 Electronic Data Submissions

In a pilot program, the Emission Statement program began accepting electronic format data submission starting for reporting year 1993. In the pilot program, more than 10% of the records reported to NJDEP were submitted in an electronic format. In the 1994 reporting year, more than 30 percent of the facilities requested to participate in the program. This effort has been successful in reducing the cost and reporting/processing burden to the regulated community and to NJDEP.

Also, as of May 15, 1995, the basic operating permit application could be submitted electronically. Enhancements of this system are in progress.

3.3. Air Toxics

NJDEP, under the authority of the Air Pollution Control Act, primarily uses a state-of-the-art technology approach to control the emission of toxic air contaminants. It is inherently a control technology approach aimed at non-criteria pollutants. However, for potential sources of toxic emissions such as incinerators, municipal solid waste combustion facilities, and coal combustion units, the risk associated with the residual emissions (i.e., the risk that remains after control technology has been applied) is routinely examined. Hundreds of other sources are routinely screened for potentially high cancer risk. In this way, risk assessment is used as a tool to fine-tune the determination of state-of-the-art controls, and to ascertain whether the remaining risk warrants further control or prohibition.

3.3.1 Mercury

In January 1993, a NJDEP-convened Mercury Emissions Standard Setting Task Force recommended that NJDEP set the strictest mercury emissions standard in the world for municipal solid waste incinerators. The task force - made up of representatives from the regulated community, environmental organizations, science and medical fields, academia and governmental entities - recommended that levels of the toxic metal released into the air by 1996 be reduced by nearly 91 percent from 1990 baseline levels. By the year 2000, emissions would be cut by over 96 percent from 1990

levels.

The resulting new standards, adopted September 1994, are designed to address the potential dangers from breathing mercury vapors or ingesting the metal through contaminated water or fish, which can cause damage to the nervous system. The standards will be met through private/public partnerships, the use of new air pollution control technology and through the increased practice of source reduction and source separation for mercury-containing waste, such as batteries and fluorescent lights.

NJDEP is continuing to work on a number of issues related to defining the health risks from exposure to mercury. These include the identification and development of standards for other sources of mercury emissions, such as incineration of hospital waste and sewage sludge, and the burning of coal in power plants.

3.3.2 Toxic Catastrophe Prevention Act (TCPA) Program

The TCPA program's success is reflected by the lessening of risk of catastrophic releases of regulated substances. In 1988, when the TCPA rule was adopted, 68,100 tons of extraordinarily hazardous substances (EHSs) were in inventory in 957 facilities, most of them potable and wastewater treatment facilities. In mid-1995, 40,400 tons of EHSs were in inventory 179 facilities. That the program has contributed to lower levels of catastrophic release is reflected by release histories for the years 1988 through 1994. Eighty percent of the 2,315 releases were less than one hundredth of the quantity that would have an effect beyond the plant boundary. None of the 2,315 releases resulted in off-site injury to NJ citizens.

A complete picture of the lessening of the risk that has taken place is not complete comparing just the number of sites and their inventory alone. Chemical and industrial firms now handle over 97 percent of the inventory of regulated substances. They, as a group, have superior technical and management resources to apply to managing risk. All have created and implemented comprehensive risk management programs. All have identified the chemical accident risks at their facilities and have taken steps to reduce those risks.

3.3.3 Inspections of High Risk Point Sources

Special air toxics inspections were conducted by NJDEP's Enforcement staff in fiscal year 1993, based on information reported in USEPA's Toxic Release Inventory (TRI). Using these data and toxicity values for specific chemicals, relative public health risks from individual facilities were estimated. Enforcement staff then used those estimates to determine which facilities to inspect. Approximately 28 were selected.

Special inspection forms were developed, which included a comparison of TRI data from previous years. Limited evaluations were also made for releases other than air (such as water, land, and off-site disposal). Inspectors checked the facilities' compliance with applicable regulations, their reported emission reductions, and their continued progress towards more accurate emission calculations. The primary reasons given by facility representatives for reductions in reported TRI emissions were found to be: more accurate record keeping and reporting; process change; and additional controls.

3.4. Pollution Prevention

NJDEP is developing a facility-wide permit program. This program, mandated under the Pollution Prevention Act of 1991, focuses on the cumulative impact of an industrial facility's operations. Instead of issuing separate permits to regulate the handling of hazardous wastes and "end-of-the-pipe" discharges into air and water, facility-wide permitting is designed to streamline the process with the issuance of a single, multi-media permit that will enable the company to build pollution prevention principles into the "front end" of the manufacturing process. The air operating permits for about 750 major facilities will also be put in a facility wide permit format.

3.5. Air Monitoring Network

New Jersey was a pioneer in its air monitoring program in many respects. It was among the first to implement continuous monitoring methods and the automatic telemetering of data. The program has been consistently upgrading its data acquisition and reporting system. Air quality data are now being transmitted directly to public kiosks so that citizens can have real time access to air quality levels, pollution forecasts and other department information. The monitoring program has also recently expanded its efforts to measure ozone precursors and now has one site capable of reporting hourly values for some 60 hydrocarbons known to be important in ozone formation. Through the cooperative efforts of several New Jersey utilities and Rutgers University, NJDEP established an upper air weather monitoring system for the evaluation of ozone precursors and transport. The site has been recognized nationally as an example of public/private partnerships.

3.6. Emission Trading: Pilot Program

The department is working through the OTC with other states in the region to develop policies for emission trading that would apply not only within each individual state, but between states. Trading involves the use of emission reduction credits to offset emission increases from new sources of pollution. Allowing the trading of emission credits in a regional marketplace would

increase opportunities for economic growth while allowing states to continue to make progress toward attaining air quality standards.

New Jersey's emission credit bank - which is actually a registry of emission credits in the state - is being used as the prototype for the other OTC states. In 1993, NJDEP also participated in a voluntary pollution-reduction credit demonstration project conducted by the Northeast States for Coordinated Air Use Management (NESCAUM). In this project, businesses, environmentalists and regulators worked together to determine how an emission credit system can maximize pollution reductions in the most cost-effective manner. A report on the project was released in January 1994.

3.7. Compliance Assistance

3.7.1 Alternative Dispute Resolution

In May 1994, NJDEP established the Office of Dispute Resolution (ODR) to provide a process other than the courts for resolution of disagreements between NJDEP and individuals, groups or organizations. Several successful mediations have been completed involving violations of air pollution control rules and permits.

Mediation is a dispute resolution technique that attempts to promote meaningful dialogue between the regulated community and the regulatory agencies, while avoiding protracted and costly taxpayer-financed legal battles. The process is one which facilitates identification and resolution of key issues and an agreement on a further course of action. The process not only produces a mutual resolution, but also fosters a greater understanding of the issues facing each party is complying with and enforcing regulatory requirements.

3.7.2 Air Permit Amnesty Program

On September 30, 1994, NJDEP announced a pilot amnesty program designed to bring business and industry into compliance with New Jersey's air quality regulations. The pilot program allowed companies requiring air permits to come into compliance during an eight-month period without penalty. About 250 facilities submitted over 1100 applications, 30 percent of which included air pollution control devices. These permits also updated, added to, and improved NJDEP's inventory of these sources and, therefore, gave the department a more accurate record of air emissions critical to sound regulatory decision making.

3.7.3 Voluntary Environmental Audits or Compliance Evaluations

NJDEP has prepared a draft interim enforcement response policy providing for the waiver or mitigation of civil and administrative penalties for violations of environmental laws discovered, reported and corrected through a voluntary environmental auditing program. Voluntary environmental audits and self-policing programs performed by regulated entities help improve compliance and thereby protect human health and natural resources. This interim policy is intended to encourage regulated entities to perform voluntary environmental audits and to establish self-policing programs by adopting a fair, consistent and predictable policy regarding NJDEP's enforcement response to violations that are discovered, reported and corrected as a result of a voluntary audit or self-policing program.

3.7.4 Grace Periods

NJDEP and EPA have historically measured the effectiveness of their enforcement programs based upon the magnitude of penalties imposed, correlating higher penalties with greater success. This is predicated upon the belief that the threat or imposition of monetary sanctions is the sole economic incentive inducing compliance and the dominant force driving corporate compliance decisions and investments. However, the economic dynamics of pollution control and waste management have substantially changed since the inception of environmental regulatory and enforcement programs and considerable market forces now exist which substantially influence the economics of compliance. The threat or imposition of monetary sanctions is no longer the dominant force driving corporate compliance decisions and investments. The enforcement programs administered by NJDEP have recognized these changes in the factors which influence compliance. Therefore, NJDEP has established a grace period for minor air pollution violations that have minimal, if any, direct effect on public health, safety or natural resources.

The grace period promotes compliance by reasonably covering those members of the regulated community who are committed to working diligently and cooperatively toward compliance with minor violations, including investing capital in pollution control equipment and other measures which will yield long-term environmental benefits. This allows NJDEP and the regulated community to avoid costly litigation and will enable the department to more sharply focus limited public resources on serious violations of environmental law.

3.8. Air Operating Permit Program

After several years of negotiations and three (3) rule proposals, the final portion of the operating permit rule was adoted on August 10, 1995. This followed the enactment of revisions of the New Jersey Air Pollution Control Act on August

2, 1995, which included fees and other required operating permit provisions. Workgroups with industry, environmental groups, and NJDEP staff participation have been set up to make the New Jersey air pollution control program more efficient and effective. The air program will be "reengineered" over the next two years, so the operating permit program can be accomplished without new staff. A revised workload analysis will be prepared as part of this reengineering effort, and it will be submitted to EPA as part of the full operating program submittal, due in two years.

4. Analysis of Institutional Constraints and Program Weaknesses

4.1.1 Motor Vehicle Emissions

As indicated in Figure AQ-1.1, mobile sources contribute a substantial portion of the ozone precursor emissions in New Jersey. While the state has recently enacted legislation which will require an enhanced Inspection/Maintenance program to identify cars which are emitting excess emissions, projections of a slow turn over in the vehicle fleet indicate that motor vehicle emissions will still be the single greatest source of emission in the future. However, the state, acting through the OTC, will continue to negotiate with the U.S. and foreign auto manufacturers for the production and sale of a low emission vehicle nationwide. If such negotiations fail, the state will enact California-based emission standards for new cars. It is imperative that New Jersey continue to work with EPA and the Ozone Transport Commission (OTC) to improve the quality of cars sold in New Jersey as well as those that travel through the state (as based on their pollutant emissions). Similarly, there are constraints on our ability to regulate the type of gasoline sold in New Jersey since gasoline is an interstate product. Finally, transportation control measures have had difficulty reducing the travel demands of New Jersey's motoring public.

4.1.2 Addressing Regional Transport

Emissions of NOx and VOC outside New Jersey's borders contribute substantially to nonattainment of the ozone standard within the State. Conversely, emissions of NOx and VOC from within New Jersey contribute to nonattainment in some areas outside the State. Therefore, states within the Ozone Transport Region (OTR) must base their attainment demonstration in part upon regional strategies that address out-of-state emissions. New Jersey has developed such regional strategies in cooperation with other member states of the OTC, and is committed to taking all reasonable steps to coordinate with these other states to make the necessary SIP revisions and implement the regional strategy.

However, it appears likely that in spite of those efforts,

emissions of ozone precursors from states outside the OTR will contribute to continued non-attainment. Preliminary results from the EPA modeling indicate that if the Low Emission Vehicle and NOx controls discussed above were implemented throughout the eastern United States rather than in the OTR alone, peak ozone concentrations in New Jersey would be lowered an additional 9 to 15 parts per billion (about ten percent of the standard), and episodes would be less persistent.

To better determine and understand the contribution of ozone transport to New Jersey and other downwind states, state officials are active participants in EPA's Ozone Transport Assessment Group (OTAG). Commissioner Shinn is the Chair of the group's Modeling and Assessment Subgroup, whose mission is to review the existing science to determine the need for, and type of additional national/regional strategies to alleviate this transport. OTAG is scheduled to submit a report of its recommendations and findings to EPA by September 1996.

New Jersey expects the 1996 OTAG report to expand the state of the modeling and assessment data upon which the OTC 1994 MOU was based. Due to the complexity of the transport issue and the unlevel playing field that exists between the OTR states and others, the requirement to install NO_x RACT technology becomes the baseline indicator for all states to measure further progress.

4.1.3 Assessing the Impact of Potential Revisions to the NAAQS

New Jersey's short-term ability to achieve its broad air program goal of protecting public health and the environment against the adverse effects of ambient air pollutants is dependent, in part, on the appropriateness of the standards currently in force at the federal level. Recent evidence provided by EPA and others suggests that for ozone, PM-10 and sulfur dioxide, the current standards may not be protective for a significant fraction of the population. The possible need to update these standards creates potential weaknesses in the current program if these standards are the sole basis for judging whether or not the environmental goals have been accomplished. If EPA does make changes in any of the NAAQS, than NJDEP will assess its existing program to identify any additional actions which may be necessary to achieve the new standards. Some possible changes to the NAAQS are documented below.

Ozone EPA is currently considering revisions to the Criteria Document for Ozone. In part this re-evaluation stems from recent clinical and epidemiological data on human health effects which appear to occur at and below currently acceptable ambient exposure levels (Federal Register, 1995). These include research documenting statistically significant increases in hospital

emergency room admissions for asthma symptoms on days when ozone levels exceeded 0.06 ppm, a level which is half of the current 1-hour NAAQS level of 0.12 ppm (Weisel et al., 1995). Any lowering of the ozone NAAQS will require additional SIP revisions and control strategies.

PM-10 Epidemiologic data suggest increased mortality associated with daily PM-10 levels less than 1/3 of the current EPA 24-hour NAAQS levels of 150 $\mu g/m^3$. Other data suggest increased morbidity as measured by hospital emissions for asthma and other respiratory and cardiovascular symptoms as well as adverse effects on measures of respiratory competence (FEV, peak respiratory flow) associated with increases in ambient PM-10 of as little as 10 $\mu g/m^3$ (AWMA, 1995). Suggested levels for a new standard would require a new monitoring effort as the size fraction would likely be different and significant portions of the state would not be likely to attain the standard.

Sulfur Dioxide EPA is currently considering revising its NAAQS for sulfur dioxide by adding a short-term (5 minute) standard of 0.6 ppm to its 24 hour standard of 0.14 ppm based on acute effects on asthmatics (Federal Register, 1994). This would require changes to the monitoring network and the effect on attainment status would have to be determined.

4.2. Gaps in the Ambient Air Monitoring Program

Existing monitoring data, such as ambient levels of criteria pollutants, are not necessarily the only data desirable for environmental indicators. What NJ does not measure may be just as important, or in some cases, more important in assessing environmental conditions and defining how NJ protects health and the environment.

It is known that the program is missing broad types of measurements such as fine particulates that are known to be important in human health. There is little analysis of the collected particulate samples so their relative health and environmental impacts cannot be assessed. Because of the increasing evidence that fine particulates (<10 um) may be associated with adverse health effects, monitors capable of this fractionation should eventually be part of the Air Quality Monitoring effort. Volatile and semi-volatile organics are not measured, nor are mercury and many other substances with known health effects. Additional monitoring of pollutants is needed to adequately assess pollution levels at NJ's borders so that appropriate regional strategies can be developed. Also lacking is the ability to address site-specific public health concerns. (One example is asbestos. With no NJ baseline data on background ambient air levels, it would be difficult to compare levels in an area of concern).

There is also concern that the current program does not adequately characterize air contaminants so that basing our daily air quality ratings on the six pollutants that are measured may be misleading. In fact, many air pollutants that the department regulates are not monitored on a routine basis so it is not known how effective those regulations have actually been. For example, there is little ambient data on toxic organic compounds which would allow us to assess the effectiveness of our air toxics program. In addition, the program often falls short in analyzing the data it collects. This greatly diminishes the value of the data to NJDEP's decision makers who need to know not only what pollution levels are, but what is affecting their concentration and fate in the atmosphere. Finally the program still needs broader public exposure so people are aware of and use the information generated.

4.3. Environmental Indicators for Evaluating the Effectiveness of Air Quality Enforcement

Historically, the Enforcement program has numerically measured its success on the basis of such activities as the number of enforcement documents issued. New criteria for evaluating program effectiveness are necessary to show that enforcement activities are resulting in improved air quality. While this is not only true of the enforcement program, it represents an area that may not lend itself easily to such a change. Other program areas may need to consider similar indicators. Possible environmental indicators for evaluating the effectiveness of the compliance and enforcement programs should be explored, such as:

* The percent of major emission points that are continuously monitored by a CEMS system, and which pollutants are monitored. Monitor downtime would have to be included in the evaluation. This can be combined with the potential to emit to determine the approximate percent of the total statewide emissions which are in continuous compliance or even exceeding the regulatory requirements.

* The above data can be combined with an evaluation of the level of compliance as determined from CEMS as reported in quarterly EEMPR reports to determine an approximate percent of the total monitored emissions in the state which are in compliance by criteria pollutant.

* The number of sources found to be in compliance during routine inspections as compared to the total number of facilities inspected would give an approximate compliance/non-compliance rate for all facilities in the state. This would help change the program focus.

* The percent of major emission points which have been

evaluated by a stack test within the past 5 years and a compliance rate for those emission points.

* Similar review as the above for minor facilities and area sources.

* Rule effectiveness studies for additional emission point categories to show approximate compliance rates for specific regulatory requirements.

* A summary of Operating Permit compliance certifications showing the level or rate of compliance for self reported compliance/non-compliance.

* Major enforcement case summaries showing successes and evaluating enforcement cases that were difficult to resolve. This could include a "Timely and Appropriate" enforcement review based on EPA guidance documents on "Timely & Appropriate."

* An auditing program for reporting requirements, such as emission statements, compliance certification reports, and Right-to-Know data, to ensure that data submitted by facilities are accurate.

4.4. Mobile Source Emissions and Personal Behavior

NJDEP has participated in several efforts to influence personal decisions that affect the amount of emissions from automobiles in the state. For example, a recent public education campaign provided information on such topics as buying a clean car, keeping a car running clean, and alternatives to commuting in single-passenger cars. Because NJDEP does not have the authority to regulate such activities, however, these efforts have met with limited success.

4.5. Emissions Database

Air emissions data are collected by several programs within NJDEP. Each program covers a finite portion of the universe of air emission sources and stores the collected data in a unique database. As a result, NJDEP collects a tremendous amount of data, but the data are not used to full advantage because of the incompatibility of the databases in terms of scope, and computer software and hardware. The data quality also varies from one database to another. Several of these databases are described briefly below. These data have the potential to be used as environmental indicators if the problems of data quality and data availability are properly addressed. Other data should also be considered for inclusion on some database, such as the stack test and continuous emissions data that are collected by the Bureau of Technical Services in the Air Quality Permitting Program. These

data are currently stored in hard copy only.

4.5.1 Air Pollution Enforcement Database System (APEDS)

Data in the APEDS system are mainly generated from information submitted by facilities during the permit application process and various follow-up activities conducted by the Air Program including compliance inspections. The system is set up in a series of four main files (Plant, Stack, Source, and Action Files) plus several small files (such as Contaminant and Municipality Files). After the Department issues a permit to construct, the appropriate input worksheets are completed and sent in batches to a key punching section for data entry.

4.5.2 Toxic Release Inventory (TRI) and Right-to-Know (RTK) Data

New Jersey business owners and operators who are regulated by the New Jersey Worker and Community Right to Know (W&CRTK) Act and/or the federal Emergency Planning and Community Right-to-Know Act (EPCRA), also known as Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), are required to report inventories of the hazardous substances manufactured, used or stored at their facilities. The NJ W&CRTK Act determines coverage according to the Standard Industrial Classification (SIC) code of a business. Businesses not covered under the state law are required under EPCRA, Section 312, to file state inventory reporting forms if quantities of hazardous substances manufactured, used or stored on site exceed the federal reporting threshold. Also, specific manufacturing facilities are required under these laws to report environmental releases and waste transfer data as well as information on pollution prevention activities for more than 300 toxic chemicals, if they have 10 or more full time employees and exceed a set threshold. There is a need to ensure that such reporting requirements are not duplicative or unnecessarily burdensome on the regulated community.

4.5.3 Emissions Statements

Facilities which emit air pollutants above certain thresholds must report their annual emissions to the NJDEP within 6 months after the end of the year. The covered pollutants are VOC, NO_x, CO, SO_2, TSP, PM10 and lead. These data will be used to charge facilities subject to the Operating Permit Program emission fees in accordance with the amount of emissions released. As such the data base must be quality assured and accurately reflect a source's emissions.

4.6. Information Integration

The Air Program must increase the efficiency of its efforts

if it is to keep up with its growing responsibilities. To the extent possible, the program needs to be reengineered to maximize the use of computers and other tools to reduce resource needs. The integration of emission and other program databases, electronic data transfer and submittal, task automation and information processing and dissemination are all areas where additional capacity is needed. As the program changes, staff will require additional training to make effective use of new tools and technologies.

4.6.1 IRIS

Continued access to USEPA's Integrated Risk Information System (IRIS) is very important to the Air Quality Permitting Program. The use of IRIS unit risk factors is integral to the AQPP risk screening procedure for carcinogens; IRIS reference concentrations are used for risk assessment of noncarcinogens; and IRIS documentation is often referred to in making risk management decisions. IRIS can also be used when evaluating other routes of exposure to air pollutants. Since information is regularly updated in IRIS, it is essential that it be checked periodically, to expand the list of pollutants for which risks can be evaluated, and to keep up with new information that could lead to changes in chemical-specific risk values.

4.7. Expansion of Public Education Efforts

There is a growing body of scientific evidence about the harmful effects of air pollution and polluting behaviors on human health. While the NJDEP has been heavily involved with its "Let's Clear the Air" campaign since 1993, recent polling and market surveys indicate that there is a greater need to educate the public about all air pollution sources, with a stronger emphasis on the threat they pose to human health. Recognizing this, NJDEP is developing a comprehensive public outreach campaign using the mass media and other outlets to communicate this message. The success of this effort will depend largely on the level of resources made available to the project.

4.8. Fiscal Accounting

The Air Program has several distinct funding sources, each with its own accountability mechanisms. The air grant which is administered by the EPA currently funds less than 25% of the program. It gives the EPA oversight of a larger percentage of the programs activities however, because state matching funds must be provided. The matching fund provision for this grant is unusual in that not only must the state match the federal share, but the state can never reduce the amount it contributes, even if the federal grant is reduced. To receive the grant the state must submit a work plan with specific outputs which must be accomplished in order to earn the grant. It is imperative that

the state be able to show appropriate accounting of staff time and operating expenditures related to grant work plan activities. On the other hand the new operating permit program carries its own accountability provisions. Since these are permit fees the money can only be used for activities related to the facilities permitted. Time or operating costs incurred by this part of the program cannot be charged against the grant and vice versa. Better tracking of activities by funding source will be needed to ensure that all accountability requirements are met.

5. References

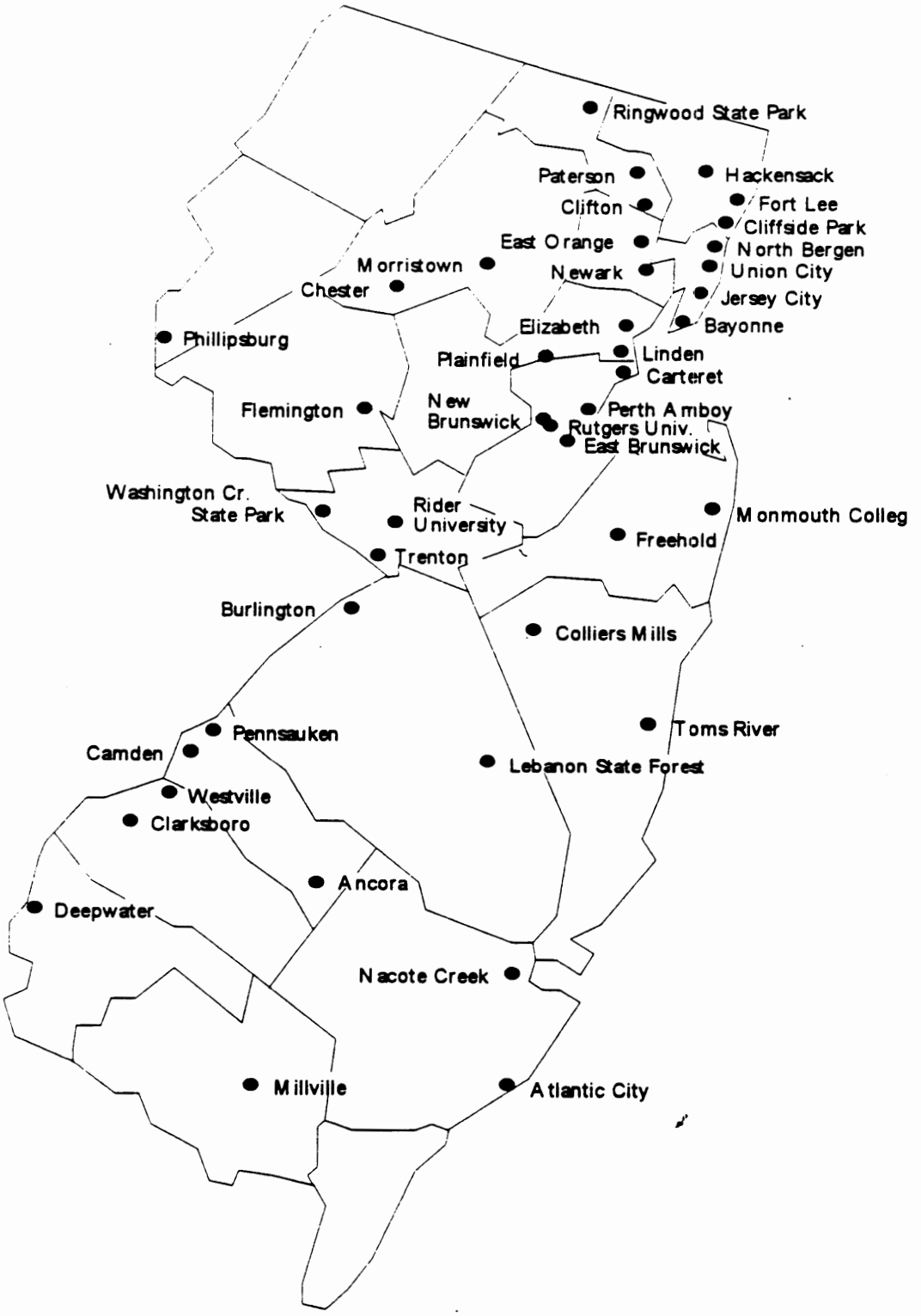
AWMA (1995). Summary of Conference on Particulate Matter: Health and Regulatory Issues, April 4-6, 1995, Pittsburgh, PA.

Federal Register (1994). Vol. 59, No. 219 / Tuesday, November 15, 1994.

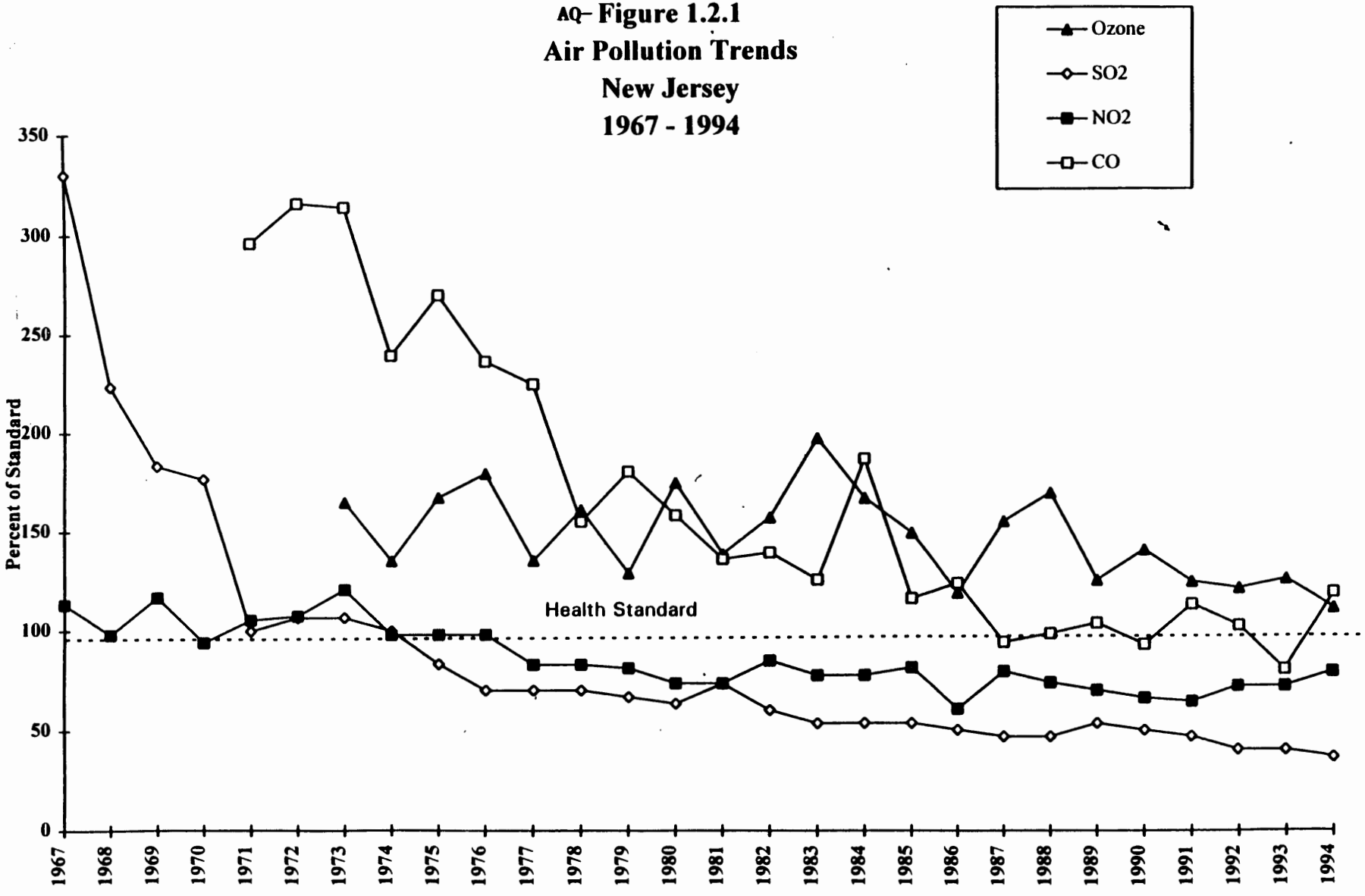
Federal Register (1995). Vol. 60, No. 42 / Friday, March 3, 1995. pp. 11973.

Weisel, C.P.; Cody, R.P. and Lioy, P.J. (1995). Relationship between Summertime Ambient Ozone Levels and Emergency Department Visits for Asthma in Central New Jersey. Env. Health Perspect. 103: (suppl. 2) 97-102.

AQ-Figure 1.1
State of New Jersey
Air Monitoring Network, 1994



AQ- Figure 1.2.1
Air Pollution Trends
New Jersey
1967 - 1994



AQ- **Figure 1.2.2**
Air Pollution Trends
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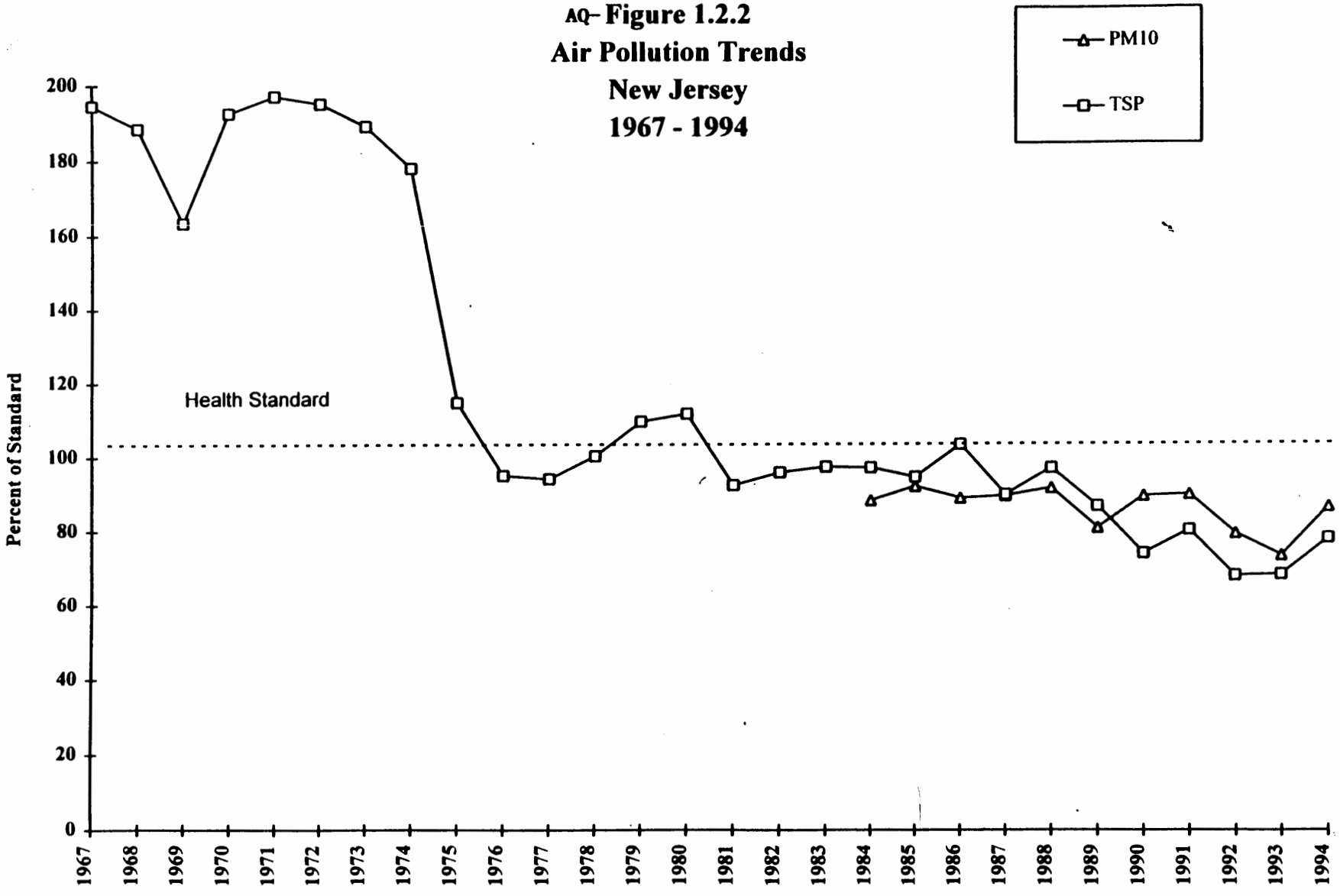
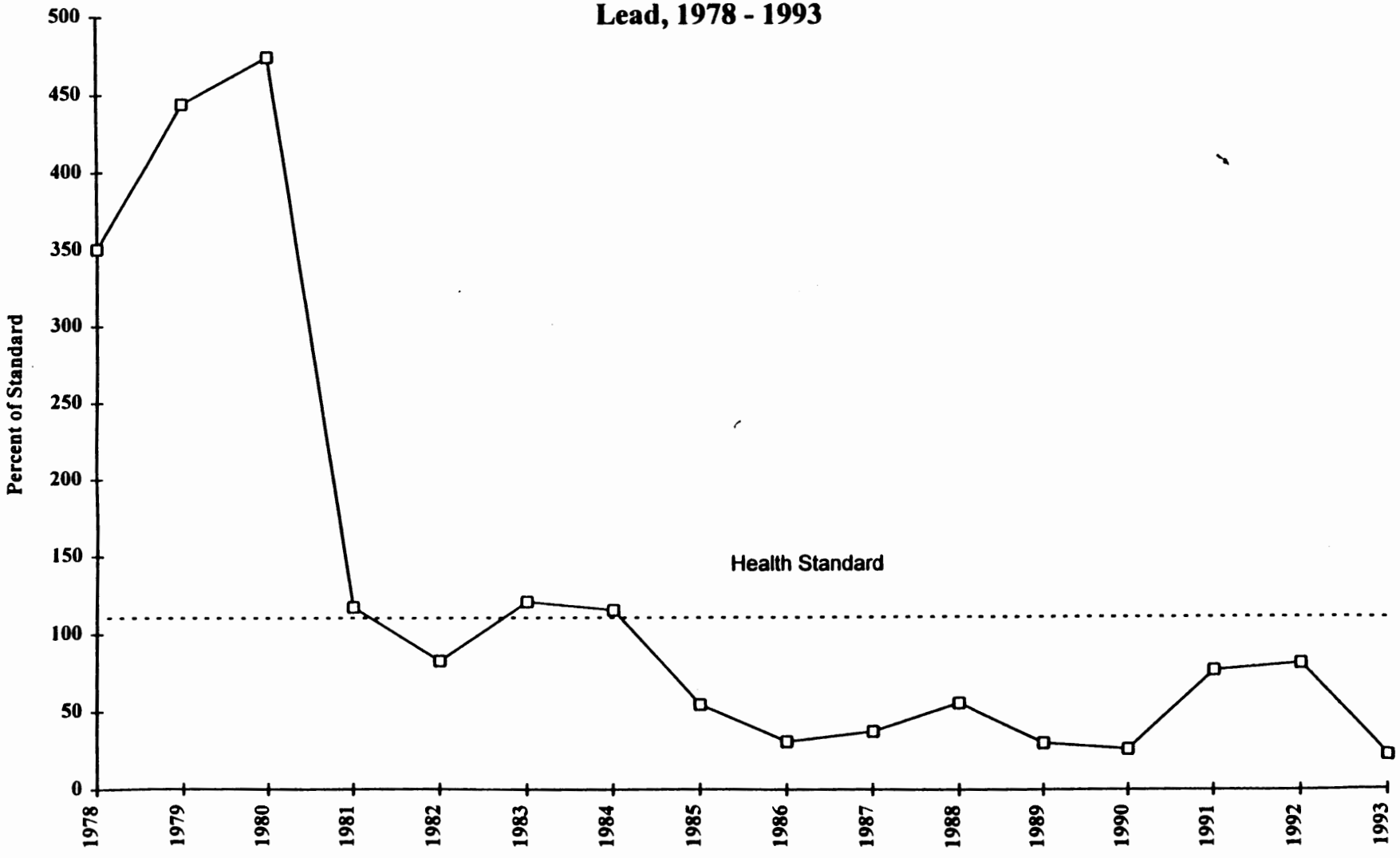
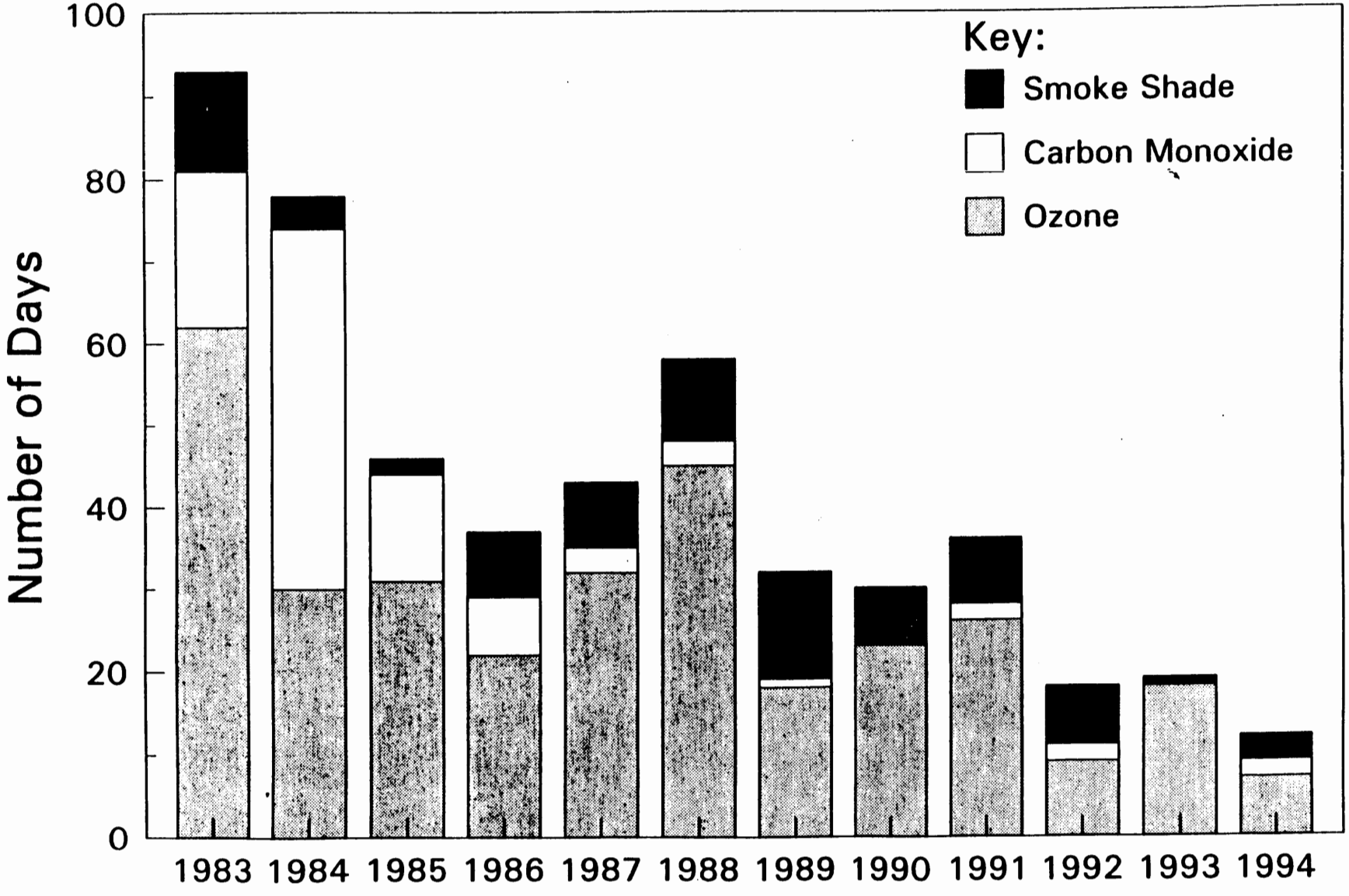
1967 - 1994



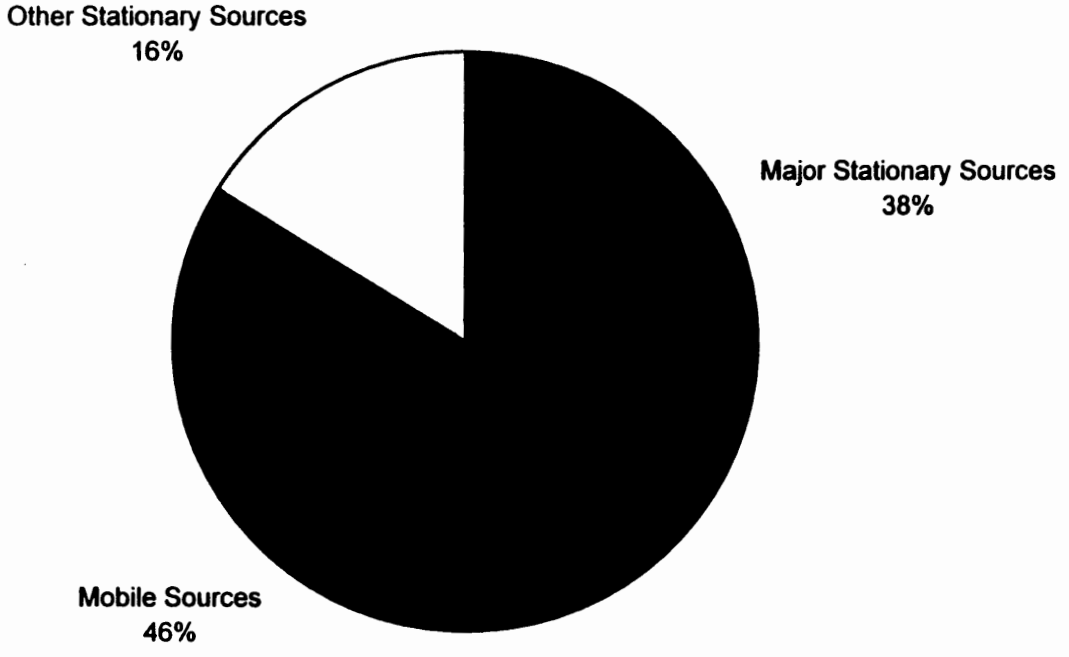
AQ-Figure 1.2.3
Air Pollution Trends in New Jersey
Lead, 1978 - 1993



AQ-Figure 1.2.4: Number of PSI Unhealthful Days by Year and Pollutant

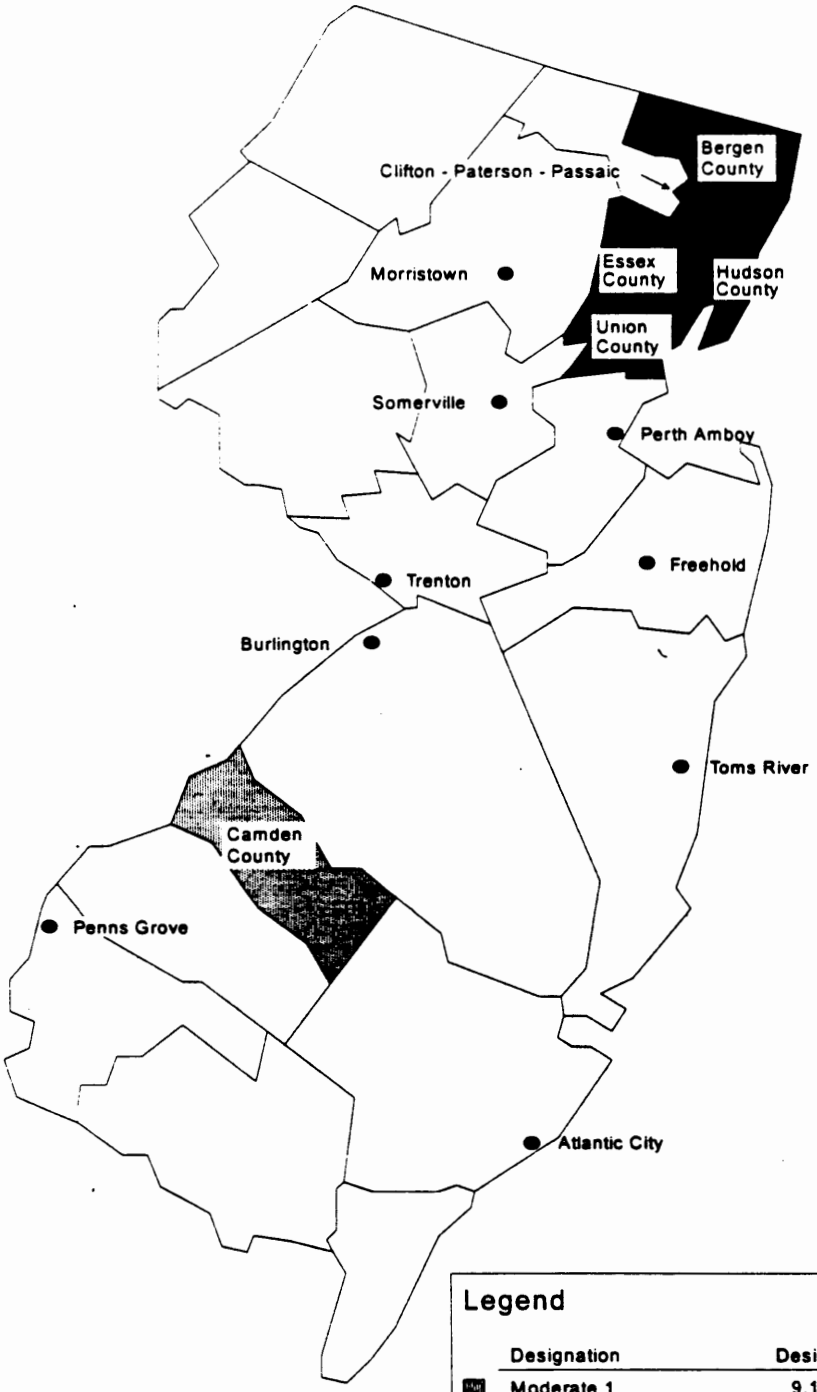


AQ-Figure 1.3
1990 New Jersey Emission Inventory
of VOC and NOx



AQ-Figure 2.1

Carbon Monoxide Non-Attainment Areas* in New Jersey



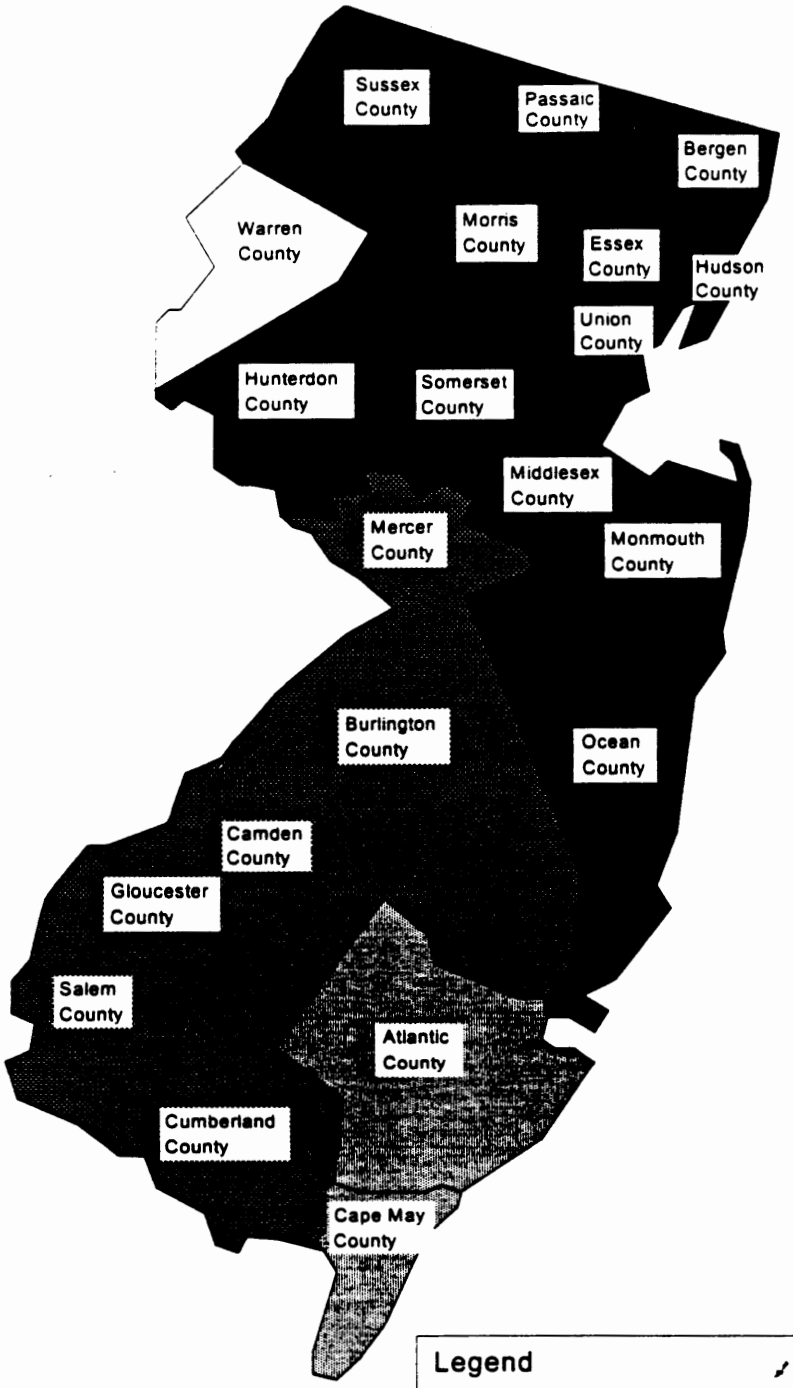
Legend

	Designation	Design Value	Attainment Date
	Moderate 1	9.1 - 12.7 ppm	Dec. 31, 1995
	Moderate 2	12.8 - 16.4 ppm	Dec. 31, 1995
●	Nonattainment prior to 1990, not classified		

*Nonattainment of the National Primary (Health) Standard

AQ–Figure 2.2

Ozone Non-Attainment Areas* in New Jersey



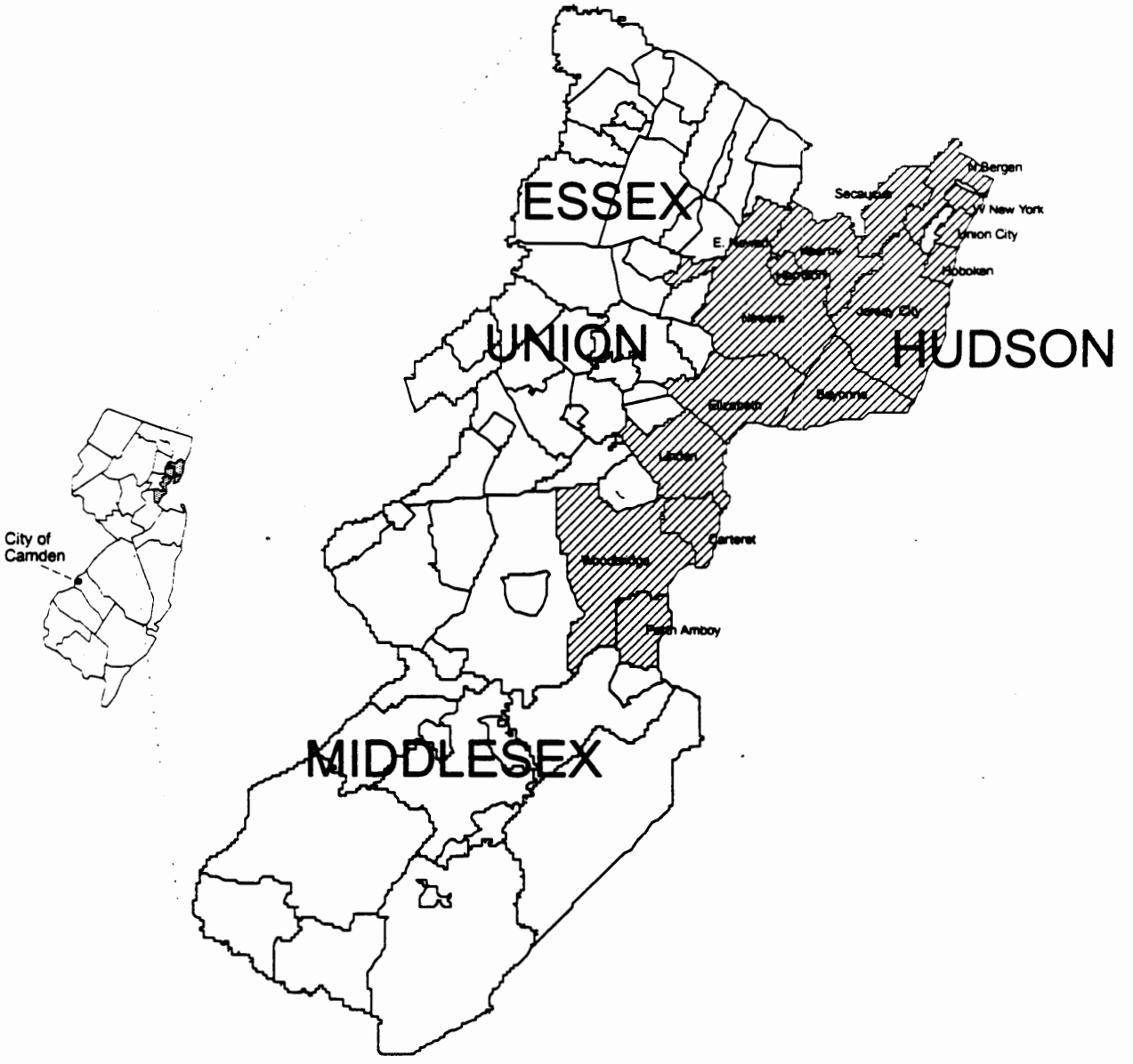
Legend

	Designation	Design Value	Attainment Date
	Marginal	.121 - .137 ppm	Nov. 15, 1993
	Moderate	.138 - .159 ppm	Nov. 15, 1996
	Severe 1	.180 - .190 ppm	Nov. 15, 2005
	Severe 2	.191 - .279 ppm	Nov. 15, 2007

*Nonattainment of the National Primary (Health) Standard

AQ–Figure 2.3

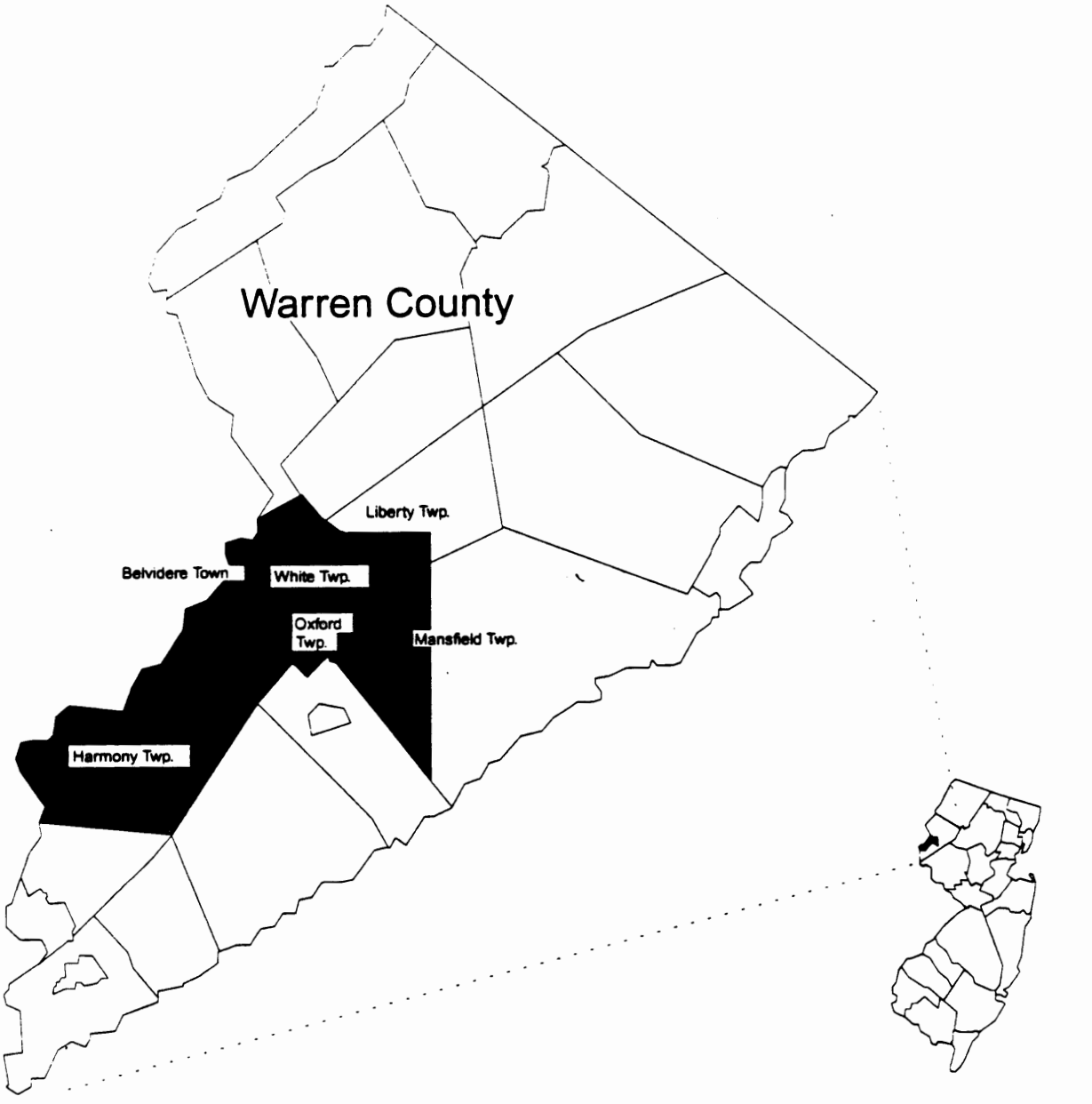
Total Suspended Particulates Non-Attainment Areas* in New Jersey



*Nonattainment of the Secondary (Welfare) Standard

AQ–Figure 2.4

Sulfur Dioxide Non-Attainment Areas* in New Jersey



Legend

■ Sulfur Dioxide Nonattainment Area
(includes Belvidere Town; Harmony Township; Oxford Township; White Township; the portion of Liberty Township south of UTM northing 4,255,000 and west of UTM easting 505,000; and the portion of Mansfield Township west of UTM easting 505,000).

*Nonattainment of the National Primary (Health) and Secondary (Welfare) Standards

WATER QUALITY SELF-ASSESSMENT

GLOSSARY

BMP	Best Management Practices
BOD	Biological Oxygen Demand
CAFRA	Coastal Area Facility Review Act
CFR	Code of Federal Regulations
CSO	Combined Sewer Overflows
DSR	Division of Science and Research
DSW	Discharge to Surface Water
DWQ	Division of Water Quality
EPA	United States Environmental Protection Agency
GIS	Geographic Information System
NJDEP	Department of Environmental Protection
NJPDES	New Jersey Pollutant Discharge Elimination System
NPS	Nonpoint Source
OEP	Office of Environmental Planning
PCBs	Polychlorinated Biphenyls
ppm	parts per million
SWQS	Surface Water Quality Standards
TMDL	Total Maximum Daily Load
USGS	United States Geological Survey
WHWE	Water and Hazardous Waste Enforcement
WQBEL	Water Quality Based Effluent Limits

Note: all figures are at the end of each section of the water quality self-assessment

Water Quality Self-Assessment: Part 1: Freshwater Watersheds

1. Introduction

1.1. Description of Surface Water Resources

New Jersey is the fifth smallest, and the most densely populated state in the nation. Population and industrial centers are concentrated in the northeast and southwest. Most watersheds in the State contain a variety of land uses. Generally, streams and rivers originate in undeveloped, rural or agricultural areas then enter suburban, urban or industrial areas. A summary of the State's population and water resources are as follows:

State Surface Area	7,419 sq. miles
State Population (1990)	7,730,188
Municipalities	567 in 21 counties
Major River Basins	Delaware, Passaic/Hackensack, Atlantic Coastal, Raritan, and Wallkill
River Miles	6,450*
Border River Miles	310*
No. of Freshwater Lakes and Ponds	1200*
No. of Public Lakes/Reservoirs/Ponds[1]	380*
Area of Public Lakes/Reservoirs/Ponds	37.5 sq. miles*
Area of Estuaries/Bays (open waters)	420 sq. miles
Ocean Coast	120 miles
Area of Freshwater Wetlands	1032.8 sq. miles*
Area of Coastal/Tidal Wetlands	379.7 sq. miles*

* Approximate Figure
[1] Public lakes include all lakes not privately owned.

A variety of freshwater aquatic habitats are found throughout New Jersey including cool trout waters in the north and acidic Pinelands streams in the south. Freshwater wetlands provide habitat for numerous aquatic and terrestrial species. In some areas, habitats have been significantly modified by development and channelization.

Human uses of water include industrial process and cooling water, drinking water, recreation, and effluent disposal. The effects of these uses on water quality are discussed in detail below. Aquatic life uses include feeding and spawning grounds, and habitat uses.

Numerous pollution and habitat degradation problems adversely affect the uses of New Jersey's waters by humans and aquatic life. Most of these problems can be traced back to the ways that people use land and manage point and nonpoint sources

of pollution, meet water supply demands and disturb lands near waterways. The major land uses in New Jersey include urban, suburban, commercial, agricultural, industrial and waste disposal. Diverse land uses occur to some degree in almost every watershed. This complexity makes identification of the sources of pollution and management of water resource problems particularly challenging in New Jersey.

1.2. Comprehensive Watershed Management

This report is organized around inter-related factors which affect watershed function: ***physical*** (habitat), ***chemical*** (water quality) and ***biological*** (indigenous flora and fauna). A **watershed** is the geographic region within which water, sediments and dissolved materials drain to a particular receiving water body. Watersheds provide the geographic focus necessary for developing a resource-based approach that addresses all of the elements of an aquatic ecosystem, including: surface water, ground water, wetlands, flood plains, stream corridors, flora and fauna, habitat, etc. Many of New Jersey's watersheds include both freshwater and tidal waters, that flow into estuaries and then to the ocean. Only the freshwater portions of watersheds are addressed in this report. A map of New Jersey's watershed and watershed management areas is provided in Figure FW-1.

NJDEP has been developing a comprehensive watershed management strategy. This strategy includes both regulatory and nonregulatory approaches to resource protection. In such a framework, all activities occurring within the watershed that impact or may impact the water resource or designated uses are managed in an integrated fashion. Point and nonpoint sources of pollution, water supply, land use and other water resource issues will be addressed strategically via watershed management. Comprehensive watershed management seeks to move beyond the site-specific and single medium approaches and encompass pollution prevention and source reduction strategies on a regional basis. This approach is intended to be resource-based rather than facility-based. Watershed management can be implemented within NJDEP by coordinating activities of existing programs.

The comprehensive watershed management strategy involves mapping and prioritizing watersheds and implementing watershed-based regulatory and nonregulatory management strategies. The critical phases of watershed management include data collection, resource assessment, goal setting, strategy development, implementation and evaluation. These phases and related activities are shown graphically on Figure FW-2.

Currently, NJDEP has made some progress in implementing watershed management. To date, watersheds have been mapped and a prioritization method has been developed. A pilot project in the

Whippany watershed is in its second of five years. Progress to date in the Whippany watershed includes preparation of a draft characterization report, articulation of goals and objectives and a work plan for watershed modeling has been prepared with assistance from a public advisory group.

The NJDEP is issuing some wastewater discharge permits on a watershed basis which include water quality-based effluent limitations for conventional parameters. However, on a statewide basis, data development, issue identification, goal formulation, strategy development and implementation, monitoring and evaluation are not yet conducted from an overarching planned watershed management perspective. Therefore, the key environmental issues in this self-assessment document are not discussed within a watershed framework.

1.3. Surface Water Quality Standards (SWQS)

The Surface Water Quality Standards (N.J.A.C. 7:9B) establish the policies, designated uses and criteria used to protect and enhance the State's waters. Designated uses reflect current and intended uses of the State's surface waters. Criteria are used to evaluate and achieve attainment of these designated uses. Wherever achievable, the designated uses reflect the fishable/swimmable goals of the federal Clean Water Act. Designated uses of New Jersey's waters include: recreation; water supply; maintenance, migration and propagation of biota; preservation of selected waters in their natural state; and other reasonable uses.

Antidegradation policies apply to all waters of the State. These policies are intended to protect and maintain existing water quality unless it is shown that a lowering of water quality is needed to accommodate important economic or social development. Irreversible changes to water quality which would impair or preclude attainment of designated uses are prohibited. The State has established three antidegradation categories: Outstanding National Resource Waters, Category One Waters (C1), and Category Two Waters.

Outstanding National Resource Waters (FW1 and PL waters) receive the highest level of protection: no change from existing water quality is allowed, except improvements toward natural conditions. Historically, FW1 waters have been limited to waters within State and Federal lands or other publicly held lands. Category One waters receive the next highest level of protection: no change is allowed in the mean of the water quality. Category Two waters are protected from changes which would cause water quality to be lowered below the promulgated criteria plus a reserve.

Ambient water quality criteria have been promulgated to

protect human health from the consumption of water and aquatic organisms, as well as to protect the aquatic biota. Different Category Waters have different criteria that correspond with their designated protection level. Promulgated criteria for most of New Jersey's waters consist of numerical criteria for specific pollutants.

1.4. NJDEP Water Resources Programs

The management of water resources is complex. Numerous programs and functions address the various aspects of watersheds and water resources. As stated previously, these programs and functions are not conducted within a watershed framework. NJDEP water resource management programs are explained briefly below and summarized on Table FW-1.

1.4.1 Policy and Planning

Office of Environmental Planning

The Office of Environmental Planning (OEP) is responsible for planning functions related to watershed management, water supply, stormwater management, and surface water standard setting. Additionally, OEP administers several federal grants related to demonstration and implementation projects for nonpoint source management, evaluates data from water quality monitoring programs and conducts a pilot study to support the development of the watershed management strategy.

Division of Science and Research

The Division of Science and Research conducts research projects in numerous disciplines including sources, fate and transport of water pollutants, geographic information system (GIS) analysis, ground water - surface water interactions, and microbiological quality of source waters. Research studies currently provide the only data gathered by NJDEP on toxics in biota consumed by humans. In addition DSR provides technical support for standard setting and other activities.

Water Monitoring Management

Within DSR, Water Monitoring Management operates several monitoring programs to assess water quality in rivers, lakes, sediments and marine waters. Chemical and bacteriological water quality and biological monitoring of benthic macroinvertebrate populations provide the basis for water quality assessments, and provide data for regulatory and classification purposes.

1.4.2 Environmental Regulation

Division of Water Quality

The Division of Water Quality (DWQ) issues permits for discharges of treated sewage and industrial wastewater to waterways, manages the pretreatment program for discharges of industrial wastes to sewage treatment plants, issues permits for sludge management, landfill leachate discharges, industrial and municipal stormwater. The DWQ also facilitates upgrades of treatment works and collection systems through the construction financing program.

Division of Water Supply

The Division of Water Supply is responsible for programs that assure adequate and safe supplies of drinking water, permitting water diversions and conducts water supply feasibility studies.

Land Use Regulation

The Land Use Regulation program administers the permit programs associated with the Waterfront Development Act, the Wetlands Act of 1970, the Flood Hazard Area Control Act and the Freshwater Wetlands Protection Act, the Riparian Lands Management Program and the Realty Improvement Act. The Subsurface Wastewater Disposal Program establishes standards for the proper installation of private septic systems.

1.4.3 Enforcement

Water and Hazardous Waste Enforcement Element

The Water and Hazardous Waste Enforcement Element (WHWE) inspects permitted facilities, tracks compliance with reporting and effluent limitation requirements and enforces permit requirements. WHWE also conducts investigations of unauthorized activities and responds to complaints.

Coastal and Land Use Enforcement Management Element

The Coastal and Land Use Enforcement Management Element enforces land use regulations related to wetlands, riparian lands, floodplains and lands within the Coastal Area Facilities Review Act (CAFRA) jurisdiction. (The CAFRA jurisdiction includes some freshwater portions of coastal watersheds.)

1.4.4 Natural and Historic Resources

Division of Fish, Game and Wildlife

The Division of Fish, Game and Wildlife manages state owned

wildlife management lands for recreation and conservation purposes. Responsibilities include fish and waterfowl harvesting and protection programs, including trout water stocking and assessments, the Endangered and Nongame Species program and the Environmental Review program.

Division of Parks and Forestry

The Division of Parks and Forestry manages state owned park and forest lands for recreation and conservation purposes. Responsibilities include the identification and development of strategies to protect unique, rare, endangered and scenic habitats.

1.4.5 Site Remediation

The Site Remediation Program is responsible for cleanup or oversight of cleanup at contaminated sites. Responsibilities include site management to avoid or minimize contamination of surface and ground waters and sediments.

1.5. Point and Nonpoint Sources of Pollution

Sources of pollution are classified as point and nonpoint sources. Point sources include industrial and municipal wastewater treatment plant outfalls, cooling water discharges, industrial stormwater and combined sewer overflows. New Jersey's waterways receive treated wastewater discharges from 810 industrial and 357 municipal point sources. (NJDEP, 1995). The significant and widely distributed industrial base includes manufacturing, refining and chemical production. Approximately 90% of New Jersey's industries discharge their wastewater to sewage treatment plants.

Nonpoint sources include stormwater outfalls, construction, urban and agricultural runoff, land disposal practices, hydrologic and habitat modification, and marinas located in lakes and coastal waters. Municipal stormwater runoff emanates from diffuse sources and is considered a component of nonpoint source pollution in New Jersey. Contamination of municipal stormwater with petroleum hydrocarbons, metals, nutrients, pesticides, pathogens, suspended solids and other pollutants has been documented in scientific literature. Fecal contamination from municipal stormwater discharges has led to swimming beach and shellfish harvesting area closures in New Jersey's estuaries and ocean waters. However, these effects on freshwater resources in New Jersey are currently unquantified.

1.6. Data Sources for Identification of Key Issues

1.6.1 Ambient Stream Monitoring Network

The Ambient Stream Monitoring Network, operated cooperatively by NJDEP and USGS, consists of 79 fixed stations monitored 5 times per year. Stations are located at midstream and downstream portions of freshwater streams. Complimentary flow data are also collected to allow conversion of in stream concentrations to loads. Parameters include dissolved and total nutrients, and physical parameters (e.g. dissolved oxygen, pH, etc.) and fecal coliform. Metals in water are monitored two times per year. These parameters are a subset of parameters regulated in the Surface Water Quality Standards (SWQS). Metals, chlorinated pesticides, polychlorinated biphenyls (PCBs) and phosphorus are monitored in sediments once every 3 years. Sediment criteria are under development at EPA.

Each of these 79 stations represents approximately 5 stream miles, approximately 525 miles total (8.1% of New Jersey's stream miles). Extrapolation to the rest of the state is not scientifically valid because the network is a non-random fixed station design and complex interactions of point and nonpoint source pollution are not understood at each station.

1.6.2 Ambient Biological Network

The Ambient Biological Network consists of 635 stations, at which the populations and diversity of benthic macroinvertebrates are monitored. This network is used to screen stream reaches for chemical monitoring and assess potential impacts to aquatic life in midstream and upstream portions of freshwater streams. The data are used to classify waters as unimpaired, moderately and severely impaired for aquatic life uses.

1.6.3 Other Data Sources

Additional information sources also include research projects and special studies conducted by water management programs and DSR. The Division of Water Quality maintains a database of permitted facility information including permit loadings and discharge monitoring report (DMR) data. The GIS database includes watershed boundaries, monitoring and permitted facility locations. The Site Remediation Program (SRP) often requires water quality and sediment monitoring near contaminated sites. SRP maintains data on locations of sites, remediation status. However, chemical concentration data are not computerized.

2. Key Water Quality Issues

2.1. Surface Water Quality Standard criteria are not met in all stream reaches

Using Ambient Stream Monitoring Network data, DSR and a consultant recently conducted an analysis of trends for 20 years

(1974-1994) and attainment with Surface Water Quality criteria for 5 year intervals for 79 stations for 20 parameters in water and sediment. This work is being conducted as part of a research project entitled Evaluation of New Jersey's Ambient Monitoring Programs and Development of Environmental Indicators. Preliminary results indicate that exceedences of Surface Water Quality criteria, and impairment of designated uses, are occurring in monitored waters. Recent exceedence information is based on at least one criteria exceedence in the 1990-1994 monitoring period, typically 20 sampling events. Results are summarized below and in Table FW-2.

It should be noted that while an assessment of the failure to achieve Surface Water Quality Standard criteria is a useful means to identify water quality issues, it isn't necessarily definitive. A valid consideration in the watershed approach is whether the essentially statewide criteria (by classification) are appropriate for each particular watershed. For example, one of the major outputs of the New York/New Jersey Harbor Estuary Program was the development of a harbor-specific criteria for copper.

2.1.1 Widespread and significant exceedences of the fecal coliform criteria negatively affect the "swimmable" designated use

The fecal coliform criteria is set at 200 most probable number (MPN) per 100 milliliters. Exceedences of the fecal coliform criteria were observed at 75 out of 79 stations using summer data. Primary contact designated use is not met at 405 stream miles (77% of monitored miles). Results are summarized on Table FW-3. Due to the highly variable levels, trends were detected at only 19 stations; 14 were increasing, 5 were decreasing.

Limitations of the fecal coliform indicator

The presence of fecal coliform bacteria indicates fecal contamination from humans and/or animals. It is an imperfect indicator of potential human health risks since organisms that cause human illness may or may not be present in the presence of fecal coliform bacteria. However, testing for specific human pathogens is time consuming, expensive and not possible for all pathogens.

Sources of Fecal Coliform

The sources of fecal coliform contamination at 75 stations have not been identified. Since sewage effluent is disinfected, nonpoint source runoff, stormwater and contaminated sediments are likely sources. Fecal coliform pollution may also originate from malfunctioning septic systems, illegal connections to

stormwater drains, wet weather combined sewer overflows and sewage infrastructure failure.

2.1.2 Exceedences of the Suspended Solids criteria may negatively affect aquatic life designated uses

Exceedences of the criteria occurred at 23 stations between 1990-94. The criteria are set at 25 ppm in trout production and maintenance waters and 40 ppm in nontrout waters to protect aquatic life and habitat quality. Suspended solids may also transport some contaminants (e.g. metals) to waterbodies. There are insufficient data to assess trends.

The source of suspended solids contamination at the 23 stations has not been identified. Suspended solids pollution may originate from both point and nonpoint sources.

2.1.3 Exceedences of the phosphorus criteria may negatively impact aquatic life designated uses

The phosphorus criteria is set at 0.1 ppm to protect against eutrophication, except when phosphorus is not a limiting nutrient. Above impoundments, the criteria may be set lower to protect lakes and reservoirs. Assuming phosphorus is a limiting nutrient, exceedences of the criteria occurred at 73 stations (92%) between 1990-94. Levels of phosphorus are decreasing at 37 stations and increasing at 8 stations.

The sources of phosphorus at the 73 stations have not been identified. However, phosphorus is present in sewage treatment plant effluents and runoff from lawns and agriculture. Phosphorus compounds are also used to reduce drinking water corrosivity by some purveyors. This practice may increase phosphorus concentrations in sewage treatment plant effluent. Phosphorus in sediments may contribute to water concentrations, and nationally, the concentrations in sediment appear to be rising.

2.1.4 Exceedences of the Mercury criteria may contribute to fish consumption advisories

Exceedences of the mercury criteria occurred at 16 stations between 1990-1994. Insufficient data were available for trend analysis. Spatial analysis is needed to compare water column, sediment and fish tissue concentrations of mercury.

The source of mercury exceedences at the 16 stations has not been identified. Historic use of mercury-containing pesticides, air deposition (fossil fuel fired power plants, waste incinerators, etc.), industrial discharges, landfills and contaminated sediments are all potential sources of mercury in streams.

2.1.5 Exceedences of the Lead criteria have occurred

Exceedences of the criteria for lead occurred at 16 stations between 1990-1994. Insufficient data were available for trend analysis. The sources of lead contamination at these stations has not been identified. However, point sources, nonpoint source runoff and sediments may contribute to water criteria exceedences.

2.1.6 Exceedences of the pH criteria may negatively affect aquatic life designated uses

Exceedences of the pH standards occurred at 55 stations; 39 stations had increasing trends (i.e., becoming more basic), and 1 decreasing trend (i.e. becoming more acidic). Since the criteria is stated as a range (i.e. pH between 6.5 and 8.5), and many factors affect the hydrogen ion concentration, these results are difficult to interpret.

2.2. Eutrophication of lakes is accelerated in New Jersey

Almost all of the public lakes that have been monitored show various degrees of eutrophication. The eutrophication process is being accelerated in New Jersey by anthropogenic inputs of suspended solids, and nutrients from fertilizers, stormwater and air pollution. Eutrophic lakes must be managed to make them suitable for swimming and fishing (i.e. location of the swimming beach near an oxygenated area, algal control, dredging to remove sediments and oxygen demanding bottom materials).

2.3. Contamination of fish necessitates fish consumption advisories to protect human health

2.3.1 Organic contamination

NJDEP has found elevated levels of PCBs and certain pesticides (primarily chlordane) in finfish collected in New Jersey waters. As a result, commercial fishing bans and recreational fishing advisories have been issued by the State for these waters. Recommendations to limit consumption are in effect on striped bass, white perch, white catfish, and American eel, which are found in fresh and salt waters. Commercial sale of striped bass and American eel taken from most of these waters is prohibited.

2.3.2 Mercury contamination

NJDEP has also recently issued statewide consumption advisories on pickerel and largemouth bass due to mercury contamination. Numerous freshwater bodies also have advisories that are more stringent than the statewide advisories. The drinking water supply from affected waters remains safe because

the mercury resides primarily in sediments and aquatic life.

Mercury contamination in fish tissue is a national problem. New Jersey is one of 32 other states that have enacted fish consumption advisories in response to mercury contamination. Consumption advisories are most restrictive for "at risk" segments of the population: pregnant women, women planning pregnancy within a year, nursing mothers, and children under five years old.

2.3.3 Sources of finfish contamination

Finfish contamination results primarily from bioaccumulation of pollutants in sediment through the food chain. This problem is probably widespread, but data that are available are only on species consumed by humans or those classified as endangered or threatened.

Wastewater discharges, air deposition (fossil fuel fired power plants, waste incinerators, etc.) landfills and agricultural inputs, and contaminated sites are potential sources of mercury contamination.

2.4. Contaminants in sediment contribute to several designated use impairments

Trophic transfer of toxic pollutants from sediments to biota (i.e. bioaccumulation) has resulted in elevated levels of PCBs and mercury in New Jersey fish. Contaminated sediments are a significant problem because long term exposure can result even after the contamination source has been removed as evidenced by current contamination of fish by DDT. Ingestion of organisms with high levels of contaminants poses a risk to humans and other wildlife.

Phosphorus in sediments may contribute to eutrophication of lakes and exceedences of Surface Water Quality Standards in streams. Levels of phosphorus in sediment appear to be increasing nationally. Available data for New Jersey are insufficient for trends analysis.

Disturbance of contaminated sediments can resuspend the contaminants in the water column. This is problematic primarily in industrialized areas that are periodically dredged.

2.5. Aquatic life designated uses are impaired in some areas

Aquatic life designated uses are evaluated for rivers using benthic macroinvertebrate data collected at 200 stations and fish assemblage monitoring. Approximately 1617 stream miles (25%) are evaluated. Designated use is attained but threatened at 1101 miles (68% of assessed miles), and is impaired at 516 miles

(32%). Results are summarized on Table FW-4.

The causes of impairments to benthic aquatic life at each location have not been determined. Potential causes include sediment and/or water column contamination, and habitat alteration.

2.6. Habitat alterations suspected of causing significant aquatic life designated use impairments

The extent of habitat alteration has not been documented. However, due to the extensive development in New Jersey, habitat alteration is suspected of causing significant impairments to aquatic life designated uses.

Urban, suburban, and commercial land uses can negatively affect water resources by dramatically increasing the extent of impervious surfaces, which can lead to flooding and streambank erosion. Altered hydrology (e.g., drying of wetlands, etc.), temperature fluctuations (caused by removal of riparian vegetation and thermal discharges) and eutrophication can occur. Table FW-5 summarizes the effects of urban runoff on water quality and aquatic habitat.

In New Jersey, development of rural and agricultural land for residential purposes has been occurring rapidly in coastal and northern counties. This development is thought to be causing water quality degradation in formerly high quality streams. However, current lack of monitoring in undeveloped areas precludes quantitative analysis of these effects.

2.6.1 Wetlands losses

Historically, preparing land for agriculture included the ditching and draining of wetlands. Later, residential, industrial and commercial development included destruction of wetlands and the channelization, relocation or elimination of natural stream corridors. While it is estimated that approximately half of the nation's wetlands have been lost since colonial times, the exact extent of wetlands loss in New Jersey is unknown. However, data do exist which demonstrate that between 1953 and 1973, the state lost 200,000 wetland acres, approximately 20% of freshwater and estuarine wetlands. The rate of destruction slowed somewhat so that by 1988, losses were estimated at a minimum of 500 acres per year.

3. Program Successes

3.1. Human health and aquatic life-based Surface Water Quality Standards

The SWQS classify certain waters of the State as Outstanding

National Resource Waters (FW1 and PL) and contain antidegradation provisions intended to protect these waters from any degradation. Additionally, other waters (C1 waters) are designated for protection from changes, other than those necessary to accommodate important economic or social development, which would lower the water quality to an extent that the mean of the water quality would be changed. Finally, the SWQS contain criteria which, if attained, will protect human and ecological health and allow attainment of the designated uses.

3.2. Monitoring, research and databases inform decision-making

Ambient monitoring data are utilized within NJDEP to develop priority lists of impaired waters requiring permitting and enforcement actions. These data also form the basis for designated use and trends assessments reported in the State Water Quality Inventory Report (i.e., 305b report). Private consultants, industry, municipal governments and other agencies also use these data in site specific analysis.

In 1991, Water Monitoring Management re-established a statewide biological monitoring network which uses the EPA Rapid Bioassessment Protocol II for steam macroinvertebrates. This network is presently comprised of 635 stations and is anticipated to reach a level of 1000 stations by the time the full network is in place. This is in sharp contrast to the original 30 station biological monitoring network which NJDEP operated from 1975 through 1979. Biological assessments have been completed for a substantial number of the state's major watersheds including the upper Delaware River, the Passaic, Hackensack and Walkill Rivers and the Raritan River. These assessments are providing information on the biological health status of the state's waterways and are being provided to municipal and county land planning agencies in order to provide them the opportunity to strengthen their zoning ordinances and land use plans to protect water uses and quality within their jurisdictions.

Approximately 10 public lakes are monitored each year for nutrients, dissolved oxygen and clarity to determine trophic status and develop plans for lake remediations. This program also conducts limited monitoring for toxics in fish and sediments.

Numerous research and special projects have been conducted by Division of Science and Research, Office of Environmental Planning, Division of Water Quality, and Natural and Historic Resources. These projects supplement monitoring and assessment information, provide guidance for wise use of scarce resources and identify emerging issues. Research is used to assess sources, fate and transport of pollutants including mercury contamination in freshwater fish and sediment. Research has been conducted to evaluate potential alternate indicators for

pathogenic contamination to compliment fecal coliform data.

The NJPDES database provides loadings information from discharge monitoring reports. This database is used to assess permit compliance and set fees.

3.3. Reduction in point source loadings

3.3.1 Upgrades and regionalization of sewage treatment plants have reduced stream loads of conventional pollutants

Over the past 25 years, permitting, enforcement and funding programs have been instrumental in reducing instream loads of BOD, ammonia, total Kjeldahl nitrogen, suspended solids thereby improving instream dissolved oxygen. In the early seventies there were approximately 100 primary sewage treatment plants in the state, whereas today there are none. Primary plants were designed to eliminate only 60 percent of the solid material in wastewater and 35 percent of the oxygen depleting pollutants. Secondary treatment eliminates 85 percent of the solid material and oxygen depleting pollutants in wastewater. To help achieve this, over $4.5 billion was spent in New Jersey to upgrade all treatment plants to secondary treatment.

3.3.2 Industrial Pretreatment Program has reduced loads of toxics to sewage treatment plants

In 1990, with the passage of the New Jersey Clean Water Enforcement Act, local agencies were given enforcement authority over industrial facilities conveying wastes to their sewage treatment plants. With state oversight, this Industrial Pretreatment Program has helped eliminate many of the contaminants reaching surface water via municipal treatment plant discharges. As of February, 1993, NJDEP had delegated permitting authority to 23 sewage treatment plants.

3.3.3 Elimination of dry weather combined sewer overflows has reduced human health concerns and BOD loads

New Jersey has maintained an aggressive policy toward eliminating dry weather flows from combined sewer overflows (CSOs). Combined sewers collect and transport stormwater and sewage to sewage treatment plants through a single collection system. In wet weather, the collect systems often becomes overloaded with stormwater, and stormwater and untreated sewage are discharged via combined sewer overflow pipes. If the collection system is insufficient or malfunctioning, untreated sewage may be discharged even in dry weather. Due to the presence of untreated sewage, CSOs are a human health concern.

In 1988, the Delaware River Basin Commission cited dry weather CSO flows in Camden County for contributing 3.2 million

pounds per year biological oxygen demand (BOD) and 3.7 million pounds per year of suspended solids, equating to 25 percent of the wastewater load generated in the Camden-Gloucester sewer service areas. Since that time, the Camden County Municipal Utilities Authority (MUA) has secured over $1 million through the state revolving loan program for planning, design, and construction of upgraded facilities. These upgrades have been constructed and today there are no anticipated dry weather CSO flows in Camden or any other area in New Jersey.

3.3.4 Compliance with permits has improved under the Clean Water Enforcement Act

Compliance rates with permit discharge limitations and reporting requirements have significantly improved over the past few years. These improvements reflect NJDEP's continuing efforts to advise and assist permittees with their permit and reporting requirements through assistance provided during compliance evaluation inspections, development of a Discharge Monitoring Report instruction manual and the conduct of seminars to explain permit and Water Pollution Control Act requirements. From calendar year 1992 to 1994 the number of discharge limitation violations decreased by 23% and the number of reporting violations by 65%. The number of serious violations, as defined by the WPCA, also dropped by 18%. The number of significant non-compliers identified in 1994 was 44 which is greatly reduced from the 81 facilities cited in 1992. However, data to document the environmental gains due to increased permit compliance have not been collected.

3.3.5 Industrial stormwater permitting focuses on pollution prevention

Under Federal Clean Water Act Amendments of 1987 and rules adopted by EPA, permits are required for industrial stormwater discharges. The Stormwater Permitting Program emphasizes pollution prevention and source control through the use of best management practices instead of traditional effluent limitations. The program relies heavily on outreach and education. In order to implement the program two general Discharge to Surface Water permits were adopted. The Basic Industrial Stormwater General Permit requires the elimination of contact between industrial materials or operations and stormwater. Facilities that do not meet this requirement must obtain an individual permit. The Construction General Permit is for construction activities disturbing 5 or more acres and certain mining activities. This permit is administered by the local Soil Conservation Districts. The water quality improvements from these new types of permits have not yet been documented.

3.4. Reduction in habitat alterations and nonpoint source loadings

3.4.1 Land use regulation programs reduce impacts of development on stream corridors and wetlands

Since 1973, NJDEP has been controlling impacts to wetlands and stream corridors through its Land Use programs. The Coastal Area Facility Review Act was one of the earliest programs in NJDEP to comprehensively address these issues because its jurisdiction extends well into the freshwater portions of watersheds. For 20 years, the program has successfully controlled the impacts resulting from larger developments.

In 1984, the Flood Hazard Area Control Act regulations began requiring development alternatives to destruction of wetlands and stream corridors. As a result, the rate of wetlands loss began to decline. Recent amendments specifically address the importance of near stream vegetation. As a result of these efforts, stream corridor elimination, channelization and relocation have been almost eliminated.

The State wetlands program began July 1, 1988. NJDEP's data show that between July 1, 1988 and December 31, 1993, annual wetlands impacts had been reduced to approximately 100 acres per year, 80% less than historically permitted under the federal program.

In 1993, EPA acknowledged the Program's success in wetlands protection by granting New Jersey the authority to regulate wetlands using the State program in place of the Federal 404 program implemented by the Army Corps of Engineers. New Jersey is only the second state to successfully obtain this authority.

3.4.2 Stormwater and nonpoint source pollution best management practices

NJDEP recently released a new Stormwater and Nonpoint Source Pollution Best Management Practices Manual which provides guidance on how to reduce nonpoint source pollution to meet new regulatory requirements. Water quality improvements in the Navesink River due to implementation of Best Management Practices are described in Section 3.5 below. BMPs will also be implemented in the Great Swamp basin to mitigate impacts from stormwater runoff. In many cases, data are not available to quantify the benefits of BMP implementation and stormwater management.

3.5. Water quality improvements at monitoring stations and in specific waterbodies have been documented

3.5.1 Improvements at monitoring stations

Un-ionized ammonia, which is toxic to aquatic life is decreasing at 42 stations. Exceedences of criteria for un-

ionized ammonia and dissolved oxygen occurred at 5 out of 79 stations. Criteria for chloride were met at all stations; nitrate criteria were exceeded at only 1 station.

3.5.2 Improvements in specific waterbodies

The NJDEP permitting, enforcement and financing groups have worked together to reduce the impacts of point source pollution in several watersheds. In general, NJDEP appears to have been successful in eliminating the discharge of the reduced forms of nutrient material from point sources and so reduce the in-stream oxygen demand resulting from these discharges. Some success stories are described below.

Cooper River/Big Timber Creek

Water quality improvement in the Cooper River, Big Timber Creek, and Newton Creek has been documented as a result of the regionalization of sewage treatment plants within the past eight years. Although water quality is still poor in the Cooper River many water quality parameters have showed rapid improvement in 1988 due largely to this extensive municipal discharge regionalization that resulted in the elimination of most of the discharges to the Cooper River.

Whippany River

With the upgrades of four municipal treatment plants along the Whippany River, water quality has shown notable improvement based upon the ambient monitoring station in Morristown and the biological monitoring stations both in and downstream of Morristown.

Navesink River

Upgrades of sewage treatment plants and nonpoint source management of domestic animal waste significantly improved water quality, allowing the reopening of shellfish harvesting beds in the tidal reaches of the river.

Delaware River

Efforts of the four Delaware Basin states and the interstate Delaware River Basin Commission have lead to significant improvements in water quality in the Delaware River and Estuary. The pollutant loadings have been dramatically reduced and oxygen levels have increased from 0 in some parts to levels that allowed the number of species of fish in the river to increase from 16 in 1959 to over 40 today.

Great Swamp

The Great Swamp National Wildlife Refuge's watershed is affected primarily by stormwater and nonpoint source pollution. The Great Swamp Watershed Advisory Committee recommended a goal of reducing stormwater runoff and pollutant loadings by 10% within the watershed. NJDEP has included a condition of "no net increase" in pollutant loadings and stormwater runoff in the adoption of the Chatham Township Wastewater Management Plan. A stormwater management study and development of a management plan are ongoing. The effectiveness of nonpoint source controls will be evaluated in the watershed.

3.6. Regulatory reform will facilitate watershed-based permitting and increase permit outputs

3.6.1 Watershed based permitting

The Division of Water Quality has undertaken a comprehensive review of the existing NJPDES (N.J.A.C. 7:14A) rules, policies, and procedures, and is preparing a proposal to substantially change the NJPDES program. This rule reform is part of the NJDEP's efforts to develop and implement a comprehensive watershed management strategy. The proposal includes the development of a watershed approach to permitting which will enhance program coordination and provide a scientific basis to assess the contribution of pollutants from numerous sources (agriculture, municipal and industrial discharges, contaminated ground water, stormwater, etc.). This process will enable NJDEP to make decisions regarding the most effective ways to control these pollution sources.

This process can be used to determine which watersheds or portions of watersheds need further attention and to assess the assimilative capacity through the development of comprehensive water quality models. Available capacity will be allocated among pollutant sources within a watershed. NJDEP will then be able to include water quality-based effluent limitations (WQBELs) in discharge permits to protect in-stream water quality and designated uses. The NJDEP is in the process of developing WQBELs for the New York / New Jersey Harbor, the Delaware Estuary and the Whippany watershed. In addition, the allocation process will facilitate the implementation of Best Management Practices (BMPs) for stormwater and nonpoint sources of pollution.

The watershed approach will enhance cooperation with local governments and stakeholders regarding environmentally sensitive land use planning to address both point and nonpoint pollutant sources on a regional basis.

In February 1993, the Division of Water Quality published an interested party review and on October 6, 1994, a rule summary document for public comment in the New Jersey Register. These documents explained the division's plans for shifting the NJPDES

permitting process toward a watershed based program.

3.6.2 Increased permit outputs

The new rules will also implement major administrative reforms to make the permit application and issuance procedures more efficient and flexible. These include:

- Expanding the scope of changes to existing permits that can be accomplished through minor modifications;
- Providing for automatic renewal of permits where a new review would not provide any environmental benefit, e.g. where standards have not changed since the permit was issued;
- Allowing for concurrent review and processing of water quality management plan amendments and NJPDES permit applications; and
- Increasing the use of general permits and permits by rule.

3.6.3 Other Regulatory Reforms

Industrial pretreatment regulations

The Bureau of Pretreatment and Residuals is currently drafting Industrial Pretreatment Regulations which will be included within the NJPDES regulations. These regulations will incorporate the pretreatment program requirements currently specified under the federal General Pretreatment Regulations at 40 CFR Part 403; the New Jersey Water Pollution Control Act; and any other applicable regulations, statutes, and current policy requirements.

Sludge regulations

It is the Division of Water Quality's intent to propose amendments to the NJPDES regulations to incorporate most of the provisions of 40 CFR part 503 for land application of sludge in 1995. In developing the amendments, NJDEP is carefully considering and placing heavy emphasis on those approaches that will support its beneficial use policy. Adoption of components of 40 CFR part 503 will also facilitate federal delegation of the sludge management program to the state of New Jersey.

Stormwater permitting regulations

Amendments to the NJPDES rules are proposed as part of the Statewide Stormwater Permitting Program. Amendments are proposed to general permits to discharge industrial stormwater and

stormwater associated with construction activity. The scope of both permits is being expanded to include additional stormwater discharges to surface water. These additional discharges are nonpoint source discharges and discharges defined by NJDEP as discharges "associated with industrial activity" that fall outside of the Federal definition.

3.7. Watershed management strategy development and Whippany watershed pilot

Watersheds and subwatershed boundaries were delineated for the entire State based on USGS hydrologic subunits and other considerations (see Figure FW-1). These watersheds were grouped into a preliminary map of 20 watershed management areas that take into consideration watershed boundaries as well as other related planning and program area boundaries currently applied through the various water resource protection programs. A method for prioritizing watersheds is under review.

A five year pilot project in the Whippany watershed represents NJDEP's first attempt to fully integrate and coordinate all aspects of water resources management into one watershed management project. Through this pilot project, NJDEP intends to develop a comprehensive watershed management process that can be replicated in other watersheds in the State. The Whippany Project is a collaborative effort between NJDEP and the Whippany Watershed Partnership, a public advisory group consisting of the regulated community; businesses, environmental and civic groups; residents; federal, state, regional, county and local government; and academics.

The Whippany Project is in its second year and has produced the following: a public advisory group and four working committees; a Project Strategy and workplan; a preliminary water quality study and sediment sampling; a technical workplan for in-stream and nonpoint source monitoring and modeling; a watershed characterization report; and a series of public outreach events including watershed cleanups, storm drain stenciling and river bank walks.

Ultimately, the Whippany Project will result in the adoption of a Watershed Management Plan that identifies and prioritizes water resource problems within the Watershed. The Plan will include a combination of regulatory and non-regulatory mechanisms to address priority problems that will be implemented at the local, county and state level. These mechanisms will include, where appropriate, watershed-based permits for point source discharges that consider the relative impact of point source discharges, nonpoint sources, groundwater contributions, and surface water withdrawals. The plan will also address nonpoint source pollution control measures, land use and zoning ordinances, public education and outreach, and voluntary

compliance.

4. Program Weaknesses

4.1. Existing standards have not been fully implemented

4.1.1 Guidelines needed for implementation of antidegradation policies

The existing antidegradation provisions are written in broad terms which were subject to varying interpretations. Antidegradation implementation procedures are being proposed as part of the regulatory reform package. The new procedures will improve consistency in implementation and provide guidance on the justifications needed to lower water quality. These provisions are being drafted to reflect the NJDEP's commitment to deal with water quality management on a watershed basis. As the regulatory reforms are implemented, there will be a shift from making antidegradation decisions on a site-specific basis to making them as part of a watershed planning effort. This shift will enable NJDEP to address secondary impacts of development (including nonpoint source pollution), cumulative effects of the discharge of pollutants and better protect high quality waters.

4.1.2 Degradation of high quality waters have been documented

Exceedences of SWQS in Pinelands, Category 1 and Trout Production waters, which are protected by nondegradation policies, have been documented. The sources of contamination have not been clearly identified or mitigated. Since fecal coliform exceedences have occurred, NPS from agriculture and residential development are suspected contributors to the contamination problem. The extent of contributions of point sources to water quality degradation in these waters is unknown.

4.1.3 Limitations of classification system protecting aquatic life

The existing use classification system divides the State's freshwaters into trout and nontrout waters. This is frequently viewed as using trout as an indicator species to protect other important aquatic biota or as a measure of the quality of the water. However, trout are not particularly sensitive organisms to the spectrum of pollutants found in the State's waters. The main determining factors in the suitability of a waterway to support trout are habitat, dissolved oxygen levels and temperature. This system does not necessarily ensure protection of endangered aquatic organisms or endangered wildlife (e.g., bald eagles) that may utilize the waterway as a source of food and water. Currently there is no classification system in place that reflects the quality of the waters. A water quality classification system (as opposed to the use classification

system currently in use) may be needed in addition to a use classification system

A benthic macroinvertebrate-based water quality classification system should be used because it integrates the effects of habitat modifications, nonpoint source pollution and point source pollution. In addition, through the use of reference stations (unimpacted sites which are representative of the ecoregion) it would be possible to obtain a relative measure of the health of the aquatic ecosystem.

4.1.4 Need to develop water quality-based effluent limitation for toxics in water quality impaired waters

Waters impaired or suspected of being impaired by toxics have been identified as shown on Tables FW-6, FW-7, and FW-8. (NJDEP, 1995). NJDEP has issued permits with water quality based effluent limitations (WQBELs) for conventional parameters for most permits. However, limits for toxics are not in place for some facilities, and toxics permit limits are developed using modified water quality based effluent limits. Permits are issued on a site specific basis for toxics, so multiple discharge interactions are not addressed in existing permits.

Water quality based effluent limitations include load allocations for nonpoint source pollutants. Achieving these load allocations will be facilitated by comprehensive watershed management which promotes control of nonpoint source pollution through improved project design, implementation of Best Management Practices, use of innovative approaches such as pollutant trading and public education and outreach.

4.1.5 Lack of sediment standards hampers protection of fish consumption and aquatic life designated uses

Finfish contamination with PCBs, dioxin and mercury has been documented in New Jersey. This contamination of finfish may reflect sediment concentrations which are too high to protect against bioaccumulation. Additionally, existing sediment concentrations of phosphorus may be contributing to water column concentrations of phosphorus that exceed criteria levels and result in accelerated eutrophication of the State's waters. This problem is made more complex by the fact that sediment contamination in some areas reflects contaminant loadings from both within and outside the borders of the State. The EPA is in the process of developing and issuing sediment standards for selected pollutants, as well as developing a methodology which can be used to develop sediment standards for other pollutants.

4.2. Data are needed to determine extent of water pollution problems and protect designated uses

Lack of information on the nature and extent of exceedences of SWQS will hamper prioritization of watersheds and development of water quality indicators.

4.2.1 Limitations of Current Data

- Trend and SWQS exceedence analysis for all parameters monitored in the Ambient Stream Monitoring Network have not been completed yet.

- There are numerous contaminants for which numerical criteria are available, that are not monitored in water, primarily due to costs. Some parameters volatilize or adsorb to sediments, and thus have a low probability of detection in the water column.

- The existing network assesses water quality in 8.1% of stream miles. These results cannot be generalized to the rest of the state, which hampers development of scientifically credible indicators.

- The extent of monitoring conducted in high quality waters is very limited and tidal stream reaches are not monitored.

- The current monitoring frequency is insufficient to quantify trends for metals in water and all sediment parameters. This hinders the ability to evaluate the effectiveness of regulatory and management programs and develop indicators.

- Sediments are monitored for banned pesticides and organics, which contaminants are important to understanding bioaccumulation in aquatic life. However, numerous other pesticides and other chemicals in use today are not monitored in the network.

- Additional cuts in parameters and stations monitored may occur as funding decreases and more expensive metals sampling methods are implemented.

- Data on the extent of habitat alterations and nonpoint source pollution are limited. These data are needed to make decisions regarding their priority and management methods.

- To protect human health, additional research on contaminants in biota (e.g., lead) and fish consumption patterns are needed. Trophic transfer, bioaccumulation, bioconcentration, and biomagnification of toxics in freshwater systems are not well understood.

- Additional research on pathogens such a Cryptosporidium and Giardia, and point and nonpoint source contributions of nitrates, and other contaminants in drinking water source

waters are needed.

- An assessment of effectiveness of industrial stormwater permitting program is needed to evaluate the effectiveness of industrial stormwater pollution prevention plans and develop measures to address remaining problems due to industrial stormwater.

- Permit compliance monitoring is currently conducted via grab sampling methods. Composite samples, which are usually required for DMR reporting, are needed to effectively assess permit compliance.

- Ambient sediment and water column data collected by the Site Remediation Program and responsible parties need to be computerized to enable NJDEP to use these data for water quality planning and assessments.

4.3. Need to determine causes and sources of SWQS exceedences

Current monitoring efforts are designed to provide status and trends assessments. Point and nonpoint sources of the contaminants which have known exceedences of water quality criteria at numerous stations are often present. Data are needed on the relative contribution of point and nonpoint sources in order to effectively evaluate management program effectiveness and fairly regulate point and nonpoint source discharges. Additionally, ground water in urban areas that has been degraded by discharges of toxic pollutants can enter surface water as a "non-point" source loading. Ground water that has been degraded on a regional level by numerous discharges/contaminated sites can represent significant pollutant loading to a surface water system.

4.4. Comprehensive watershed management is not yet implemented

Planning functions should integrate the watershed management activities of data development, issue identification, goal formulation, strategy development and implementation, monitoring and evaluation. The NJDEP is developing a comprehensive watershed management strategy to accomplish this objective. Watershed boundaries have been mapped and a prioritization method for watersheds is under review. Permitting functions are organizing along watershed framework. However, implementation of proposed regulatory reforms and additional coordination efforts are needed to facilitate a resource-based approach to watershed management. Watershed management is designed to address many of the point and nonpoint source water quality issues identified previously.

4.4.1 Comprehensive watershed management needed to control nonpoint source pollution and stormwater

Due to extensive development, nonpoint sources of pollution are suspected to be a significant cause of water quality degradation in the State. Nonpoint source pollution is a significant source of fecal coliform and suspended solids pollution and is a component of instream loads of nitrates, phosphorus, chloride, metals, oxygen demanding substances, petroleum hydrocarbons, and pesticides in watersheds where development has occurred. However, very little data exist to quantify the extent or the effectiveness of best management practices used to control nonpoint sources. Historically stormwater runoff has been controlled on a site by site basis using generic statewide standards which have not resolved the problems of downstream flooding or contamination caused by urbanization. The integration of water resource protection programs, including programs for point source discharges, nonpoint source pollution and stormwater management, and implementation at the local and regional levels as part of an overall watershed management programs, is needed to operate a more effective and efficient system for maintaining watershed hydrology and protecting, maintaining, and enhancing water quality and water resources throughout the state.

4.4.2 Staff development is needed to meet modeling needs for watershed management implementation

Internal staff resources and expertise are insufficiently developed to conduct complex watershed modeling, model review and data analysis on a statewide or regional basis. A new "Water Quality Training Academy" is being developed to train permit staff in modeling and analysis. However, it will take time to build a program with the ability to meet the demands.

4.5. Integrated priority system for financing needed

Financing should be used as a tool to implement, support, enforce and evaluate water resource planning and management decisions or policies. However, each of NJDEP's various financing programs has its own set of priorities and project funding criteria. Some of these evaluative criteria overlap or conflict with criteria or management strategies applied by other regulatory and planning programs. All programs which directly or indirectly fund water quality projects need to have a priority system that ranks projects higher if they conform to the strategies proposed in the watershed management plan.

5. References

NJDEP, Office of Environmental Planning. 1992. State Water Quality Inventory Report.

NJDEPE. Sept., 1993. Stormwater and Nonpoint Source Pollution

Control Best Management Practices Manual.

NJDEP, Division of Science and Research. July 1994. Mercury Contamination in New Jersey Freshwater Fish. Report of the Toxics in Biota Committee

NJDEP, Enforcement and Environmental Regulation. January, 1995. Fourth Annual Report of the Clean Water Enforcement Act.

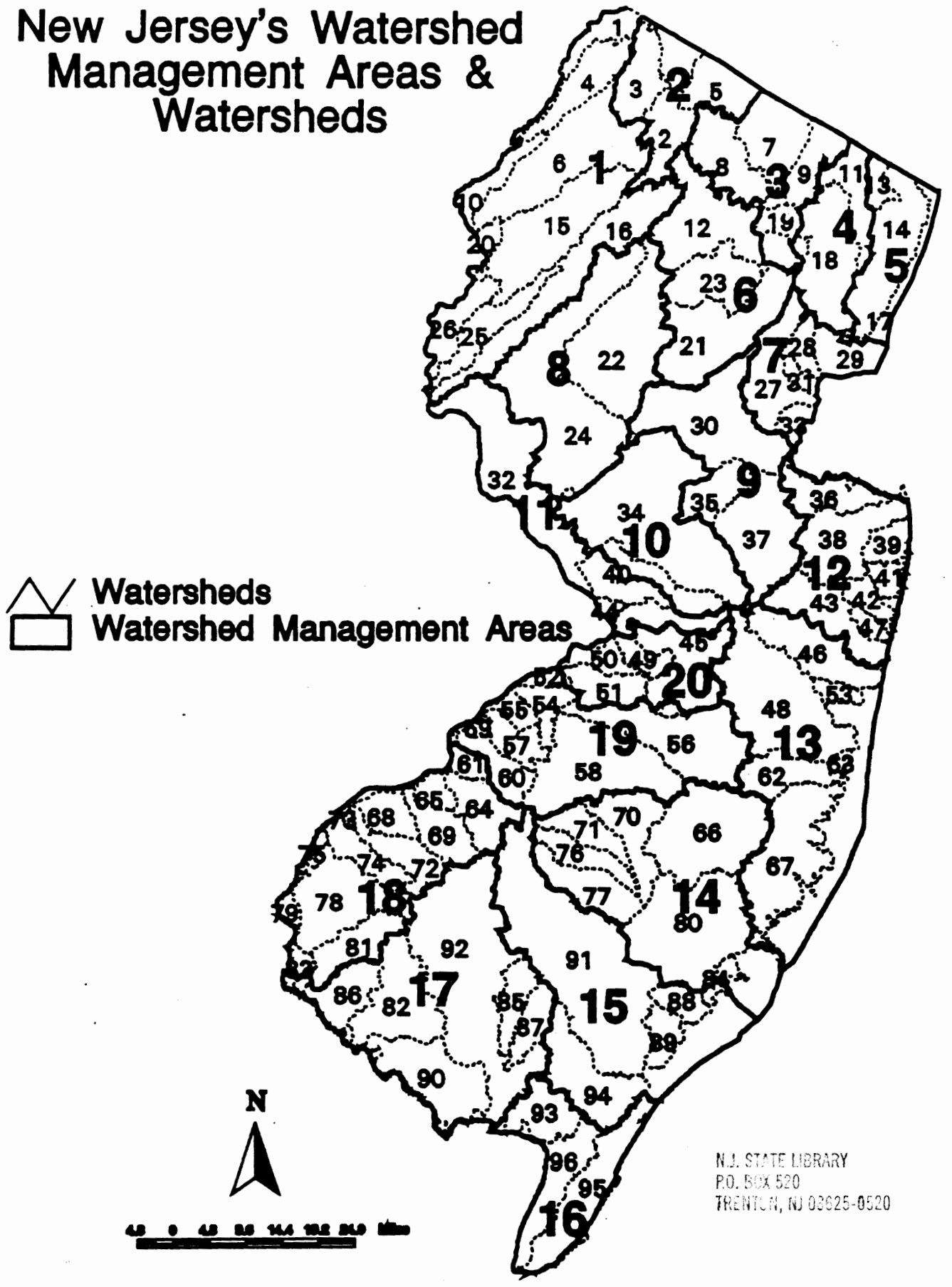


Figure FW-1

New Jersey's Watersheds

1	SHIMMERS BROOK
2	WALLKILL RIVER
3	PAPAKATING CREEK
4	FLAT BROOK
5	POCHUCK CREEK
6	PAULINS KILL
7	WANAQUE RIVER
8	PEQUANNOCK RIVER
9	RAMAPO RIVER
10	VANCAMPENS BROOK
11	SADDLE RIVER
12	ROCKAWAY RIVER
13	PASCACK CREEK
14	HACKENSACK RIVER
15	PEQUEST RIVER
16	MUSCONETCONG RIVER
17	HUDSON RIVER
18	LOWER PASSAIC RIVER
19	POMPTON RIVER
20	DELAWANNA CREEK
21	UPPER PASSAIC RIVER
22	N. BRANCH RARITAN RIVER
23	WHIPPANY RIVER
24	S. BRANCH RARITAN RIVER
25	POHATCONG CREEK
26	LOPATCONG CREEK
27	RAHWAY RIVER
28	ELIZABETH RIVER
29	ELIZABETH CHANNEL
30	LOWER RARITAN RIVER
31	MOSES CREEK
32	LOCKATONG CREEK
33	WOODBRIDGE RIVER
34	MILLSTONE RIVER
35	LAWRENCE BROOK
37	SOUTH RIVER
36	MATAWAN CREEK
38	NAVESINK RIVER
39	SHREWSBURY RIVER
40	ASSUNPINK CREEK
41	WHALE POND BROOK
42	SHARK RIVER
43	MANASQUAN RIVER
44	DUCK CREEK
45	CROSSWICKS CREEK
46	METEDECONK RIVER
47	WRECK POND BROOK
48	TOMS RIVER
49	BLACK CREEK
50	CRAFTS CREEK
51	ASSISCUNK CREEK
52	MILL CREEK
53	KETTLE CREEK
54	RANCOCAS CREEK
55	POMPESTON CREEK
56	N. BRANCH RANCOCAS CREEK
57	PENNSAUKEN CREEK
58	S. BRANCH RANCOCAS CREEK
59	BALDWIN RUN
60	COOPERS CREEK
61	NEWTON CREEK
62	CEDAR CREEK
63	SLOOP CREEK
64	BIG TIMBER CREEK
65	WOODBURY CREEK
66	WADING RIVER
67	FORKED RIVER
68	REPAUPO CREEK
69	MANTUA CREEK
70	BATSTO RIVER
71	ATSION CREEK
72	RACCOON CREEK
73	MAPLE SWAMP
74	OLDMANS CREEK
75	WHOOPING CREEK
76	MECHESACTAUXIN CREEK
77	NESCOCHAQUE CREEK
78	SALEM CREEK
79	MILES CREEK
80	MULLICA RIVER
81	ALLOWAYS CREEK
82	COHANSEY RIVER
83	MILL CREEK
84	DOUGHTY CREEK
85	MANANTICO CREEK
86	STOW CREEK
87	MANUMUSKIN CREEK
88	ABSECON CREEK
89	PATCONG CREEK
90	DIVIDING CREEK
91	GREAT EGG HARBOR RIVER
92	MAURICE RIVER
93	DENNIS CREEK
94	TUCKAHOE RIVER
95	CAPE MAY ATLANTIC COAST
96	DELAWARE BAY COASTAL

Figure FW-2

COMPREHENSIVE WATERSHED MANAGEMENT

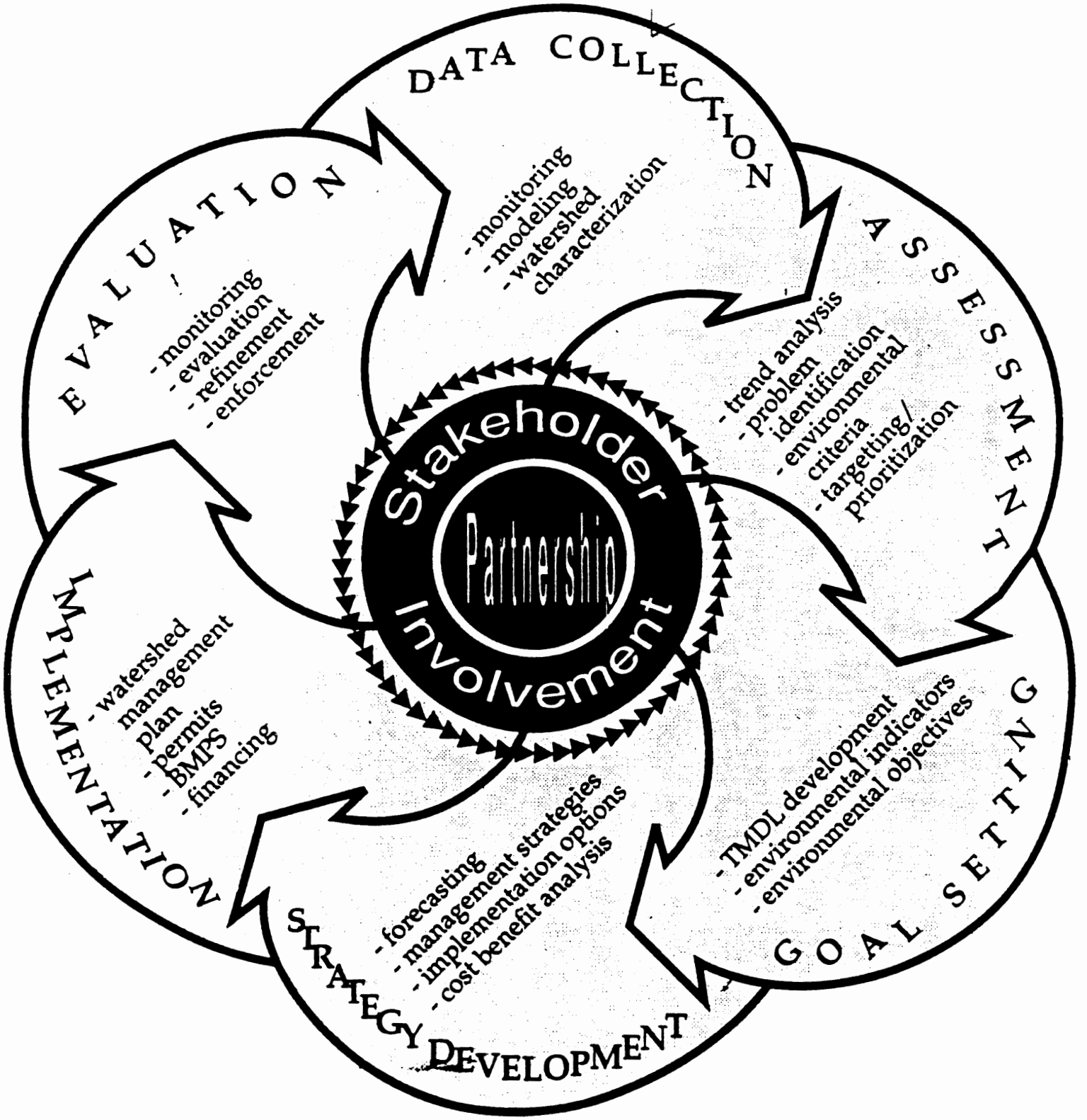


Table F[illegible]-1: DEP Water Resource Management Programs and Funcions

Function	Self Assmt (a)	Action Plan (b)	EPA $ (c)	Dele-gated (d)	Sediment	Ground Water	Rivers	Lakes Reser-viors	Tidal (e)	Estu-ary (e)	Oc ean (e)
PLANNING											
Watershed Management Planning	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Water Supply Planning	Y	Y	Y	Y	N	Y	Y	Y	N	N	N
Standard Setting	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y
NPS/Municipal Stormwater	Y	Y	Y	Y			Y	Y	Y	Y	Y
Coastal Zone Mgt	N	N	Y	Y		Y	Y	N	Y	Y	Y
Wellhead Protection	Y-SDW	Y	Y	Y	N	Y	N	N	N	N	N
Estuary Programs	N	N	Y	Y	Y	N	Y	N	Y	Y	Y
PERMITTING											
Ground Water	Y	Y	Y-UIC	Y-UIC	N	Y	Y	Y	Y	N	N
Surface Water	Y	Y	Y	Y	N	N/A	Y	Y	Y	Y	Y
Landfills	Y (GW)	Y	N		N	Y	Y	Y	Y	Y	Y
Industrial Stormwater	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y
Pretreatment	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y
Residuals	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
Construction Financing	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y
Quality Assurance			Y	Y							
ENFORCEMENT											
Surface Water	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y
Pretreatment	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y
Treatment Works	Y	Y	N	Y	N	N	N	N	N	N	N
Ground Water	Y	Y	N	Y	N	Y	N	N	N	N	N
Ground Water -UIC	Y	Y	N	Y	N	Y	N	N	N	N	N
Safe Drinking Water	Y	Y	Y	Y	N	Y	Y	Y	N	N	N
Water Allocation	Y	N	N	N	N	Y	Y	Y	Y	N	N
Lab Certification	N	N	N	N	N	N	N	N	N	N	N
RCRA	Y		Y	Y	N	Y					
HW Transportation	N	N	Y	N	N	N	N	N	N	N	N
Coastal Monitoring	N	N	N	N	N	N	N	N	N	N	Y
Compliance Monitoring	Y	Y	N	N	N	Y	Y	N	Y	Y	Y

Function	Self Assmt (a)	Action Plan (b)	EPA $ (c)	Dele-gated (d)	Sediment	Ground water	Rivers	Lakes Reser-viors	Tidal (e)	Estu-ary (e)	Oc ean (e)
MONITORING (f)											
Ambient Stream Monitoring	Y	Y	Y	Y	Y	N	Y	N	N	N	N
Ambient Biological Monitoring	Y	Y	Y	Y	Y	N	Y	N	N	N	N
Trout Waters Assessments	Y	Y			N	N	Y	Y	N	N	N
Fish /Shellfish Population Assessments	Y	Y			N	N	Y	Y	Y	Y	Y
Coastal and Estuarine Monitoring	N	N	Y	Y	Y	N	N	N	N	Y	Y
Shellfish Growing Waters Classification	N	N			N	N	N	N	N	Y	Y
Cooperative Coastal Monitoring Program	N	N	N		N	N	N	N	N	Y	Y
Clean Lakes	Y	Y	Y	Y	Y	N	N	Y	N	N	N
Ambient Ground Water Monitoring	Y	Y	Y	Y	N	Y	N	N	N	N	N
Toxics in Biota	Y	Y	N	N	Y	N	Y	Y	Y	Y	Y
Special Watershed Projects											
SRP Monitoring	Y (GW)		Y			Y	Y				
LAND USE											
Floodplain Mgt	N	N	N	N	Y	N	Y	Y	Y	Y	N
Dam Safety	N	N	N	N	Y	N	Y	Y	Y	Y	N
Stream Encroachment	N	N	N	N	Y	N	Y	Y	Y	Y	N
Shore Protection	N	N	N	N	N	N	N	Y	Y	Y	Y
CAFRA	N	N	N	N	Y	Y	Y	Y	Y	Y	Y
Wetlands	Y	Y	Y	Y (g)	Y	Y	Y	Y	Y	Y	Y
SITE REMEDIATION											
RCRA				Y	Y						
CERCLA	Y (GW)			Y	Y						

Key:

Y Yes
N No
N/A Not applicable
Blank Missing information

Notes:

a. Coverage of function in Self Assessment document
b. Coverage of function in Action Plan
c. EPA funding of function
d. EPA delegation of function
e. Tidal, estuarine and ocean waters not covered in Self Assessment or Action Plan
f. Some water quality monitoring is conducted under delegated programs. Some monitoring also conducted by drinking water purveyors and discharge permittees. Focus here is on monitoring conducted by DEP.
g. Wetlands program has assumption not delegation

Table FW-2: Summary of Water Quality Status and Trends for Selected Parameters

DRAFT Results from DSR Research Project: Evaluation of New Jersey's Ambient Monitoring Programs and Development of Environmental Indicators

Parameter	Surface Water Quality Criteria (a)	# Stations w/ Increasing Trend (b)	# Stations w/ Decreasing Trend	# Stations w/ SWQS Violations (c)	Notes
Microbiological					
Fecal Coliform	FW2: 200 MPN per 100 ml	14	5	75	MPN > 1000 at many stations
Nutrients					
Un-ionized Ammonia	FW2 TP & TM: 20 ppb FW2 NT: 50 ppb	9	42	5	Summer data only
Nitrate	FW2: 10 ppm PL: 2 ppm	46	5	1	
Total Kjeldahl Nitrogen	none	1	73	N/A	
Metals					
Copper	Reserved	Not enough data	Not enough data	N/A	
Lead	FW2: 5 ppb	Not enough data	Not enough data	23	1975-79: 58 stations violated SWQS (d)
Mercury	FW2: 0.144 ppb	Not enough data	Not enough data	16	1975-79: 78 stations violated SWQS (d)
Total Phosphorus	FW2: 0.1 ppm, unless not a limiting nutrient	8	37	73	Assumes limiting nutrient
Dissolved Ions					
Chloride	FW2: 230 ppm	70	1	0	
Chemical-Physical Parameters					
Dissolved Oxygen	FW2 TP: 7.0 ppm FW2 TM: 5.0 ppm FW2 NT: 4.0 ppm	14	13	5	Summer data only
% DO Saturation		12	13	N/A	Summer data only
pH	FW2: 6.5- 8.5 SU PL: 3.5- 5.5 SU	39	1	55	
Suspended Sediment	FW2 TP & TM: 25 ppm FW2 NT: 40 ppm	Not enough data	Not enough data	23	For 1975-79, 55 stations violated SWQS

Notes:

a: Surface Water Quality Criteria in NJ Surface Water Quality Standards (N.J.A.C.7:9)
FW2: numerical water quality criteria applied
FW1: natural water quality criteria applied
TP: Trout Production waters, sufficient quality for trout maintenance and propagation
TM: Trout Maintenance waters, presence of adult trout or trout associated species
NT: Nontrout waters, habitat unsuitable for trout
PL: Pinelands waters

b: Number of stations out of 79 with statistically significant increasing or decreasing trends between 1974-1994.

c: Number of stations out of 79 with at least 1 violation of N.J.A.C.7:9 between 1990-94

d: Interpret historical data for metals with caution, apparent improvements may be due to improved sampling and analytical techniques.

Table FW-3: Designated Use Attainment for Recreation

Assessment Category	Miles Monitored	Recreation (%)[1]
Total Assessment	525	8.1
Fully supports, not threatened[2]	0	0
Fully supports, threatened	80	15.2
Partially supports	40	7.6
No support	405	77

[1] Percent of 525 monitored miles (not 6450 total stream miles) meeting designated use.
[2] Due to the extensive land development and high population density, DEP regards all waters as threatened.

Table FW-4: Aquatic Life Designated Use Support

Assessment Category	Aquatic Life (Miles)	Aquatic Life (%)[1]
Total Assessment	1617	25
Fully supports, not threatened[2]	0	0
Fully supports, threatened	1101	68
Partially supports	306	19
No support	210	13

[1] Percent of 1617 evaluated miles (not 6450 total stream miles) meeting designated use.
[2] Due to the extensive land development and high population density, DEP regards all waters as threatened.

Table FW-5

Environmental Concerns and Impacts Associated with Urban Runoff

RESOURCE/ WATER USE	CONCERN	POTENTIAL NEGATIVE IMPACT ON RESOURCE/WATER USE	CAUSE
Groundwater	Lower dry-season reserves	Lower dry-season base flow in watercourses Lower drinking water reserves	Increased impervious catchment surface area
Aquatic Habitat	Erosion	Physical destruction of habitat	Peak discharge, high runoff volume
	Fluctuating water levels and velocities	Altered thermal and mixing characteristics Reduced habitat diversity Erosion	High peak discharges and runoff volumes Low dry-season groundwater reserves
	Low dry-season base flow	Elimination of spawning beds Reduced habitat Reduced dilution capacity	Low dry-season groundwater reserves
	Sedimentation	Smothering of bottom communities and spawning beds Filling of stormwater impoundments Transport of particulate–associated pollutants	Erosion Suspended solids
	Turbidity	Lower dissolved oxygen, reduced prey capture, clogging of fish gills	Suspended solids
	Low dissolved oxygen	Lethal and nonlethal stress to aquatic organisms	Biodegradable organic material
	Metals, organic contaminants, chlorides	Lethal and nonlethal stress to fish and other aquatic organisms in water column and bottom sediments Bioaccumulation of contaminants and related food chain effects Osmotic stress Groundwater pollution	Urban pollution
	Increased water temperature	Lethal and nonlethal stress to sensitive cold water aquatic organisms Increased metal toxicity and hydrocarbon solubility	Solar heating of urban surfaces and stored runoff water
	Bacteria	Diseases of aquatic organisms Shellfish contamination	Fecal contamination
	Eutrophication	Algae blooms and nuisance aquatic plant growth Low dissolved oxygen Odors	Nutrient enrichment
Public Water Supply	Lower dry-season reserves	Reduced water supply	Lower dry-season groundwater reserves
	Turbidity	Taste, appearance	Suspended solids
	Metals, organic contaminants, nitrates, chloride	Taste, odor, public health	Urban pollution
	Bacteria	Public health	Fecal contamination
Wildlife Habitat	Flooding and erosion	Physical destruction of environment Dewatering and flooding of key habitat areas at critical times Reduction in streambank cover vegetation	High peak discharges and runoff volumes Sedimentation
Recreation and Aesthetics	Nature enjoyment	See Aquatic Habitat and Wildlife Habitat	See Aquatic Habitat and Wildlife Habitat
	Bacteria	Public health in body contact waters Degradation of fisheries and shellfish beds	Fecal contamination
Agricultural, Residential, and Industrial Land Use	Flooding and erosion	Public safety Damages to crops and farmland Damages to buildings and contents Reduction of useable land area	High peak discharges and runoff volumes Sedimentation

Source: British Columbia Res. Corp. 1992.

Table FW-6

Waters Where Designated Use Impairment Is Suspected Due to Toxic Discharges From Point Sources

Waterbody Name	Waterbody Description
Hackensack River	From the Oradell Reservoir to the confluence with Newark Bay.
Upper New York Bay	From the confluence of the East River to the confluence with the Kill Van Kull.
Newark Bay/Arthur Kill	From the confluence with the Passaic and Hackensack Rivers to the confluence with the Rahway River and the confluence with the Upper New York Bay.
Arthur Kill	From the confluence of the Rahway River to the confluence with the Raritan River Bay.
Raritan Bay	From the confluence of the Arthur Kill/Raritan River to the confluence with the Waackaack Creek.
Lower Millstone River	From the confluence with Bedens Brook to the confluence with the Raritan River.
Mid Millstone	From the confluence with Stony Brook to the confluence with Bedens Brook.
Lower Pequest River	From the confluence with Bear Creek to the confluence with the Delaware River.
Whippany River	From the headwaters to the confluence with the Rockaway River.
Passaic River	From the confluence of the Dead River to the confluence with the Whippany River.
Raccoon Creek	From the confluence with the South Branch Raccoon Creek to the confluence with the Delaware River.
Kings Creek	From the headwaters to the confluence with the Rahway River.
Hudson River	From the New York/New Jersey state boundary to the confluence with the East River.

Table FW-7

Waters Where Designated Use Impairment is Suspected Based Upon Biological Monitoring Data

The following are stream locations where toxic contaminants are suspected of impairing waters based upon biological monitoring evidence. Such evidence is either a significant number of physical abnormalities detected on the bodies of aquatic insects collected and/or an unexplainable low number of organisms present at the study site.

Water Way	Location
Wallkill River	Sussex
Clove River	Rose Marrow Road
West Branch of Papakating Creek	Bloomsbock
Ramsey Brook (trib. to Saddle River)	Mahwah
Valentine Brook (trib. to Saddle River)	near Allendale
Valentine Brook (trib. to Saddle River)	Allendale
Hohokus Brook (trib. to Saddle River)	Allendale and Ridgewood
Saddle River	Ridgewood, Rochelle Park, and Garfield
Whippany River	Hanover Twp.
Bear Brook (trib. to Millstone River)	Entire length
Stony Brook (trib. to Millstone River)	Princeton
Millstone River	Blackwells Mills, and Manville

Table FW-8

Lakes Affected By Toxic Substances

The following lakes have been reported by the USEPA (Alcyon Lake) and NJDEP (remaining four lakes) as being affected by toxic substances:

Lake	Area(acres)	Source
Alcyon Lake	30	Landfill (Superfund site)
Newton Lake	30	Unknown
Cooper River Lake	150	Unknown
Strawbridge Lake	25	Unknown
Stewart (Woodbury) Lake	45	Unknown

Water Self-Assessment: Part 2: Ground Water

1. Introduction

1.1. Ground Water Overview

Ground water is a vital resource for New Jerseyans. It supplies about half of the state's potable drinking water and is also used for irrigation, industrial processing, cooling water and other purposes. Ground water discharges to streams, lakes and wetlands, thereby influencing their quality and water levels.

New Jersey can be separated into four physiographic provinces based on the similar landform types found in each. Each province is hydrogeologically unique because the lithology and geologic structures that control landform evolution are different in each. From north to south the provinces are: the Valley and Ridge, Highlands, Piedmont and the Coastal Plain. (See Figure 1). The three northern provinces are made up of fractured bedrock and a surface layer of unconsolidated glacially deposited materials occurs in the northern portion of each. The Coastal Plain is mainly comprised of unconsolidated sands, silts and clays.

With ground water, as with surface water, quality is an important concern. Ground water quality is a function of:

1. The composition of precipitation;
2. The conditions precipitation encounters at the land surface and the unsaturated zone;
3. The composition and mineralogy of subsurface materials the water contacts as it moves through fractures, intergranular pore spaces and solution channels (most important for influencing natural quality); and,
4. The residence time in the ground-water reservoir.

Select water quality characteristics associated with the major geologic units in each province will be presented in this section. Most of the ground water quality information is a compilation of analytical data from wells sampled as part of New Jersey's Ambient Ground Water Quality Network. The present goal of this monitoring network is to assess natural ground water quality on a regional basis as a function of geology. The monitoring network is described below.

1.2. Ground Water Quality Monitoring

The Ambient Ground Water Quality Network was established in the early 1980's by the NJDEP and USGS to monitor the quality of ground water in New Jersey. Each year, 22 wells are selected, sampled and analyzed for major ions, nutrients, trace constituents, organic carbon and gross alpha activity. (See

Table GW-1). A volatile organic chemical (VOC) scan is also conducted on each sample as a screen for detecting polluted ground water.

1.3. Overview of Ground Water Quality in NJ Physiographic Provinces Valley and Ridge Physiographic Province

This province is mostly comprised of thick sequences of Paleozoic sedimentary rocks ranging in age from 360 to 570 million years old and also has some small, unrooted slices of Proterozoic (1.6 to 1.8 billion years old) crystalline rocks to the southeast near the Highlands province. Sedimentary rock types include dolomite, limestone, sandstone, shale and siltstone. Aerially, the dominant geologic units are the Kittatinny Supergroup and the Martinsburg Slate.

Chemical analyses of water samples from a limited number of wells, 17 in the sedimentary Kittatinny and 16 in the Martinsburg Formation indicate that ground water is of a good natural quality, but locally may require treatment for undesirable characteristics and constituents. (Serfes, in prep.) The most common problems are with the state recommended secondary drinking water standards. The percentage of samples from the Kittatinny and Martinsburg Formations exceeding the secondary drinking water standards respectively are shown in Tables GW-2 and GW-3.

1.3.1 Highlands Physiographic Province

The Highlands are comprised of a belt of Proterozoic crystalline metamorphosed igneous and sedimentary rocks in fault and unconformable contact with lenses and elongate belts of Paleozoic sedimentary rocks.

Chemical analyses of samples from 45 wells in non-carbonate Proterozoic crystalline rocks of the New Jersey Highlands indicate that the ground water is of a very good quality for most uses. These waters can be characterized as oxidizing, slightly acidic, somewhat corrosive, of the calcium-bicarbonate type and fresh. Locally, the water may require treatment for undesirable characteristics and constituents. The most common problems are associated with the state-recommended secondary drinking water standards. (See Table GW-4). In 1987, 129 wells in the crystalline rocks were sampled by NJDEP for radon. (Bell et. al, 1992). The radon values in that sampling ranged from 36 to 24,000 pCi/L, and 5.4% of the wells had level greater than 10,000 pCi/L. Presently, an MCL of 300 pCi/L for radon in ground-water has been proposed by the EPA.

1.3.2 Piedmont Physiographic Province

The Piedmont Physiographic Province in New Jersey is

comprised of late Triassic aged sedimentary Stockton and Lockatong Formation and other sedimentary formations that are intruded by and interlayered with, igneous diabase and basalt. Basically, the sedimentary units are comprised of mudstones, siltstones, sandstones, and minor conglomerate. Reddish brown mudstones, siltstones, and sandstones of the Passaic Formation are the most widespread surface exposure.

Chemical analyses of 169 water samples collected from 150 wells completed in sedimentary bedrock of the Newark Basin indicated that natural quality of ground water is generally good, but that locally the water may require treatment for undesirable characteristics and constituents. (Serfes, 1994). The most common problems are with the state-recommended secondary drinking water standards. The standards exceeded are shown on Table GW-5. A few samples exceeded the state primary drinking water standards for gross alpha particle activity (6.5 percent), radium (3 percent, only Ra-226 measured), and lead (0.7 percent).

In the urbanized lower Hackensack river basin and the nearby Newark, New Jersey area the water quality is generally poor due to anthropogenic and natural factors. Localized saltwater intrusion due to over pumping and the production of deep, slowly moving, naturally mineralized water has resulted in poor water quality here.

1.3.3 Glacial Deposits

New Jersey has been exposed to at least three glacial periods. The last major glaciation, and most important for aquifer formation, peaked approximately 21,000 years ago during the late Wisconsin glacial period. From 21,000 to approximately 17,000 years ago the glacier receded, depositing stratified drift in most valleys.

Ground-water chemistry in these aquifers is variable and is mainly a function of the source of the recharge waters, the chemistry and grain sizes of the deposited material, and the residence time of the ground waters in that aquifer. Water quality in these aquifers is generally good, however, levels exceeding the secondary drinking water standards for iron, total dissolved solids and hardness occur (Miller, 1974).

1.3.4 Coastal Plain Physiographic Province

The Coastal Plain is the largest of the physiographic provinces in New Jersey, covering an area of nearly 4,400 square miles. It is a southeasterly dipping and thickening wedge mainly comprised of sand, silt and clay that can be separated into one major unconfined aquifer and four major confined aquifers. These aquifers from younger to older (and shallowest to deepest) are the unconfined Kirkwood-Cohansey aquifer system, and the

confined, Kirkwood 800-Foot Sand, Wenonah-Mt Laurel aquifer, Englishtown aquifer system and Potomac-Raritan-Magothy aquifer system. All of these confined aquifers are unconfined in their outcrop areas to the northwest.

Many localized ground-water quality studies have been conducted in the Coastal Plain. However, the data have not been compiled for an overall aquifer specific evaluation. Based on localized studies it can be determined that ground-water quality in the Kirkwood-Cohansey aquifer system is generally good but may require treatment for high iron, sometimes manganese, and corrosiveness (for example, Rhodehamel, 1970; Harriman and Sargent, 1985; and Barringer, 1989). Some wells near the Kirkwood outcrop area have reported radium and gross alpha levels above the EPA established maximum contaminant levels of 5 picocuries per liter and 15 picocuries per liter, respectively. The source(s) of these radiological contaminants are not known and studies are being conducted to better understand their occurrence in the Coastal Plain. Mercury and nitrate contamination have also been documented in the Coastal Plain, as discussed in more detail in the Key Ground Water Issues section below.

In general, the ambient ground water quality in the major confined aquifers of the coastal plain is of good quality but may require treatment for some constituents. The most ubiquitous problems are with iron and manganese, especially in the Potomic-Raritan-Mahagothy, and high chloride in aquifers affected by salt water intrusion. The confined aquifers are most susceptible to anthropogenic inputs of pollution in their outcrop areas.

1.3.5 Localized Contamination

Ground water is naturally of good quality in many areas of the state, as described above. However, naturally occurring contaminants such as radon may affect water uses locally. Additionally, New Jersey's significant industrial bases and high population have lead to pollution of ground water in numerous locations due to historical industrial practices, landfills, septic systems and applications of fertilizer and pesticides for agriculture and lawns. Salt water intrusion affects some coastal areas. These contamination problems are discussed in more detail in the Key Ground Water Issues section.

1.4. Description of Ground Water Programs

Numerous programs and functions within NJDEP manage and monitor ground water. In addition to NJDEP programs, the department works closely with the United States Geological Survey (USGS) Water Resources Division to monitor ground water quality, levels, the extent of salt water intrusion and determine safe yields.

1.4.1 Policy and Planning

Office of Environmental Planning - The Office of Environmental Planning is responsible for several programs and functions which affect ground water quality and uses. These programs include the Water Supply Planning including the Water Supply Master Plan, Wellhead Protection Program, Aquifer Recharge Area Protection Program, Ground Water Quality Standard Setting, Nonpoint Source Management and Water Conservation.

Division of Science and Research - The Environmental Research and Health Assessment Element conducts research projects related to ground water quality and provides risk assessment and analytical support for standard setting. These projects include characterization of mercury, nitrate and pesticide contamination in ground water, contamination vulnerability assessments and development of models to assess impacts of contaminated ground water on surface water.

The New Jersey Geological Survey Element conducts monitoring programs and maps aquifers as described previously.

1.4.2 Environmental Regulation

Division of Water Quality (DWQ) - The DWQ issues NJPDES discharge permits to ongoing discharges at sites that are not contaminated beyond a level that is controllable by managing and monitoring the authorized ongoing discharge. All ongoing pollutant discharges from operating facilities are required to obtain a NJPDES discharge permit in accordance with the Water Pollution Control Act (N.J.S.A. 58:10A). Nearly all of the known dischargers are industrial septic systems, high volume or multiple user sanitary septic systems, municipal septic systems, some drywells, infiltration/percolation lagoons, and operating landfills.

Bureau of Water Allocation - The Bureau of Water Allocation is responsible for permitting all wells, permitting ground water diversions (> 100,000 gallons per day), regulating agricultural diversions, and overseeing the critical areas program. Critical areas are portions of the state where water supplies are over-stressed due to excessive withdrawals or other factors. The Bureau, with other water supply agencies, conducts water supply feasibility studies for planning purposes.

Division of Solid and Hazardous Waste (DSHW) - The DSHW oversees monitoring of ground water at closed and non-operating landfills. The legal instrument used to regulate these sites is the NJPDES DGW permit. The Bureau of Landfill Engineering is responsible for administering NJPDES groundwater monitoring permits for closed sanitary landfills that operated after January 1, 1982. Approximately 100 facilities are currently regulated under this

program. These landfills require closure plans and financial assurances under the Solid Waste Regulations, N.J.A.C. 7:26-2A.9.

1.4.3 Enforcement

Water and Hazardous Waste Enforcement Program (WHWE) - Facilities issued NJPDES permits by the DWQ are inspected for compliance and offered compliance assistance by the Water and Hazardous Waste Enforcement Program.

1.4.4 Site Remediation

The Site Remediation Program (SRP) is responsible for investigations and cleanups at state funded remediation sites, and for oversight of these activities at responsible party sites. Cases are prioritized to use limited resources on the sites posing the greatest risk to human health and the environment first. Ground water contamination is considered, but is not the focus of the prioritization.

For ground water resources, the first priority is potable water immediate environmental concern (IEC) cases. IEC cases are those in which there is an existing exposure of contamination through a drinking water supply. These cases are designated an immediate priority with set procedural time frames to eliminate the exposures.

Water supply replacement for contaminated supplies and identification of unknown sources of contamination to potable wells the next priorities. All other ground water contamination cases are ranked using SRP's Remedial Priority System (RPS) in order to ensure that those posing the greatest risk to the state's population and environment are being remediated before sites posing less relative risk.

2. Key Ground Water Issues

2.1. Ground Water Pollution at Contaminated Sites

There are 7041 known sites with widely varying levels of ground water contamination. Many of these have very low levels of contamination that are just above the ground water standards and are located far from any existing or anticipated human user or other receptor (e.g., stream). The 2048 sites classified as "active" were prioritized based on 1. risk to receptors, 2. contaminant concentrations, 3. type of contaminants and 4. voluntary remedial activities initiated by the responsible party. The remainder are awaiting remedial action.

The data on types of contaminants are from 111 sites in one southern and one northern NJ county was reported in SRP's Site

Status Report is summarized on Table GW-6. (NJDEP, 1992). These data are expected to be generally representative of contaminant types and distribution throughout the state.

The SRP addresses diverse sources of ground water contamination. An examination of ground water contamination sources for 7 counties was conducted and reported in the State Water Quality Inventory Report (NJDEP, 1992). Results for the 1200 cases in these counties are shown on Table GW-7 below. Major sources of contamination (landfills, surface spills, underground storage tanks and unknown sources) are identified in bold.

Statewide, there are currently 213 SRP sites/areas where public or private water supply wells have been impacted. The source(s) of this contamination are currently unknown at 134 (63%) of these areas. As of May, 1995, all but 5 of the IEC cases were provided with permanent or temporary alternate water supplies and
work was in progress to provide supplies for these 5 situations as well.

Ground water remediation is complex and expensive. Remediation challenges vary based on the type of contaminant, but more common issues include: 1) lack of information about, or limitations of, investigatory and remedial technologies, especially in certain physiographic provinces and hydrogeologic settings (e.g., denser than water product in fractured bedrock aquifer); 2) the challenge of dealing with a large number of sources (e.g., gasoline stations and other underground storage tanks), and 3) unknowns regarding the exact nature and locations of sources and past history of a site or area.

2.2. Ground Water Pollution by Specific Contaminants

Through a variety of monitoring and research efforts, NJDEP has been able to identify contamination problems due to inorganics such as nitrate, mercury and lead, radiogenic contaminants such as radium, and organic contaminants such as pesticides. These contaminants may originate from point and nonpoint sources of pollution. Many of these contaminants are of particular concern for private wells because there are no regulatory requirements for routine statewide sampling of private wells. Private wells tend to be in shallow, unconfined aquifers, and thus are often more vulnerable to contamination. Contaminants in ground water may migrate to surface waters. In the Coastal Plain, ground water contributes about 80 percent of baseflow to streams.

The NJDEP has commissioned the US Geological Survey to further examine the causes of ground water pollution in southern NJ. The USGS has been conducting research to investigate

correlations between various water quality parameters with nitrate, radon and other radionuclides, and metals. One of the major considerations being investigated is the possibility that certain natural characteristics of the southern part of the state (e.g., corrosive ground water; sandy, acidic soil) in conjunction with agricultural land use practices may mobilize contaminants to ground water. Ground water contamination is not confined to the southern part of the state. Research conducted by DSR and USGS has shown that nitrate concentrations are also elevated in some wells in northern and central NJ.

2.2.1 Mercury

Mercury levels exceeding the drinking water maximum contaminant level (MCL) of two parts per billion have also been found in private wells in the same geologic setting. Over 2,300 private, potable wells have been sampled in southern NJ for mercury. Of these wells, approximately 300 have yielded water samples with mercury levels exceeding the MCL for mercury of 2 ppb. The highest mercury concentration found in a private well water sample was 72 ppb. Homes whose well water was found to have levels of mercury routinely above the MCL have been supplied point-of-entry treatment units (POETS) remove the mercury or have been connected to community water supplies. Mercury contamination in drinking water is discussed in more detail in the Drinking Water Self-Assessment section 2.4.3.

Since well construction information is available for only approximately 25% of affected private wells, it is difficult to definitively determine which aquifer in the Coastal Plain is contaminated. From available data and information on probable depths that private wells are drilled, it seems that most of the mercury contamination is in the unconfined Kirkwood-Cohansey formation. There are no similar data sets from other states on elevated mercury levels in ground water with which to compare NJ's results.

Since ground water contributes up to 90 percent of surface water in the Coastal Plain, elevated levels of mercury in ground water are potentially contributing to finfish contamination.

It is known from previous work that ambient levels in ground water are 1 to 40 ng/L (ppt), so levels above this are believed to be caused by anthropogenic sources. There are four suspected sources of the mercury: 1) past use of mercury-based agricultural pesticides; 2) point sources such as landfills or industrial sites; 3) household inputs such as septic tanks or household paint; and 4) atmospheric deposition. A draft report completed by the US Geological Survey for NJDEP has identified 32 contaminated areas in southern NJ using data from the Site Remediation program: an "area" is defined as at least one home where a water sample contained greater than 2 ppb mercury.

2.2.2 Nitrate

The nitrate drinking water criteria is set at 10 parts per million (ppm) to protect human health. In studies conducted by USGS and NJDEP to assess the extent and magnitude of nitrate contamination levels up to 22 ppm were found in private wells in the Coastal Plain. Nitrate in shallow wells has been attributed to agricultural use of fertilizers and septic tanks.

As part of the cooperative NJDEP-USGS studies, researchers looked for links between nitrate and pesticide occurrence. They found that wells containing elevated nitrate concentrations were associated with those wells having detectable levels of pesticides. In other words, wells vulnerable to nitrate contamination were also vulnerable to pesticide contamination. Pesticide contamination of ground water does not appear to be a widespread problem, however local contamination does occur.

2.2.3 Volatile Organic Chemicals (VOCs)

Research conducted by NJDEP and USGS in the early 1980's resulted in the discovery of VOCs in ground water in the Coastal Plain. In 1984, USGS reported the occurrence of VOCs in 46 out of 246 wells sampled in the Potomac-Raritan-Magothy aquifer system. Trichloroethylene, benzene and toluene were the most common VOCs detected. The USGS conducted studies in the 1980's investigating the influence of land use on ground water quality in southern NJ (Vowinkel & Battaglin, 1989). Wells were sampled for purgeable organic compounds (POCs) and the results were used to examine correlations between concentrations of POCs in water from wells in industrial and other areas. There was a correlation between POCs in water and the location of wells in industrial areas.

Often when VOCs are detected in ground water, a point source is found to account for the contamination. Some common point sources of chemical contamination by VOCs include accidental spills, leaking underground storage tanks, contaminated sites, septic systems, and wastewater discharges from industries or sewage treatment plants.

2.3. Ground Water Depletion

Through water level monitoring by USGS, drops in water levels signaled overpumping of ground water. Two critical areas have been established and are being used to reduce or hold steady ground water withdrawals and encourage the use of new regional sources (surface water or non-critical aquifers) to offset the loss of ground water resources. Uses of ground water affected by overpumping include drinking water, industrial, cooling water and possibly agricultural irrigation. All users of the critical aquifers must comply with the applicable sections of the Water

Supply Allocation Rules regarding Critical Areas. This is discussed in more detail in the Safe Drinking Water section of this document.

2.3.1 Salt Water Intrusion

Salt water intrusion occurs in coastal areas when ground water use exceeds replacement, drawing salt water into freshwater aquifers. Salt water intrusion affects drinking water and industrial uses of ground water. See the Drinking Water Self Assessment document section 2.3.1 for a more complete discussion of salt water intrusion.

3. Program Successes

3.1. Ground Water Quality Standards Developed

New Jersey has developed ground water quality standards which assign designated uses and provide numerical criteria to support those uses. (N.J.A.C. 7:9-6.1 et.seq.). Ground water quality standards enable NJDEP to regulate discharges to ground water, protect pristine aquifers and set cleanup goals for contaminated sites. Each aquifer and major aquitard is classified as a separate unit.

3.1.1 Class I

Class I ground waters are waters with special ecological significance, including Class I-A which are areas with endangered species, undisturbed ecosystems, etc. and Class I-B, which are Pinelands areas. For Class I areas, the groundwater criteria relate to the natural quality of ground water.

3.1.2 Class II-A

Class II areas include existing and potential sources of potable ground water. Class II-A areas are areas suitable for potable use without extensive treatment. Ground water criteria have been promulgated for Class II-A waters based on potential human health effects through drinking water exposure. Assumptions and approaches used are the same as those used by New Jersey to develop Human Health-based Maximum Contaminant Levels for drinking water. In 1992, criteria were adopted for approximately 150 contaminants. The Ground Water Quality Standards also include provisions for development of Interim Specific Standards for additional contaminants of concern, and Interim Generic Criteria for contaminants of concern for which inadequate toxicity information exists to develop specific criteria. NJDEP plans to propose criteria for approximately 35 additional contaminants in the next proposal of the Ground Water Quality Standards.

3.1.3 Class II-B

The Ground Water Quality Standards allow areas to be designated as Class II-B if they have little or no current or potential ground water use in the foreseeable future, extensive (widespread) exceedance of the Class II-A criteria such that current technologies are insufficient, and minimal potential for the harm of downgradient areas. Ground water pollution remedies would be required to achieve source control, free product removal and protection of downgradient receptors. Continuing discharges, on the other hand, would be required to meet the Class II-A standards unless the background concentrations of the substances they discharge are higher. The intent is to ensure that ground water quality improves toward the criteria for all existing pollution problems, and does not exceed the criteria for all other constituents. Petitions to classify ground waters as II-B must be submitted to NJDEP for approval.

3.1.4 Class III

Class III waters are divided into Class III-A, which are groundwaters within major aquitards, and Class III-B, waters with natural characteristics such as high TDS or chloride which make them unsuitable for potable and most other uses.

3.2. Natural Ground Water Quality Data Available

The present goal of the Ambient Ground Water Quality Network is to characterize natural ground water quality in New Jersey as a function of geology and regional distribution. Benefits of this assessment include:

1. Providing a baseline to distinguish pollution from natural quality. This is important for assessing potential ground water pollution at a site. The Site Remediation Program has used this data set to assess potential metal contamination, since metals occur naturally in ground water.

2. Allowing potential ground water users (i.e., citizens, industry and government) to determine which aquifers are a suitable source of water for the intended use and to assess treatment needs.

As of this writing, the natural ground water quality in the sedimentary rocks of the Piedmont province and the Proterozoic crystalline rocks of the Highlands province has been characterized. More ground water quality data from the sedimentary rocks of the Valley and Ridge province and the glacial sediments in northern New Jersey are being collected to ensure a thorough assessment. An assessment of ground water quality in aquifers of the Coastal Plain will be conducted by compiling the data from existing individual studies.

The Saltwater Monitoring Network was established to serve as an early warning system to detect saltwater intrusion caused by the to over pumping of some New Jersey aquifers. The network has been in existence since 1923 and consists of over 400 wells located along the Atlantic Ocean, Delaware Bay, and Raritan Bay. Wells are monitored on a periodic basis.

3.3. Pesticide Vulnerability Assessment Available

In implementing EPA's Safe Drinking Water Regulations, the Bureau of Safe Drinking Water and DSR have conducted a major study of the occurrence of pesticides in community water systems and nontransient, noncommunity water systems including ground water sources. To date, only 4 samples have contained detectable levels of pesticides. Additional information regarding pesticide vulnerability assessment is provided in the Safe Drinking Water Self Assessment section 3.5.3.

3.4. NJDEP Monitoring of Landfills Impacts on Ground water

To NJDEP's knowledge, all applicable landfill sites have been identified. Furthermore, most of the facilities have a ground water monitoring system already in place; ground water data have been reported from many of these sites for over ten years. If leachate contaminates ground water, the case is referred to the Site Remediation Program.

3.5. NJDEP's Comprehensive Approach to the Regulation of Discharges to Ground Water

In New Jersey, there are more than 1200 facilities that have permits to discharge pollutants to the ground water of the State. These facilities discharge both industrial and sanitary pollutants. The purpose of these permits, known as NJPDES DGW permits, is to authorize the discharge of pollutants as long as the discharge does not contravene the ground water quality standards. The New Jersey ground water quality standards require that permissible discharges do not exceed the ground water antidegradation criteria. Antidegradation criteria vary from zero percent degradation in the Class I areas (Ground Water of Exceptional Ecological Significance) such as the Pinelands and areas that impact trout streams, etc., to no more than 50% degradation in Class II-A areas (Ground Water for Potable Water Supply).

3.6. Major Revisions to Discharge to Ground Water Rules

The Bureau of Operational Ground Water Permits is currently working on major revisions to the NJPDES Discharge to Ground Water (DGW) regulations to make the state ground water program more consistent with Federal requirements as well as to implement more appropriate permit requirements on specific types of

facilities. A regulatory mechanism being emphasized is the Permit-by-Rule, which requires discharges of no significant environmental consequence to submit an annual inventory to NJDEP as a certification of what the discharge consisted of and where and how the discharge occurred.

3.7. Statewide Identification and Remediation of Contaminated Sites

Ground water contamination has been identified at 7041 sites. These cases have been prioritized and 2048 (29%) are actively being remediated. The Site Remediation Program has proceeded with remediation of ground water at these sites through the use of 'classification exception areas'. After the remedial investigation is conducted, the method for remediating contaminated ground water is decided. The Responsible Party is required to control the source of contamination. The remaining contaminated ground water may be actively or passively remediated, or some combination of these methods may be used. A 'classification exception area' (CEA) is delineated as allowed in the Ground Water Quality Standards (N.J.A.C. 7:9-6.1 et.seq). Ground water quality criteria may be exceeded within the CEA for a specified period of time. The potential impacts on receptors such as potable supply wells, industrial process and cooling water supply wells and surface water are considered in the selection of the remedial method and delineation of the CEA. Due to the difficulties in meeting the criteria for Class II-B classification (i.e., little or no current or potential ground water use in the foreseeable future, extensive (widespread) exceedance of the Class II-A criteria and minimal potential for the harm of downgradient areas), the SRP utilizes CEA's to allow remediation to progress. In the 2 years since the adoption of the Ground Water Quality Standards, NJDEP has received only 1 petition for Class II-B classification, which is currently under review.

In January 1995, SRP completed its final Immediate Environmental Concern Standard Operating Procedures which are designed to ensure uniform Immediate Environmental Concern case identification, notification, and response actions by all bureaus and persons of the SRP. Implementation of this guidance has aided SRP staff in evaluation of whether cases truly qualify as IECs, and has clarified the role of various bureaus regarding work on IECs.

NJDEP has utilized an EPA grant given for Preliminary Assessments/Site Investigations to fund investigatory work by case managers and geologists to identify unknown sources of potable well contamination. Out of the 134 IEC cases with unknown sources, 40 of them have been identified as the highest priority and are assigned to SRP staff, which includes 8 site investigators and geologic support as needed.

3.8. Regulation and Remediation of Leaking Underground Storage Tanks

New Jersey's Underground Storage of Hazardous Substances Act, passed in 1986, regulates underground storage tanks containing hazardous substances. In accordance with the Act, the Bureau of Underground Storage Tanks identifies and registers all tanks containing hazardous substances, including petroleum products. Approximately 125,000 underground storage tanks at 85,000 facilities are covered under this act. Regulated facilities include those that store heating oil or motor fuel above a certain volume in underground storage tanks or any tank used to store a regulated hazardous substance or waste. A subset of 50,000 tanks at 15,000 facilities are subject to Federal regulation.

As noted in Table GW-7, leaking underground storage tanks are a significant source of ground water contamination. NJDEP has aggressively pursued remediation of these sites. In 1993, 1418 cleanups or closures were completed. (NJDEPE, 1993)

3.9. Maintaining Ground Water Supplies through the Water Supply Management Act

The implementation of the Water Supply Management Act through the water allocation permit program has further prevented the depletion of ground water reserves (i.e., critical areas program) and salt water intrusion is being controlled. Further analysis in both areas is required to better understand existing problems.

4. Analysis of Program Weaknesses

4.1. Lack of Comprehensive Understanding of Ground Water Quality

A substantial amount of natural and polluted ground water information is collected each year through a number of NJDEP programs and projects. The information includes data from several NJDEP programs: Site Remediation, NJDEP permits, Underground Storage Tanks, Safe Drinking Water, Ambient Ground Water Network, and from special studies such as those conducted by the U.S. Geological Survey or through DSR research projects. Generally each program or project is designed to examine a specific facet of ground water quality or a specific region of the state. Currently, monitoring efforts do not include specific assessment of nonpoint source pollution. This lack of data hinders our ability to target pollution prevention efforts.

Currently, ground water information is managed in approximately 21 different databases. Some of these databases are administrative and the associated groundwater quality data is in

paper files. When computerized, well location and contaminant data are available, unique identifiers for the wells are not always used. Thus, a single well may be identified differently in each database. Chemical data may not be gathered via uniform methods and aquifer maps are not yet available on GIS.

In order to utilize available data to assess ground water quality, new contaminant data should be computerized and unique well identification codes, which exist through the well drilling permit program, should be used. All data should be stored in the GIS. Aquifer maps should be available through the GIS database.

4.2. Impediments to Remediation of Contaminated Ground Water

Significant delays in remediation of sites could possibly, in certain situations, cause an increase in the number of new IEC cases due to uncontrolled contaminant migration affecting potable supplies. The large number of remediation cases and the depletion of public funds to remediate contaminated sites, including those with contaminated ground water, will lead to delays in completing remediation of currently identified sites. Identification of unknown sources of potable well contamination, which accounted for 40% of the cases in 7 counties, has been delayed due to lack of funding. Legal challenges by outside parties have delayed incorporation of SRP's RPS ranking method into regulations and currently review of SRP's preliminary draft RPS rules is awaiting review by state legal counsel. This leaves SRP open for some legal challenges on its case prioritization which can delay site remediation.

4.2.1 Lack of Implementation of Ground Water II-B Classification

NJDEP believes that up to 10% of the ground waters of this state could potentially be classified as II-B. To date, only one petition for reclassification to II-B has been received by the Department. This petition is currently under review. Thus, all ground water remediations are required to meet Class IIA criteria. Often, cases remain under Classification Exception Area designations for lengthy periods of time.

4.3. Pollution Sources Not Currently Managed by Existing Programs

Although NJDEP has had great success in identifying and regulating discharges to ground water over the past twenty-five years, the potential exists for contamination of this resource to occur from sources that do not fit into an existing regulatory program. Permitting programs that regulate specific types of discharges will not identify problems at unregulated facilities or nonpoint sources and there are no current funding sources for the investigations of possible dischargers. Examples of this would be pollution from the disposal of chemicals into septic

systems at commercial or private facilities and applications of fertilizers and pesticides.

Closed landfills represent another type of source of ground water contamination for which the existing regulatory program may provide an inadequate response. These sites will not score high in relation to other contaminated sites to qualify for publicly funded remediation (CERCLA or state equivalents). They can contribute to the degradation of local ground water. The overall severity of these sites is low and there are frequently no readily identifiable responsible parties.

4.4. Enhanced public education measures for pollution prevention, nonpoint source control and water conservation measures

Given the expense and complexity of ground water remediation efforts, and the extent of potable uses of ground water, more emphasis should be placed on pollution prevention, education and outreach as a cost effective method of resource protection. Pollution prevention measures are needed to prevent degradation by all users of ground water, including the public and water purveyors and regulated community. Examples include implementing good housekeeping and best management practices within wellhead protection areas.

Nonpoint sources of pollution to ground water include private septic systems, agriculture, lawn care and stormwater infiltration devices. The extent of pollution from these sources is currently unquantified. However, numerous sources of nonpoint source pollution exist. The best source control for this type of pollution is education.

Water conservation measures are needed to ensure adequate water supplies now and in the future which may be affected by periods of low precipitation. Public education and outreach are needed to encourage water conservation measures, including installation of low flow fixtures and alternative landscaping.

5. References

Barringer, J.L., 1989, Corrosive ground water in the New Jersey Coastal Plain: Abstract, Proceedings Northeast Section G.S.A., 24th annual meeting, New Brunswick, New Jersey.

Bell, C., Litt, B., Moser, F., and Uptegrove, J., (1992). Influence of geology on radon in ground-water supplies of New Jersey's Reading Prong: Division of Science and Research Project Summary, NJDEP.

Dooley, John H. Natural Sources of Mercury in the Kirkwood-

Cohansey Aquifer System of the New Jersey Coastal Plain. New Jersey Geological Survey, Geological Survey Report 27. New Jersey Department of Environmental Protection, Division of Science and Research. Trenton, New Jersey. 1992

Harriman, D.A., Sargent B.P., (1985) Ground-water quality in east-central New Jersey and a plan for sampling networks: U.S. Geological Survey water-resources investigations report 85-4243, 114 p.

Miller, J.W., Jr., 1974, Geology and ground-water resources of Sussex County and the Warren County portion of the Tocks Island impact area: Department of Environmental Protection, Bureau of Geology and Topography, Bulletin 73, 143 p.

New Jersey Department of Environmental Protection and Energy (1993) Site Remediation Report Annual Report. Lance Miller, Assistant Commissioner

New Jersey Department of Environmental Protection and Energy (1992) Site Remediation Program Site Status Report. Lance Miller, Assistant Commissioner

Rhodehamel, E.C. (1970) A hydrologic analysis of the Pine Barrens region. N.J. Water Policy Board Circular # 22, 35p.

Table GW-1: Ground-Water Quality Parameters Analyzed for in the Network with Associated Drinking Water Standards

CHARACTERISTIC OR CONSTITUENT	MAXIMUM CONTAMINANT LEVEL p:primary; s:secondard
CHARACTERISTICS	
Temperature (C)	--
Specific Conductance (uS/cm)	--
Oxygen, dissolved (mg/L)	--
pH (standar units)	6.5 to 8.5
Field Alkalinity (mg/L as CaCOs)	--
Solids, dissolved (mg/L)	500[s]
Corrosivity (pH units)	-1 to 1[s]
Hardness, (mg/L as CaCOs)	50 to 250[s]
MAJOR AND MINOR DISSOLVED CONSTITUENTS (mg/L)	
Calcium	--
Magnesium	--
Sodium	50[s]
Potassium	--
Chloride	250[s]
Sulfate	250[s]

Fluoride	4[P]
Silica	--
NUTRIENTS, DISSOLVED (mg/L)	
Nitrogen, NH_3, (as N)	--
Nitrogen, NO_2, (as N)	1[P]
Nitrogen, NH_3 + Organic, (as N)	--
Nitrogen, NO_2+NO_3, (as N)	--
Nitrate, [NO_2+NO_3] - [NO_2] (as N)	10[P]
Phosphorous Ortho, (as P)	--
TRACE AND MINOR DISSOLVED CONSTITUENTS (ug/L)	
Aluminum	50 to 200[S]
Arsenic	50[P]
Barium	2000[P]
Cadmulumium	5[P]
Chromium	100[P]
Copper	1300[P]
Iron	300[S]
Lead	15[P]

Manganese	50[s]
Mercury	2[p]
Selenium	50[p]
Silver	10[s]
Zinc	5000[s]
ORGANIC CONSTITUENTS	
Carbon Organic, (mg/L)	--
RADIOACTIVITY (pci/L)	
Gross Alpha	15[p]

Table GW-2: Valley & Ridge and Highlands Regions

CHARACTERISTIC OR CONSTITUTENTS	TOTAL NUMBER OF WELLS	PERCENT OF WELLS EXCEEDING MAXIMUM CONTAMINANT LEVEL*
Corrosivity	16	37.5% too corrosive
Hardness as $CaCO_s$	17	41.2% too hard
Iron	17	11.8% have too much iron
Manganese	17	11.8% have too much manganese

*Percentage are based on an incomplete data set that will be updated FY96

Table GW-3: Valley and Ridge and Highlands Regions

CHARACTERISTIC OR CONSTITUENT	TOTAL NUMBER OF WELLS	PERCENT OF WELLS EXCEEDING MAXIMUM CONTAMINANT LEVEL*
Corrosivity	16	37.5% too corrosive
Hardness as $CaCO_s$	16	12.5% too soft
Sodium	16	6.2% have too much sodium
Manganese	16	18.7% have too much manganese

*Percentages are based on incomplete data set that will be updated FY96

Table GW-4: Highlands Region

CHARACTERISTIC OR CONSTITUENT	TOTAL NUMBER OF WELLS	PERCENT OF WELLS EXCEEDING MAXIMUM CONTAMINANT LEVEL
pH	44	30.2% too acidic
Corrosivity	44	50% too corrosive
Hardness as $CaCo_3$	44	13.6% too soft, 4.5 % too hard
Iron	45	6.7% have too much iron
Manganese	45	16.3% have too much manganese
Gross Alpha (radioactivity)	21	19.0% are too radioactive

Table GW-5: Piedmont (Newark Basin) Region

CHARACTERISTIC OR CONSTITUENT	TOTAL NUMBER OF WELLS	PERCENT OF WELLS EXCEEDING MAXIMUM CONTAMINANT LEVEL
pH	148	6.1% too acidic, 3.4% too alkaline
Solids, dissolved	147	10.6% too mineralizing
Corrosivity	142	31.2% too corrosive
Hardness as CaCO	147	3.4% too soft, 20.8% too hard
Sodium	147	8.5% have too much sodium
Sulfate	147	8.2% have too much sulfate
Iron	147	14.5% have too much iron
Manganese	147	27% have too much manganese
Gross Alpha (radioactivity)	259	5.8% are too radioactive

Figure CV-1

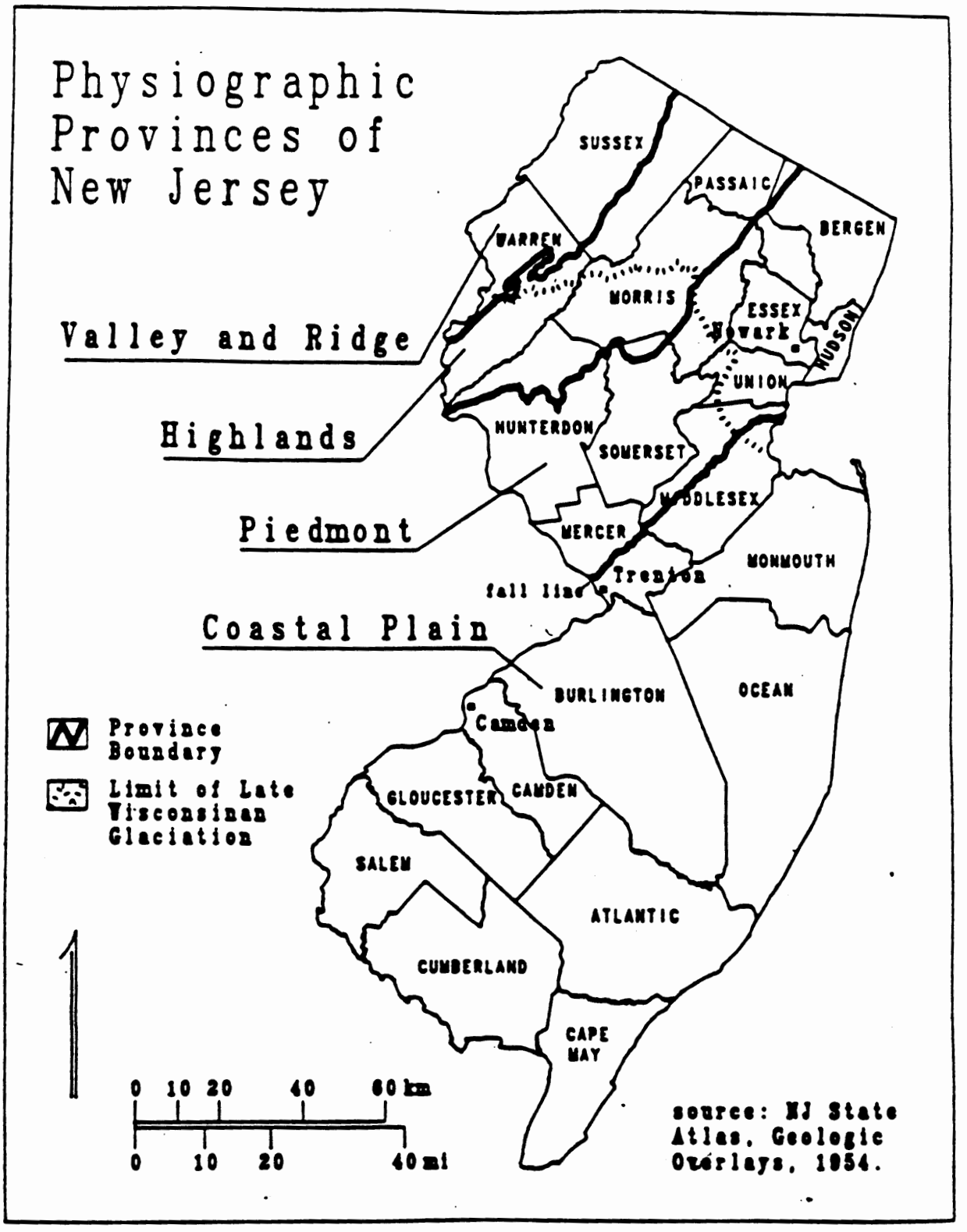
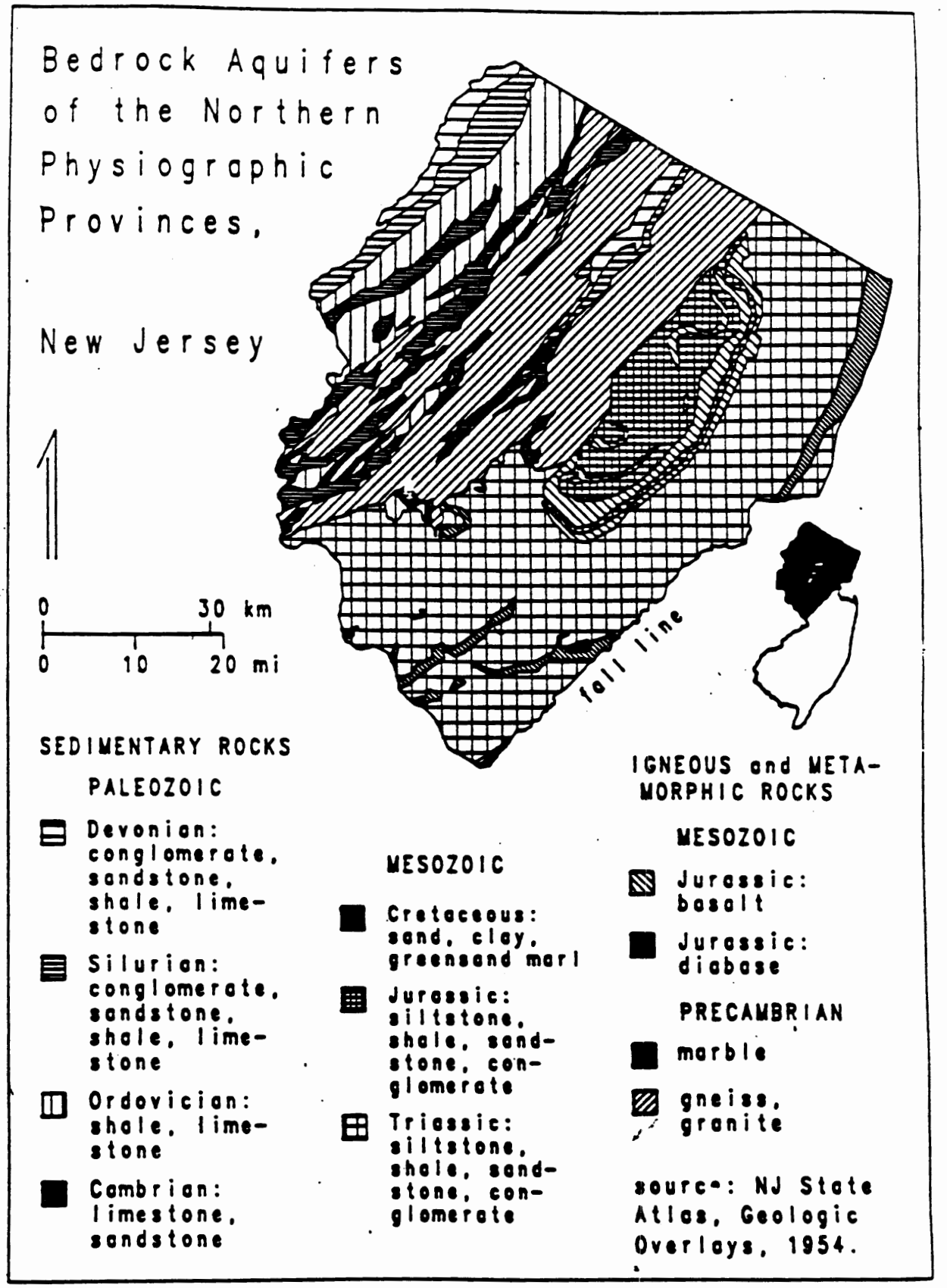
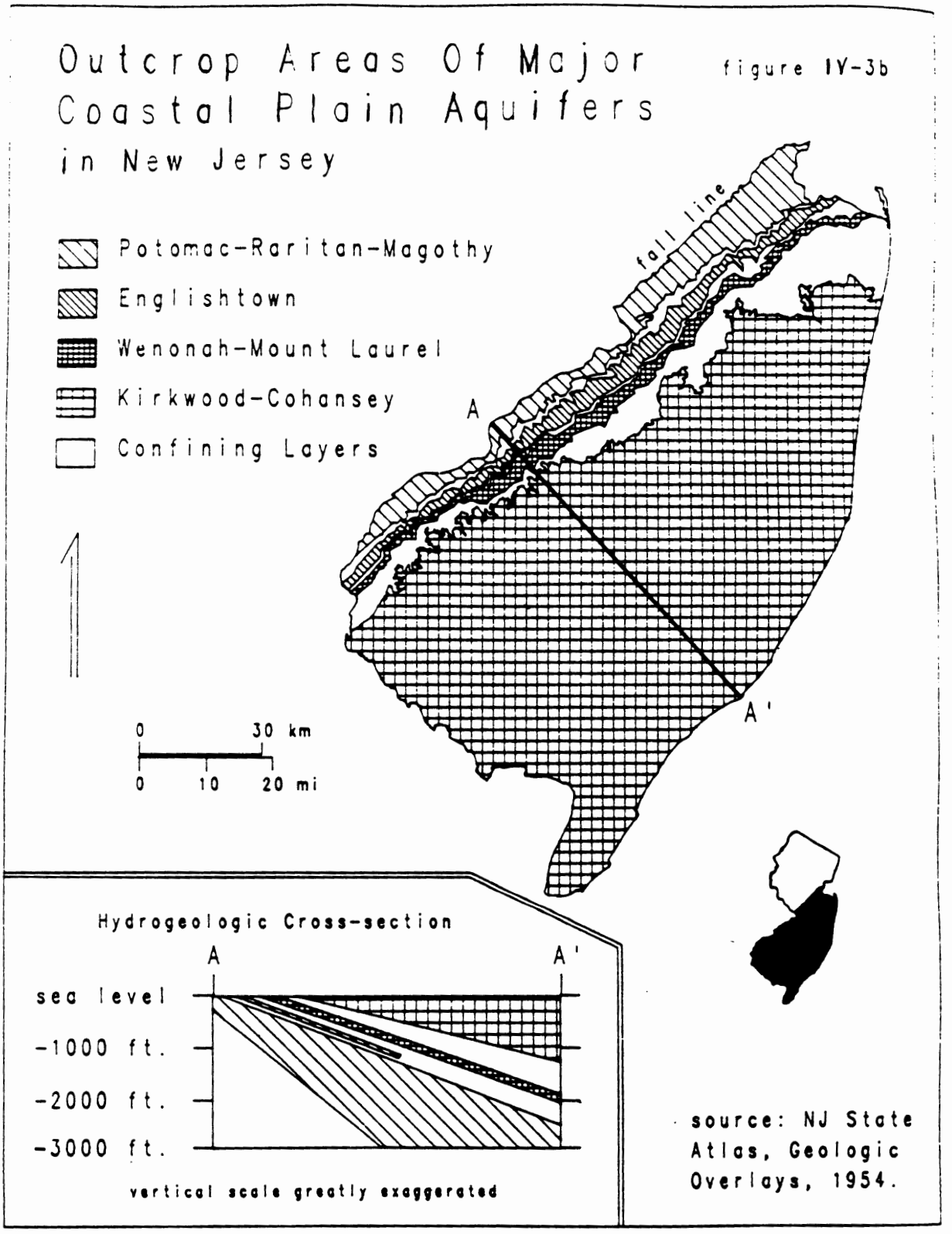

Physiographic Provinces of New Jersey
Valley and Ridge
Highlands
Piedmont
Coastal Plain
fall line
Province Boundary
Limit of Late Wisconsinan Glaciation
SUSSEX
PASSAIC
BERGEN
WARREN
MORRIS
ESSEX
Newark
HUDSON
UNION
HUNTERDON
SOMERSET
MIDDLESEX
MERCER
Trenton
MONMOUTH
BURLINGTON
OCEAN
Camden
GLOUCESTER
CAMDEN
SALEM
ATLANTIC
CUMBERLAND
CAPE MAY
0 10 20 40 60 km
0 10 20 40 mi
source: NJ State Atlas, Geologic Overlays, 1954.

Figure GW-2


Bedrock Aquifers of the Northern Physiographic Provinces, New Jersey
0 30 km
0 10 20 mi
fall line
SEDIMENTARY ROCKS
PALEOZOIC
Devonian: conglomerate, sandstone, shale, limestone
Silurian: conglomerate, sandstone, shale, limestone
Ordovician: shale, limestone
Cambrian: limestone, sandstone
MESOZOIC
Cretaceous: sand, clay, greensand marl
Jurassic: siltstone, shale, sandstone, conglomerate
Triassic: siltstone, shale, sandstone, conglomerate
IGNEOUS and METAMORPHIC ROCKS
MESOZOIC
Jurassic: basalt
Jurassic: diabase
PRECAMBRIAN
marble
gneiss, granite
source: NJ State Atlas, Geologic Overlays, 1954.


Outcrop Areas Of Major Coastal Plain Aquifers in New Jersey
figure IV-3b
Potomac-Raritan-Magothy
Englishtown
Wenonah-Mount Laurel
Kirkwood-Cohansey
Confining Layers
fall line
A
A'
0 30 km
0 10 20 mi
Hydrogeologic Cross-section
A
A'
sea level
-1000 ft.
-2000 ft.
-3000 ft.
vertical scale greatly exaggerated
source: NJ State Atlas, Geologic Overlays, 1954.

DRINKING WATER SELF-ASSESSMENT

GLOSSARY

BSDW	Bureau of Safe Drinking Water
BWA	Bureau of Water Allocation
CWS	Community Water System
DSR	Division of Science and Research
EPA	Environmental Protection Agency
HAA	Haloacetic acid
IOCs	Inorganic Compounds
MCL	Maximum Contaminant Level
NJGS	New Jersey Geological Survey
NPS	Non-point source
NTNC	Nontransient, Noncommunity Water System
OTIS	Office of Telecommunications and Information Systems
ppb	parts per billion
POE	Point of Entry
SOCs	Synthetic Organic Compounds
THM	Trihalomethane
TNC	Transient, Noncommunity Water System
USGS	United States Geological Survey
VOCs	Volatile Organic Compounds
WHPA	Well Head Protection Areas
WHPP	Well Head Protection Program

Note: All figures are at the end of the Drinking Water section

1. Introduction

The drinking water program self-assessment has been written to include the Safe Drinking Water Program, the Wellhead Protection Program, and the Water Allocation Program. These three programs are responsible for drinking water quality, drinking water quantity, drinking water protection and drinking water planning.

1.1. The Potable Water Resources in New Jersey

There are 629 community water systems (CWS) in New Jersey, of which 68 serve surface water and 561 serve ground water. A CWS serves at least 25 year-round residents or 15 service connections (e.g., municipality, mobile home park). The definitions of the types of water systems regulated in NJ appear in Figure DW-1. These 629 CWS serve approximately 87 percent of the State's estimated population of 7,750,000. The 20 largest CWS serve about 50 percent of the State's estimated 1995 population. Of these 20 CWS, 13 deliver mainly surface water to consumers and the remaining seven deliver mainly groundwater.

There are 4,179 noncommunity systems in New Jersey. A noncommunity water system generally serves a non-residential population. There are two types of noncommunity water systems: nontransient and transient. There are 1,141 nontransient systems and 3,038 transient systems. Nontransient noncommunity water systems (NTNC) serve at least 25 of the same people daily at least six months of the year (e.g., schools, office buildings). Transient noncommunity water systems (TNC) serve at least 25 people each day, but the population served changes each day (e.g., highway rest stops, restaurants). All but three of the noncommunity systems utilize groundwater sources.

It is estimated that there are approximately 400,000 private wells in New Jersey serving approximately 1.5 million people (13 percent).

1.2. Description of the Safe Drinking Water Program

The major objectives of the New Jersey Safe Drinking Water Program are:

1) to assure safe public drinking water supplies;
2) to assure adequate public supply facilities to meet peak demand conditions;
3) to assure proper operation of public water supply facilities,
4) to assure adequate monitoring and reporting by purveyors; and
5) to improve purveyor compliance through continuing enforcement actions.

The goals of the Bureau of Safe Drinking Water (BSDW), the lead agency for administering the Federal and State Safe Drinking Water Acts are: 1) to insure that adequate prime source, treatment, pumpage, storage, transmission and distribution facilities are provided to produce water of the highest quality and at sufficient volume and pressure to all consumers at all times, and 2) to insure that all water systems perform adequate sampling that is in compliance with the drinking water standards or maximum contaminant levels (MCLs) for regulated contaminants. BSDW will also continue to spend considerable time promoting water of acceptable aesthetic quality.

In order to determine the quality of the public drinking water being consumed in New Jersey, the BSDW collects mandatory monitoring data analyzed by New Jersey State certified drinking water laboratories. Each microbiological or chemical parameter or parameter group has a monitoring frequency specified in regulation depending on the type of water system serving the drinking water (community, nontransient noncommunity, transient noncommunity), and the source of water (groundwater or surface water). The monitoring data are data managed and certain standard compliance reports are electronically sent to the EPA in Washington, D.C. on a quarterly basis. Table DW-1 outlines the monitoring requirements.

The following chemical groups are required to be monitored in CWS and NTNC water systems: inorganic chemicals including asbestos, lead and copper, volatile organic chemicals, pesticides, synthetic organic chemicals (SOCs), radionuclides (CWS only) and total trihalomethanes (CWS only). The people consuming water from these types of systems drink water on a regular basis. The standards for these contaminants are based on protection from chronic health effects. The monitoring frequency for each contaminant group, outlined in Table 1, depends on the base monitoring frequency specified in the regulations and the monitoring waiver program developed for each contaminant group in the regulations. CWS and NTNC are also required to monitor annually for nitrate (quarterly for the surface water supplies) and either monthly (629 CWS) or quarterly (1,141 NTNC) for total coliform bacteria.

The TNC monitor for nitrate annually and for total coliform bacteria quarterly. These contaminants can cause acute effects, and are important to monitor in TNC water systems because an exceedance of the standards for these contaminants could most likely adversely affect people drinking the water on a short-term basis.

The Safe Drinking Water Program's focus on drinking water quality is complemented by two programs whose focus is on quantity issues. The Office of Environmental Planning (OEP) is responsible for the preparation and updating of a statewide water

supply master plan. The state's first water supply master plan was completed in 1981, and there have since been several updates. A complete revision to the master plan will be completed in 1995, completing a multi-year assessment. The Bureau of Water Allocation (BWA) is the regulatory unit that controls the allocation of all water resources in New Jersey. The BWA issues renewable permits for all ground and surface water withdrawals greater than 100,000 gallons per day. More than 95 percent of the CWS are issued water allocation permits.

The BSDW is supported in the lead role for the Safe Drinking Water Act by the following units: the Enforcement Element for formal enforcement actions; the Office of Quality Assurance for the laboratory certification program; the Bureau of Organic Analytical Services, the Bureau of Radiation and Inorganic Analysis Services and the Department of Health Public Health Environmental Laboratory for analytical services; the Bureau of Revenue for operator certification and training; the Division of Science and Research (DSR), Environmental Health Services Unit at the Department of Health, and U.S. Geological Survey (USGS) for technical assistance; and delegated regional health offices for the management of the noncommunity public water systems. The BSDW is supported in its NTNC program by 15 delegated counties. The BSDW directly implements the NTNC systems programs in the remaining six counties which have not yet been delegated the safe drinking water responsibility.

Additional units within the New Jersey Department of Environmental Protection (NJDEP) support Safe Drinking Water Activities. OEP is taking Global Positioning System (GPS) location data collected from CWS wells by BSDW and with the assistance of the New Jersey Geological Survey (NJGS) determining wellhead protection areas. The Site Remediation Programs both publically and privately funded, identify sources of contamination and contaminated water systems. The Environmental Claims Administration provides financing for solutions to contamination problems that the Well Field Remediation Program and other programs identify. The BSDW is responsible for notifying the water utilities and/or the local health officers when the Site Remediation programs discover contaminated water systems, primarily in private wells.

Staff from the BSDW and Division of Science and Research (DSR) support the New Jersey Drinking Water Quality Institute (DWQI), a fifteen member body established by the 1983 amendments to the NJ Safe Drinking Water Act to set drinking water standards or MCLs for drinking water contaminants, and to provide general guidance to the overall drinking water quality program. The DWQI is comprised of six ex officio members from NJDEP and NJDOH and nine appointed members: three appointed by the Governor; three by the President of the Senate; and three by the Speaker of the General Assembly.

1.3. Maintaining Safe Drinking Water Act Primacy

New Jersey was granted "primacy" or primary enforcement responsibility for the Safe Drinking Act in 1978 from EPA. The State has maintained a strong primacy program since that time. The Federal Safe Drinking Water Act requires that a primacy state maintain the following:

1. Regulations no less stringent than the National Primary Drinking Water Regulations. New Jersey adopts the most current version of the National Primary Drinking Water Regulations by reference in our regulations.
2. Enforcement regulations, including the ability to assess administrative penalties.
3. Records and reports as required by federal regulations. BSDW's data management system maintains a complete inventory of all public water systems, stores individual and summary data on all required monitoring data and testing done by the BSDW. The data management systems also automatically determine compliance, and generate both monitoring and MCL violations for most contaminant groups.
4. A variance and exemption process in accordance with federal statutes.
5. Adopted plans for the emergency provision of drinking water.

In addition to the previously described federal statutory requirements, EPA regulations require the following additional activities be maintained.

1. A sanitary survey/inspection program. Periodic inspections of all CWS are performed by NJDEP's enforcement program, and county health agencies inspect the noncommunity systems.
2. A laboratory certification program for drinking water including laboratory certification regulations, inspections and required proficiency testing.
3. A primacy laboratory capability for all required drinking water parameters.
4. A design and construction approval program for public water systems. The BSDW issues construction and operation permits for all CWS, and local health agencies issue certifications for construction and modification of noncommunity and non-public systems.

2. Key Drinking Water Issues in New Jersey

Four areas have been identified for maintaining safe drinking water in New Jersey: 1) continuous improvement of

drinking water quality, 2) source water protection, 3) maintenance of adequate water supplies, and 4) identification of the most important contaminant groups in New Jersey.

2.1. Maintenance of Drinking Water Quality (Baseline Program)

The BSDW has a regulatory program that measures its success by comparing drinking water monitoring data analyzed by NJ certified laboratories for the water utilities against a set of drinking water standards. The BSDW relies on water systems contracting with NJ certified laboratories to have the required analyses performed. Water systems are required to send test results to the BSDW for compliance determination. Although drinking water delivered to consumers may meet the standards, if the BSDW does not receive the test results, a violation is automatically generated.

The larger water systems in NJ understand and implement the data collection process well. However, the numerous noncommunity water systems have more difficulty in performing the required testing. First, many small systems, such as restaurants, do not consider themselves in the water delivery business. Second, the NTNC that serve regular customers, such as schools or factories, now have to comply with a relativelv new set of regulations that are complex and expensive. Education of these systems about the required sampling, as well as sampling waivers and the significant cost savings that are available to them will help BSDW in implementing these new testing requirements.

Prior to collecting any drinking water samples for new water sources, other technical reviews of sources and facilities are conducted by the BSDW to assure that the delivered water quality is safe. These activities include approval of drinking water sources, water distribution systems, and water treatment facilities.

The inspection of facilities and water sources at the time they are built, as well as on a routine basis afterwards, helps to assure that water quality will be maintained by the proper operation of the water facilities. Inspections also include a field review of water quality data maintained at the water treatment plants. To verify the test results submitted to the BSDW for compliance purposes, field personnel at the BSDW randomly collect water quality data from CWS throughout the State.

In addition to the standards provided by EPA, NJDEP has the authority to set drinking water standards for contaminants that are of concern in this State. NJDEP can adopt standards for contaminants not regulated by EPA and/or adopt standards that are more stringent than those adopted by EPA. Through these existing program activities, the BSDW maintains a drinking water program

that delivers water of acceptable water quality to consumers.

2.2. Drinking Water Source Water Protection

Protection of source water is important since it is likely to be more cost effective to prevent pollution than to treat contaminated source waters. In the past, source water protection activities focused primarily on improving the quality of point source discharges to surface waters by requiring improved treatment at sewage and industrial treatment plants. These efforts have been highly successful in improving the quality of drinking water sources and have allowed water purveyors to refine their water treatment processes.

Drinking water sources in New Jersey are a crucial resource which have been affected by pollution and can benefit greatly from preventative action and public education. Through planning initiatives, a gradual shift in focus to proactive preventative actions and education for the protection of the resource have been undertaken. Program initiatives related to these issues are discussed below.

2.2.1 Ground water

The 1986 Federal Safe Drinking Water Act Amendments (Section 1428) require that all states develop a Well Head Protection Program (WHPP) to target areas for special protection for both CWS and NTNC water supply wells. Ground water protection is a particular concern since 50 percent of the population consumes ground water, and numerous cases of ground water pollution have been documented over the years. For this reason, New Jersey in December of 1991, submitted to EPA and subsequently adopted the New Jersey WHPP Plan. The purpose of the WHPP plan is to minimize the risks posed to these wells from pollutant discharges to ground water. The special protection for these areas is focused within a delineated geographic area called a Well Head Protection Area (WHPA). In this area, ground water pollution, if it occurs, may pose a significant threat to the well. This geographic area in New Jersey is calculated based upon a "time of travel" coupled with the hydrogeologic characteristics of the well and the surrounding aquifer.

The WHPA delineation project is a multi-year proactive endeavor which involves all levels of government, a variety of agencies and the public in an effort focusing on prevention. The Department over the course of several years will be performing WHPA delineations for all CWS wells. For NTNC wells, WHPA delineations will be adopted by regulation. The emphasis of the program is the institution of the minimum controls required to provide protection to the drinking water source. These controls may range from prohibition of certain types of activities in the vicinity of the wellhead to education. The focus is on discharge

prevention, rather than pollution mitigation. All relevant regulatory programs of the NJDEP were involved in development of the WHPP plan and will utilize the WHPAs when they are developed. Management plans and regulations of these programs will be changed over time, where necessary, to implement the WHPP plan. Local governments and other land use regulators will be encouraged likewise to use these delineations for their decision-making processes and to refine the delineations using more advanced methods.

2.2.2 Watershed Protection

The protection of drinking water supplies is included in theNJDEP's watershed approach for both ground and surface water sources. Historically, the NJDEP's point source discharge control program has produced significant improvement in at least two large river systems used for drinking water. However, through watershed protection, management plans and strategies will be developed to address priority issues within each watershed management area. In general, as NJDEP focuses on a watershed management area, established regulatory and prevention water-oriented programs will seek to focus their efforts in those areas. Other programs which are oriented towards drinking water, such as Well Head Protection and Nonpoint Source Management will play an important role in education, management and outreach into those areas in particular where drinking water is identified as a priority.

2.3. Maintenance of Adequate Water Supplies

2.3.1 Salt Water Intrusion

The historic overuse of certain aquifer systems in New Jersey has caused the migration of salt water into those aquifer systems. In particular, the use of areas in the Coastal Plain aquifers in Cape May and in Northeastern Middlesex County have been compromised leading to closure of wells, drilling new wells in other aquifer units and proposed desalinization plants. The NJDEP has placed limits in two critical areas in order to conserve this resource, has initiated conservation programs and developed additional regional water supplies. NJDEP will continue to evaluate salt water intrusion in the coastal areas of the State, and if necessary, develop regulations in addition to existing water allocation regulations to address the problem.

2.3.2 Overuse of Water Resources

Although New Jersey usually has adequate annual rainfall for its water needs, the competition for those resources on a location by location basis continues to increase. Because the State has been subject to several significant droughts during the past 50 years, the most recent one in 1991, planning to manage

existing resources and conduct long range planning to establish future capacity to minimize the effects of droughts is a continuing challenge. The NJDEP no longer allows new withdrawals from several aquifer systems and stream segments.

Through work undertaken in the Water Supply Master Plan, the NJDEP is looking at depletive use of aquifers as well as the safe yield of the aquifer to deliver water. It is estimated that 50 percent of the aquifers in the State are used depletively due to interbasin transfer of wastewater. NJDEP is evaluating this issue in order to determine the potential impact and significance.

2.4. Important Contaminants in New Jersey Drinking Water

The following contaminants are of most concern to New Jersey: 1) microbiological contaminants, 2) lead, 3) mercury, 4) nitrates/nitrites, 5) VOCs, 6) disinfection byproducts, and 7) radon.

2.4.1 Microbiological

There have been no drinking water related disease outbreaks in New Jersey for the last 15 years. However, disease outbreaks, especially if small numbers of people are involved, are difficult to detect and it is possible that such outbreaks have occurred, but gone undetected.

The microbiological safety of drinking water is assured, in part, through monitoring of drinking water for "total coliform bacteria". Such monitoring has always been an important component of NJ's drinking water program, because the absence of total coliform bacteria has historically been thought to be indicative of the absence of disease-causing microorganisms. Federal law regulates coliform bacteria in finished water under the "Total Coliform Rule" (TCR). A few specific pathogens (viruses, Giardia, and Legionella) in surface water supplies are regulated under the "Surface Water Treatment Rule"(SWTR).

To assess the effectiveness of existing regulations, the BSDW has summarized 2 years of coliform data. Compliance with the monitoring requirements of the Total Coliform rule in NJ CWS is generally good. About 10 percent of the CWS had reporting (nonsubmittal) violations in 1991 and 1992; over half of these violations were single month nonsubmittal violations. Approximately two percent of the CWS exceeded the acute MCL (fecal coliform or E.coli present) in 1991 and 1992 and about six percent of the CWS exceeded the monthly MCL for total coliforms. The NJ noncommunity water systems did not comply with microbiological reporting requirements as well as the CWS. In 1991, 16 percent did not submit results. In 1992, this percentage dropped to 9 percent. For both years the percentage

of acute MCL violations was less than 1 percent, and the percentage of monthly MCL violations was less than 3 percent. This indicates that microbiological water quality in CWS and noncommunity supplies is similar.

Coliform bacteria are a good indicator of some but not all waterborne pathogens. This is because many pathogens have greater resistance to disinfection than coliforms. Recent drinking water-related disease outbreaks in other states due to the parasite Cryptosporidium have resulted in possible federal regulations for this organism as well as potential revisions to the Giardia and virus SWTR regulations. Compared to coliform bacteria, Cryptosporidium has high resistance to chlorine and other chemical disinfectants.

At issue is whether or not there are pathogens, other than Cryptosporidium, that are not controlled by existing regulations. The "universe" of pathogenic organisms that may not be removed from drinking water under existing regulations may never be known.[2] Nevertheless, the EPA has identified some "newly emerging pathogens". Some of these are more likely than others to present a health threat in treated drinking water and hence warrant additional scrutiny. The following are some, but undoubtedly not all such organisms.

1. Pathogens that cause disease in persons with weakened immune systems, such as individuals with AIDS and organ transplant and cancer therapy patients. Such pathogens include *Mycobacterium* bacteria, opportunistic bacterial pathogens in distribution systems (e.g., *Pseudomonas*), enteric fungal infections caused by organisms such as *Candida, Histoplasma, and Cryptococcus*, and microsporidia parasites, if they can be shown to be waterborne. The disinfection resistance of many of these organisms is not known.

2. *Helicobacter pylori and enteric Helicobacter* - the former causes ulcers and has been detected in contaminated drinking water. The latter, if shown to be waterborne, may be an important health issue as several species have been found in people with severe gastroenteritis.

3. Toxigenic cyanobacteria or blue-green algae, which can grow in eutrophic fresh water supplies. Toxins produced by these

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2 In addition to pathogenic microorganisms, there are a variety of "problem" organisms in source waters and in distribution systems which are considered nuisance organisms and are not direct threats to human health. These include iron and sulfur bacteria in wells, algae and actinomycete blooms in reservoirs which cause taste and odor problems, periodic growths in source waters of large, multicellular organisms such as nematodes, midges, rotifers and crustaceans, and nitrifying bacteria (for systems using chloramines) and iron bacteria in distribution systems.

organisms have killed wild and domesticated animal populations. These algae may be a periodic source of toxins in some drinking water supplies.

These microbiological quality issues are national in scope and not limited to New Jersey.

2.4.2 Lead

Lead is important because it is a cumulative toxin. Fetuses and small children are most vulnerable to lead toxicity. There are many sources of exposure to lead - air, soil, dust, food, and water. Water can be a significant source of lead, especially for infants whose diet consists of liquids made with water, such as baby food formula. In 1991, the Centers for Disease Control changed the definition of lead toxicity from 25 micrograms per deciliter to 10 micrograms per deciliter, which means that lower levels of lead may be harmful to growing children than previously believed.

Lead may reach drinking water through the dissolution of lead-containing materials used in plumbing. Homes served by lead service mains and those containing new lead solder are most vulnerable to leaching into the water supply. In NJ, most of the major urban centers are served by lead service lines. Further, the extensive development of the 1980's led to increased construction of homes before the lead solder ban was implemented (1987). Lead continues to be of concern in public water supplies.

In systems serving the southern part of the state, the concern over lead leaching is important because of the natural corrosivity of the ground water there. Of particular concern are homes served by private wells because these systems tend to have no treatment on them. Since there are no state requirements for routine private well testing, potential problems may be unidentified.

Lead monitoring regulations were phased in so that the 20 largest water systems, serving more than 50,000 people, were sampled first in 1992. The lead action level of 15 ppb was exceeded by 9 and 7 water systems, respectively, during the two, six month sampling periods. Since then all CWS and NTNC have been required to monitor. Nearly half of the systems that monitored had at least one sample that exceeded the action level of 15 ppb for lead.

Since children spend a great deal of time at schools and day care facilities, 1988 amendments to the Federal Safe Drinking Water Act focused attention on monitoring for lead at these institutions. DSR research has shown that fountains and new faucet fixtures used for drinking can contain elevated levels of

lead in first draw samples (one day care facility's water was measured at over 200 ppb in first draw samples). While EPA recommends that schools and day care centers monitor their water for lead and copper, there is no federal program in place to assist them in this endeavor. It is up to states and individual facilities to monitor.

2.4.3 Mercury

Over 1000 CWS samples for mercury have been collected statewide between 1992 and 1994 as part of normal monitoring requirements. Three samples exceeded the MCL of 2 ppb. Therefore, mercury would not appear to be a significant problem in New Jersey drinking water. However, over 2,300 private, potable wells have been sampled in southern NJ for mercury. Of these wells, approximately 300 have yielded water samples with mercury levels exceeding the MCL for mercury of 2 ppb. The highest mercury concentration found in a water sample was 72 ppb. A draft report completed by the US Geological Survey for NJDEP has identified 32 areas of contamination in southern NJ using data supplied by the Site Remediation Program. The Site Remediation Program defines an area of contamination as a geographical area where at least one well has a mercury concentration greater than 2 ppb. Two additional areas of contamination have been identified where mercury concentrations are greater than 1 ppb, but less than 2 ppb. (See Figure DW-2)

Previous research by NJGS and DSR indicates that ambient mercury levels in ground water in this area to be 0.001-0.040 ppb and that levels above this indicate anthropogenic influences. Preliminary investigation indicate that the contamination is limited to the unconfined portion of the Kirkwood-Cohansey aquifer system. NJDEP conducted evaluations in the impacted residential areas to delineate the extent of contamination, supply alternate water sources to affected residences, and to determine the potential source(s) of the contamination. A discussion of potential sources of mercury in groundwater is located in Section 2.2 of the Ground Water Self Assessment.

2.4.4 Nitrates/Nitrites

Nitrate/nitrites in water are of concern because of the acute health effects associated with the consumption of nitrate/nitrite contaminated water by infants (methemoglobinemia or "blue baby disease"). But nitrates are also an important contaminant to measure due to the fact that high nitrate concentrations in ground water are related to nonpoint source pollution. The presence of nitrate in a potable well indicates that the well is susceptible to contamination from surface activities and this data should be used as an early warning of the potential for contamination from other contaminants such as pesticides, VOCs and microbiological contaminants.

Since 1993, all public water systems using groundwater have been required to sample annually for nitrate and those using surface water are to sample quarterly. In 1993 and 1994, over 11,000 nitrate analyses have been performed and 139 samples exceeded the MCL. The BSDW has made the follow-up of these high values a priority activity.

2.4.5 Volatile Organic Compounds (VOCs)

VOCs were first studied in NJ drinking water supplies in the early 1980's, as part of a Statewide drinking water survey. At the time when VOCs were detected, there were no drinking water standards for these contaminants, so that it was not possible to determine the significance of the concentrations found. However, some of the contaminants were classified by EPA as known human carcinogens; others as probable human carcinogens; while others were thought to be of concern because of noncancer health effects. Landmark legislation passed in 1983 gave NJDEP the authority to require semiannual monitoring of all CWS and to adopt drinking water standards for a specific list of 22 synthetic organic chemicals, mostly VOCs, and any others because of occurrence and potential health effects upon recommendation of the DWQI. Following extensive work by BSDW, DSR, NJDOH, and the DWQI evaluating human health risk assessment, analytical capabilities, and treatment techniques VOC standards were adopted in 1989. Millions of dollars have since been spent by CWS to improve drinking water quality and to comply with the VOC standards.

Regular semiannual monitoring by CWS in NJ between 1984 and 1992 revealed a significant number of water systems with VOC contamination. It is for this reason that when federal regulations for VOCs were adopted in 1989, 1991, and 1992, New Jersey was already solving its VOC problems. Figure DW-3 shows the percentage of CWS that have shown detectable concentrations of VOCs from 1984-1992. The percentage of CWS showing MCL exceedances in a single sample has generally decreased over time (with the exception of 1988). These pie charts are an overestimation of VOC contamination in water systems since a single sample in a given year with an MCL exceedance places the CWS in the "greater than MCL" category although the remainder of samples may have not had any contamination. Water systems are required to remediate the drinking water within one year of the confirmation of the MCL violation.

New federal regulations that took effect in 1993 decreased the frequency of required VOC monitoring, increased the number of samples required from each water system and changed the VOC sampling location from "water distribution system" to "point-of-entry" (POE) to the water distribution system. This means that drinking water quality after treatment, which more closely

reflects source water quality, is being monitored. Blending of marginal drinking water sources with clean water sources to reduce the concentration of contaminants in the water distribution system in order to achieve the standards, is no longer allowed.

Transient noncommunity water systems have been required to monitor at least once for VOCs beginning in 1989. The extent of VOC contamination is not yet well known in these types of supplies. Domestic water sources are not required to monitor under State regulations so little is known about the extent of the VOC contamination in these types of water systems. One county has adopted an ordinance that requires water quality testing, including VOCs, to be performed upon the sale of a residence. In this way, private well water quality problems have been discovered.

VOCs are more common in groundwater systems and therefore surface water has often been purchased as an interim or long term replacement for contaminated ground water sources of drinking water. This practice has been a concern because it results in abandonment of the groundwater resource, and because surface water sources may have their own unique set of water quality limitations.

2.4.6 Disinfection Byproducts

When chlorine reacts with dissolved organic matter in source water, especially surface water, other chlorinated compounds are formed. Trihalomethanes (THMs) are the most extensively studied group of disinfection byproducts and have been regulated in drinking water since 1989. Chloroform, chlorodibromomethane, bromodichloromethane, and bromoform make up the trihalomethane group. The concentrations of disinfection byproducts formed are a function of the amount of precursor material available, the concentration of chlorine, time of contact, pH and temperature.

The use of chlorine in drinking water supplies in the early 1900's nearly eliminated waterborne bacterial outbreaks in this country. Its public health importance cannot be overemphasized. However, the THMs and other disinfection byproducts formed as part of the chlorination process are probable human carcinogens. There is growing national recognition that the levels of THMs and other disinfection byproducts in drinking water need significant additional research and probable regulatory control to achieve improved public health protection.

When the THM regulation first took effect, several New Jersey water systems exceeded the 100 ppb standard. By plant modifications and changes to chlorine application practices, the levels of THMs have dropped, and systems returned to compliance. In 1994, only one water system in New Jersey exceeded the 100 ppb

annual average concentration for THMs. Recent Federal regulations have proposed changing the standard to 80 ppb. If the standard were lowered, three water systems in the state would exceed the standard based on 1994 data. A future standard of 40 ppb is being considered by EPA. Twenty-four systems would exceed the standard based on 1994 data.

Another major group of disinfection byproduct contaminants being proposed for regulation are the haloacetic acids (HAA). This group of disinfection byproducts has not been regulated in the past. The Public Health Environmental Laboratory at NJDOH is presently analyzing samples for HAA in drinking water. These test results must be evaluated during the next year to learn more about New Jersey's water quality. EPA is proposing a standard of 60 ppb and considering an even lower standard of 30 ppb for a group of 5 HAAs.

The balance between the amount of disinfectant used for microbiological protection of drinking water and the amount of disinfection byproducts produced as a result of the chlorination process must be carefully managed in order for the water utilities to continue providing high quality drinking water.

2.4.7 Radon

In 1987, 129 wells in crystalline rocks were sampled by NJDEP for radon. The radon values in that sampling ranged from 36 to 24,000 pCi/L and 5.4 percent of the wells had levels greater than 10,000 pCi/L. Presently a MCL of 300 pCi/L for radon in groundwater has been proposed by EPA.

3. Program Successes

The State of New Jersey has always maintained a strong interest in the safety of its drinking water supplies. Chlorine disinfection, first used in New Jersey in the early 1900's, and mandatory surface water filtration required since the late 1960's are strong contributing factors to our lack of waterborne disease outbreaks. Modeled after the federal act, the state passed the New Jersey Drinking Water Act in 1976 and subsequently was delegated primacy by the EPA. Prior to 1984, the drinking water quality program consisted of regulating and monitoring microbiology, inorganic chemistry, trihalomethanes, limited pesticides and herbicides, and radiochemistry parameters. These state monitoring requirements were identical to those required by the federal government.

Recent drinking water program successes include: 1) promulgating New Jersey MCLs for VOCs; 2) obtaining primacy and implementing new EPA drinking water regulations; 3) insuring adequate water supplies through the critical area process and

regional water projects; 4) revising and developing MCLs for 10 contaminants; 5) improving data management; 6) maintaining a research program on drinking water issues; and 7) continuing the water supply loan program.

3.1. Promulgating New Jersey MCLs for VOCs

On January 9, 1984, landmark legislation was signed into law that established New Jersey's hazardous contaminant testing program in drinking water. The lack of federal drinking water standards for VOCs, detected in both New Jersey groundwaters and in the groundwaters of other states in the early 1980's, prompted the NJ legislature to pass these amendments to the NJ Safe Drinking Water Act (P.L. 1983, c.443). These amendments mandated that CWS begin monitoring the water delivered to their consumers for a list of 22 synthetic organic contaminants commonly referred to as the "2a" list. This legislation also charged NJDEP with the responsibility of setting MCLs for these 22 contaminants, targeting other candidate compounds to add to the list, and establishing a drinking water quality research program. In addition the legislation established the DWQI, a 15 member advisory group to the department on matters relating to drinking water. To derive the MCLs, the DWQI combined three key elements: health effects information, analytical methodologies including practical quantitation limits, and water treatment capabilities.

The DWQI recommended MCLs for 16 of the 22 hazardous contaminants to the NJDEP in 1987 and MCLs for these 16 contaminants were adopted by the Commissioner in January 1989. The lack of EPA approved analytical methodologies precluded the DWQI from recommending MCLs for all 22 of the hazardous contaminants listed in the law. Prior to the adoption of these enforceable standards, the NJDEP developed interim guidelines for assessing drinking water test results based on the best available published federal information available at the time. These interim guidelines were used by the department from 1985 through 1988. Although the guidelines enabled the department to strongly recommend actions needed at the water supplies with the highest levels of synthetic organic contaminants, many water utilities were willing to take contaminated wells out of service but deferred making large capital expenditures for treatment for removal of the hazardous contaminants until the MCLs were adopted into regulations and were enforceable. The DWQI recommended that the MCLs be reviewed every three years to insure that the most current toxicological, analytical and treatment data have been incorporated into NJ drinking water standards.

3.2. Obtaining Primacy and Implementing new EPA Drinking Water Regulations

Prior to the adoption of new Federal primacy regulations in 1989, a State that had primary enforcement responsibility or

primacy for the Federal Safe Drinking Water Act regulations was automatically granted primacy for new rules. The BSDW has had primacy since 1978. The federal primacy regulations now require states to apply for primacy for each new Federal regulation that is proposed and adopted. Major work efforts have been expended in receiving primacy for the following rules that have been proposed and adopted since the primacy rules took effect: total coliform rule and surface water treatment rule; lead and copper rule; phase II/V rules for VOCs, pesticides, synthetic organic compounds (SOCs), and inorganic compounds (IOCs). This involved demonstrating to EPA Region 2 and/or EPA Headquarters that the New Jersey drinking water program fulfills the implementation, reporting, and enforcement requirements of the federal regulations.

The 1986 amendments to the Federal Safe Drinking Water Act required 83 contaminants to be regulated in drinking water. Most of these contaminants are included in the above rules. New concepts such as first draw sampling and action levels for lead and copper; point-of-entry sampling, base monitoring requirements, vulnerability assessments and sampling waivers for phase II/V regulations; and groundwater under the direct influence of surface water were introduced into regulation. The BSDW with support from DSR had to develop action plans for implementing these new concepts in our drinking water systems, educate the internal staff, educate the regulated community, upgrade BSDW's data management system, and implement the rules in NJ. In addition, the time frames for implementation were very challenging.

Examples of the types of information that had to be gathered for each CWS and NTNC in order to successfully implement the Federal program are: 1) an assessment of whether ground water was influenced by surface water and therefore is subject to the filtration requirements of surface water, 2) a survey of pipes used in the water distribution system to determine if asbestos pipe was present and ultimately determine if monitoring is necessary for this parameter, and 3) a survey of all community and noncommunity water sources to determine land use within the 5 year time of groundwater travel for the aquifer where the wells were located. This survey was done so that BSDW could determine where costly pesticide monitoring was necessary and where this monitoring requirement could be waived. These data are on databases within the BSDW.

BSDW received primacy for the surface water treatment rule in 1993, lead and copper in 1994, and phase II/V in 1995. Many other states have not had the same degree of success in implementing these new rules. For example, California has not yet received primacy for the lead and copper rule.

3.3. Adequate Water Supply

Over the past 10 years New Jersey has made significant progress in addressing overpumping in two large potable use aquifers and in providing additional safe yield in northeastern New Jersey. New Jersey has established two critical areas for ground water withdrawal. Critical areas are created through a statutorily established program. After USGS conducts studies to establish the extent of overpumpage and regional planning identifies regional solutions for additional water, the NJDEP establishes the critical area. The establishment of the critical areas has allowed NJDEP to either reduce or hold steady groundwater withdrawals, and encourage the use of new regional sources of water to offset the loss of groundwater resources. Critical Area No. 1 (portions of Monmouth and Ocean Counties) has already seen an increase in water levels in previously stressed aquifers. The alternate water supply in Critical Area No. 2 (portions of Camden, Burlington, and Gloucester Counties) is currently under construction.

Additionally, to supplement northeastern surface water sources, that previously had frequent water shortages, the State supported a unique public/private partnership to provide additional pumped storage capacity through a new pumping station and raw water transmission mains to two existing and one new reservoir. This additional safe yield provided additional water to four large water systems in northeastern New Jersey and has prevented at least two drought emergencies since being placed into service.

3.4. Revising and Developing MCLs for Ten Contaminants

NJDEP, in conjunction with DWQI, has completed a review of the basis for the 23 MCLs which were adopted in 1989 pursuant to the 1983 amendments to the NJ Safe Drinking Water Act. Based on an evaluation of current toxicological information, analytical methods and treatment techniques, changes are recommended for five MCLs: chlorobenzene, cis-1,2-dichloroethylene, trans-1,2-dichloro-ethylene, formaldehyde, and xylenes. Additionally, as mandated by the 1983 amendments, MCLs were developed for five additional contaminants chosen on the basis of their occurrence in New Jersey water supplies. These are 1,1-dichloroethane, methyl tertiary butyl ether, naphthalene, 1,1,2,2-tetrachloroethane, and 1,1,2-trichloroethane. It is anticipated that these 10 MCLs will be included as part of the State Safe Drinking Act regulatory proposal later this year.

3.5. Improving Data Management

3.5.1 Locating and Managing Source Waters

Surface Water Intakes - Personnel from the BSDW and DSR used

a GPS unit to accurately locate the intakes for all of the CWS in New Jersey. This information is currently being translated into a Geographic Information System (GIS) file. This information will be very valuable for future program decisions that involve potable water considerations.

CWS Wells - In order to begin developing the WHPA delineation process, it was recognized that information on water supply wells was not adequate to meet current and future WHPP needs. Three separate programs maintained databases on public supply wells which could not be easily linked. The three programs are BSDW, BWA, and the New Jersey office of USGS. During the past three years resources have been placed in data development and coordination of information related to ground water supplies which are sources of potable water. As part of the WHPP, resources were invested in updating and improving existing information, making corrections where data were found to be inaccurate, and coordinating this information into one database which could then be then used by all three programs. This database currently is managed by the New Jersey Geological Survey (NJGS) and will be amended as the WHPA delineations progress.

New technology now allows accurate locational information to be collected on the wells utilizing GPS. Both GPS and database information are placed on NJDEP's GIS. Within the last three years, locational information for 2000 of the State's approximately 2700 CWS wells has been collected and correlated. Gaps in the available data exist for some of the smaller CWS wells. The OEP is working with the County Health and Planning Departments to obtain locational information for the 1300 NTNC wells. Five counties are working with the state to collect this information.

3.5.2 Developing a PC based database for CWS source inventory, analytical data, and violations

The BSDW contracted with the Office of Telecommunications and Information Systems (OTIS) in the NJ Department of Treasury to develop a personal computer based data presentation system for information on all public water systems in NJ. Prior to the development of this system, all records regarding water systems were maintained in a SAS database on a mainframe computer that was difficult to access. Now each user can access the administrative information associated with each water system, the physical attributes of the water supply system (i.e., names of treatment plants, names of wells, capacity of the facilities, generators, water tanks, etc.), test results, and violations from 1993 to the present. This enables each user to quickly call up basic information on water systems and water quality, determine compliance and enforcement status and respond to requests for information in a more timely and accurate fashion.

3.5.3 Developing a Vulnerability Ranking for all CWS and NTNC Wells

The Phase II/V Safe Drinking Water Regulations allow states to issue monitoring waivers for VOCs, pesticides, and SOCs if the water source is not vulnerable to contamination by these compounds. Vulnerability is defined as a combination of the susceptibility of the source water (ground or surface water) to contamination, and the use of the pesticides and SOCs in the vicinity of the source water. Both susceptibility and use waivers can be issued. As part of a DSR-sponsored research project, the USGS developed a model for ranking the susceptibility of CWS's source waters to contamination from surface activities. The model was based upon factors such as depth of the well and the distance from an outcrop area. Each well used by a CWS was given a rating of high, medium, or low susceptibility (see Figure DW-4). In addition, DSR developed a model for the NTNC sources using previously reported data on nitrate concentrations and the occurrence of VOCs.

DSR developed a questionnaire concerning land use and human activities that occur in the vicinity of each well. Data on a total of 2059 CWS wells were collected. This corresponds to 1,207 CWS points of entry. Using the susceptibility ranking developed by USGS and the information from the questionnaire, 280 POEs were granted susceptibility waivers and 717 POEs were granted use waivers. The remaining 310 POEs had one or more wells that were considered to be vulnerable to pesticide contamination and needed to be sampled. At this time, 326 CWS wells are targeted for sampling and 113 POEs have had all of the required screening samples collected. Although the analytical results are not available for all the samples, so far, only 3 CWS wells have had a detectible concentration of a pesticide.

Data were available for a total 1147 NTNC wells. Using the susceptibility ranking developed by DSR and the information from the questionnaire, 564 POEs were given susceptibility waivers and an additional 369 POEs were issued use waivers. The remaining POEs had one or more wells that were considered to be vulnerable and needed to be sampled. A total of 180 wells were targeted for sampling. At this time 92 NTNC wells have had all of the required screening samples collected. Although the analytical results are not available for all of the samples, so far, only two NTNC wells have had a detectible concentration of a pesticide.

This innovative program saved water purveyors in New Jersey approximately $8 million in analytical costs, and it allowed BSDW to concentrate its pesticide sampling on groundwater wells where pesticide contamination was most likely to be found.

3.6. Maintaining a Research Program on Drinking Water Quality

The drinking water program includes an active water quality research program in DSR. This allows the State to conduct research on emerging environmental issues that have special significance to NJ with a focus on NJ drinking water supplies. Besides providing funding for a number of professional positions in DSR, the program allocates approximately $300,000 annually for research projects relating to drinking water and source waters. The type of research the program has funded in the past includes the development of analytical techniques for particular classes of contaminants (e.g., pesticides); technical support for the development of MCLs, contaminant occurrence surveys, such as studies of Crytosporidium and Giardia in source waters; and the development of approaches such as the model being used to conduct vulnerability assessments for Phase II contaminants. Approximately five projects are funded annually through this fund.

3.7. Continuing the Water Supply Loan Program

NJDEP has actively promoted its Water Supply Loan Program intended to benefit the State, the consumer, and the waterworks industry. The Water Supply Bond Act (Bond Act), L. 1981, c. 261, as amended by L. 1983, c. 355, authorized issuance of $350 million in bonds to provide for planning and construction of infrastructure necessary to assure adequate supplies of potable water. The Bond Act established a revolving low interest loan program for public owned water utilities to conduct improvements in accordance with the periodic updates of the 1982 NJ Statewide Water Supply Master Plan. Loans are repaid to the "Water Supply Fund" and are available for future loans or other projects. These types of loans set up by the Bond Act included (all dollar figures in millions):

Loan Program	Master Plan Alloc.	Legis. Approp.	No. Loans Executed	Loans Executed	Applic. in Process
High priority infrastructure rehabilitation	$120	$100	114	$78.0	$38.9
Interconnection testing and improvement	$15	$8	1	$0.275	$5.9
Contaminated wellfield replacement	$27	$27	20	$21.9	$2.0

The water supply infrastructure rehabilitation loan program

has provided an incentive to publicly owned water utilities to rehabilitate existing facilities, and therefore, to conserve water by elimination of leakage and inefficiency. The consumer has benefitted through improvements which reflect water supply reliability.

The revitalization of water supply infrastructure has provided job opportunities to both the professional and construction industry for the duration of the improvement work. Improvements made as a result of the loans may encourage other economic development which is dependent upon adequate and reliable water supply.

4. Analysis of Program Weaknesses

The following seven areas where improvements need to be made were identified: 1) the inflexibility of EPA regulations; 2) data management; 3) enhancing the working relationship with county and local health agencies; 4) low priority placed on nonregulatory programs which focus on nonpoint source problems, groundwater management, and groundwater protection; 5) no coordinated NJDEP program to collect and evaluate information on water quality problems in private wells; 6) depletive use of water, and 7) assess the interrelationship between potable water withdrawals and wastewater discharges.

4.1. Need for Enhanced Flexibility of EPA Regulations

The current national primary drinking water regulations are very complex and prescriptive in nature. These regulations establish MCLs or treatment techniques and for most rules rigid monitoring schedules. Recent regulations have been highly controversial, with legal challenges from regulated industry and environmental groups. In order for both federal and state drinking water programs to address future drinking water concerns, either substantial additional resources will need to be identified in both Federal and state budgets, or extensive revisions to existing regulations that focus Federal and state resources on monitoring and reporting violations of small systems will be needed. To encourage the most effective utilization of resources states should be allowed to develop their own state-specific monitoring programs, addressing their highest priorities while still maintaining minimum national MCLs.

4.2. Data management

4.2.1 Need to Implement Electronic Submission of Analytical Data

All monitoring results, except radiological contaminants, are reported to the BSDW on paper. There are approximately 20,000 summary reports for total coliform monitoring alone submitted each year to BSDW. These reports must then be entered into a

database to determine compliance with the drinking water standard. Many drinking water laboratories automatically computer generate the standard BSDW reporting forms and provide a paper copy of the results for BSDW to then manually enter into a database. A more efficient way to handle data would be for the laboratories to electronically transfer the data to BSDW. The BSDW would benefit from electronic data transfer because it would decrease the number of test results that are lost in the mail system and it would eliminate transcription errors. In addition, staff time could be focused away from data entry and tracking down test results that have not been received by NJDEP into other areas of BSDW needs.

NJDEP has an electronic bulletin board that could be utilized for receiving the data. BSDW needs to complete the development of a reporting format which would be compatible with every laboratory or purveyor submitting data to BSDW.

4.2.2 Need to Improve Laboratory Certification and QA/QC Program

Enhanced priority should be placed on improving the laboratory certification program and on data management of quality assurance data generated by individual certified laboratories.

The laboratory certification program is an important component of the Safe Drinking Water program in New Jersey. Through this process of data validation BSDW can be certain that the analytical data generated by the many private laboratories meet the necessary QA/QC standards. There are two laboratory certification issues that are important to BSDW's program:

1. certification for inorganics needs to be done on a method specific basis, as it is for organic compounds, and not on a contaminant specific basis;
2. setting up certification for new EPA methods needs to be made less time consuming and difficult.

Currently, the NJDEP laboratory certification program collects and evaluates a large amount of data that are not data managed. This means that this information is not readily available to other programs in NJDEP. This information includes laboratory method detection limits, precision and accuracy data for each method/analyte for which a laboratory requests certification. The BSDW needs access to these data to determine interlaboratory MDLs and develop contaminant and method specific practical quantitation levels (PQLs). This information is important to the BSDW for two reasons: 1) expensive monitoring decisions are based on low level detections, and 2) in developing drinking water standards, analytical considerations are integral parts of the process.

4.2.3 Lack of Coordination Between NJDEP Databases

Historically, various programs have developed databases to manage their specific program needs. Currently, there are multiple databases within NJDEP that include information about public water supply systems. The coordination of the types of data being collected by the various programs, the level of accuracy, and the program responsibilities to insure consistency across programs needs better definition.

4.2.4 Development of BSDW Source Inventory for NTNC

As part of the vulnerability assessment survey process for VOCs, pesticides, and SOCs, detailed information has been collected on CWS and NTNC water sources. A preliminary source inventory exists on the SAS mainframe database that meets EPA's minimal requirements, however, it has not proved to be useful for conducting vulnerability assessments. Since the BSDW is required to regulate NTNC at nearly the same level as CWS, the development of a source inventory with well attributes, well permit numbers, and treatment facilities identified is critical.

4.2.5 Analytical Data is Managed for Compliance with EPA Regulations

Data records submitted by water purveyors in accordance with the drinking water regulations are maintained in databases developed for compliance purposes. While the databases are adequate for tracking reporting violations or determining MCL exceedances, they are not necessarily appropriate or efficient for the characterization of water quality or the assessment of trends. For instance, lead and copper data are entered into the same database; however, there is no parameter to specify where samples were collected, so there is no way to correlate lead with copper levels or lead with pH, alkalinity or any other parameter which may impact lead concentrations in drinking water. Data programs should be reevaluated for uses other than compliance assessment.

4.3. Enhancing NJDEP'S Working Relationship with County and Local Health Agencies

The drinking water program continues to generate large numbers of routine monitoring and reporting violations for NTNC and TNC systems. Many of these violations occur because of the transitory nature of these systems, going out of business, change of ownership, connecting to other water systems. The updating of this information by county and local health agencies is not a high priority. Additionally, many systems continue to send test results to the local agency and not also to the BSDW. Over the past several years the BSDW, in coordination with the Bureau of Local Government Assistance, and regional enforcement Bureaus,

has made significant progress in reducing the number of violations. However, much remains to be done. Local agencies need either local ordinances or statewide enforcement strategies to address chronic noncompliers.

4.4. Additional Emphasis Needed for NonPoint Source Problems, Groundwater Management Issues, and Groundwater Protection

NPS Management and Ground Water Management have gained much of their success by their ability to work with the public and to convey their prevention message to the public. Partnerships with these groups, which include: business and industry as well as nonprofit environmental groups, and their education has been a successful venture in raising awareness to solutions to prevent pollution. These programs have also relied on these outside interests due to a lack of staff resources. Funding for these initiatives has been available through both Federal 319(h) funds and 106-Groundwater funds, and through the State Water Bond Fund. Continued effective use of these funds for pollution prevention efforts is needed.

4.5. No Coordinated NJDEP Program for Gathering Information on Water Quality Problems of Private Wells

Approximately 1.5 million people in New Jersey drink water from private wells. Local health departments respond to private well contamination cases for all types of contaminants as needed. In general NJDEP becomes involved with private well contamination cases when there are hazardous contaminants involved. However, certain private well problems such as microbiological contamination or nitrate contamination are not brought to NJDEP's attention on a regular basis. NJDEP responds to private well contamination problems on a case-by-case basis when large numbers of wells are contaminated from man-made sources through publicly and privately funded site remediation programs. There presently is no regulation or policy that allows or encourages NJDEP to gather information on private wells for parameters other than hazardous substances in order to evaluate other water quality problems that may impact the private well owner. Since many pollution problems are first identified in private wells, this data could be important to NJDEP and to the counties.

4.6. Depletive Use of Water

Based upon estimates in NJDEP's Water Supply Master Plan and Depletive Water Use Report, 50 percent of water use in the State is depletive. The water is not returned to the original basin after use due in large part to the regionalization of wastewater treatment facilities. This has the potential to affect the amount of water available for drinking water and other uses. NJDEP needs to evaluate how to balance the various in-basin and out-of-basin needs, and develop a policy including a strategy on

how existing programs will implement the policy.

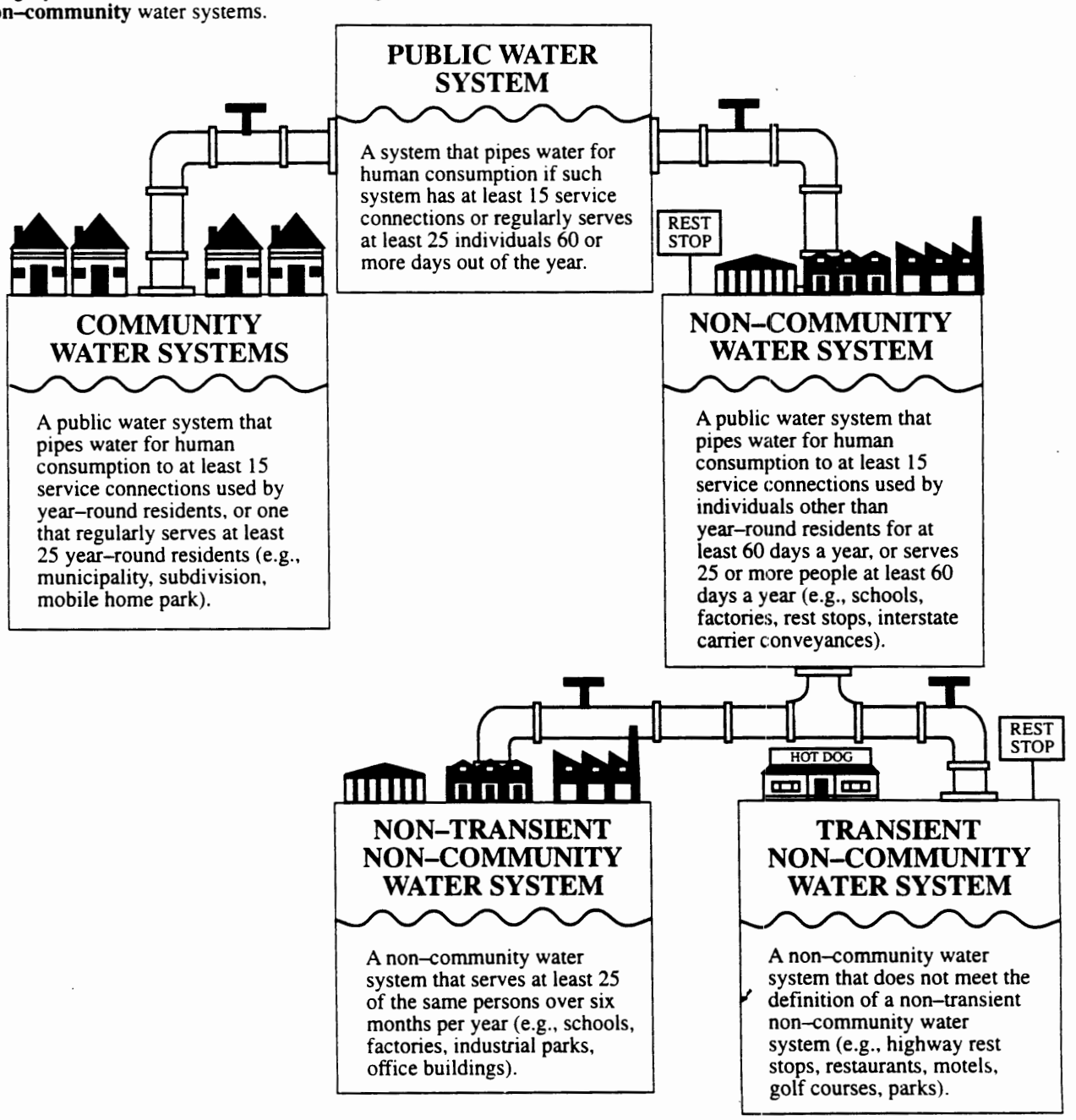
4.7. Assess the Interrelationship Between Potable Water Withdrawals and Wastewater Discharges

Many streams within the State contain areas where water intakes and wastewater discharges exist close to one another within the same stream segment. A discharger may be located directly above a water supply intake thereby affecting the water quality or an intake above the discharger affecting the discharger's ability to meet effluent limitations. Additional evaluations of the impacts of point source discharges on surface water intakes need to be conducted.

FIGURE DW- 1

Types of Public Water Systems

A "public water system" has 15 or more service connections or regularly serves at least 25 people 60 or more days a year. A system that serves water 60 or more days a year is considered to "regularly serve" water. Public water systems can be publicly or privately owned. Public water systems are subdivided by regulation into two major categories: **community** and **non–community** water systems. This division is based on the type of consumer served and the frequency the consumer uses the water. Basically, a **community system** serves water to a residential population, whereas a **non–community system** serves water to a non–residential population. The **non–community** category is futher broken down into two categories: **non–transient non–community** water systems and **transient non–community** water systems.



From: Public Notification Handbook for Public Water Systems, USEPA Office of Water, USEPA Publication 570/9–89–002 September 1989

Figure DW-2. Locations of Areas with Mercury-Contaminated Ground Water.

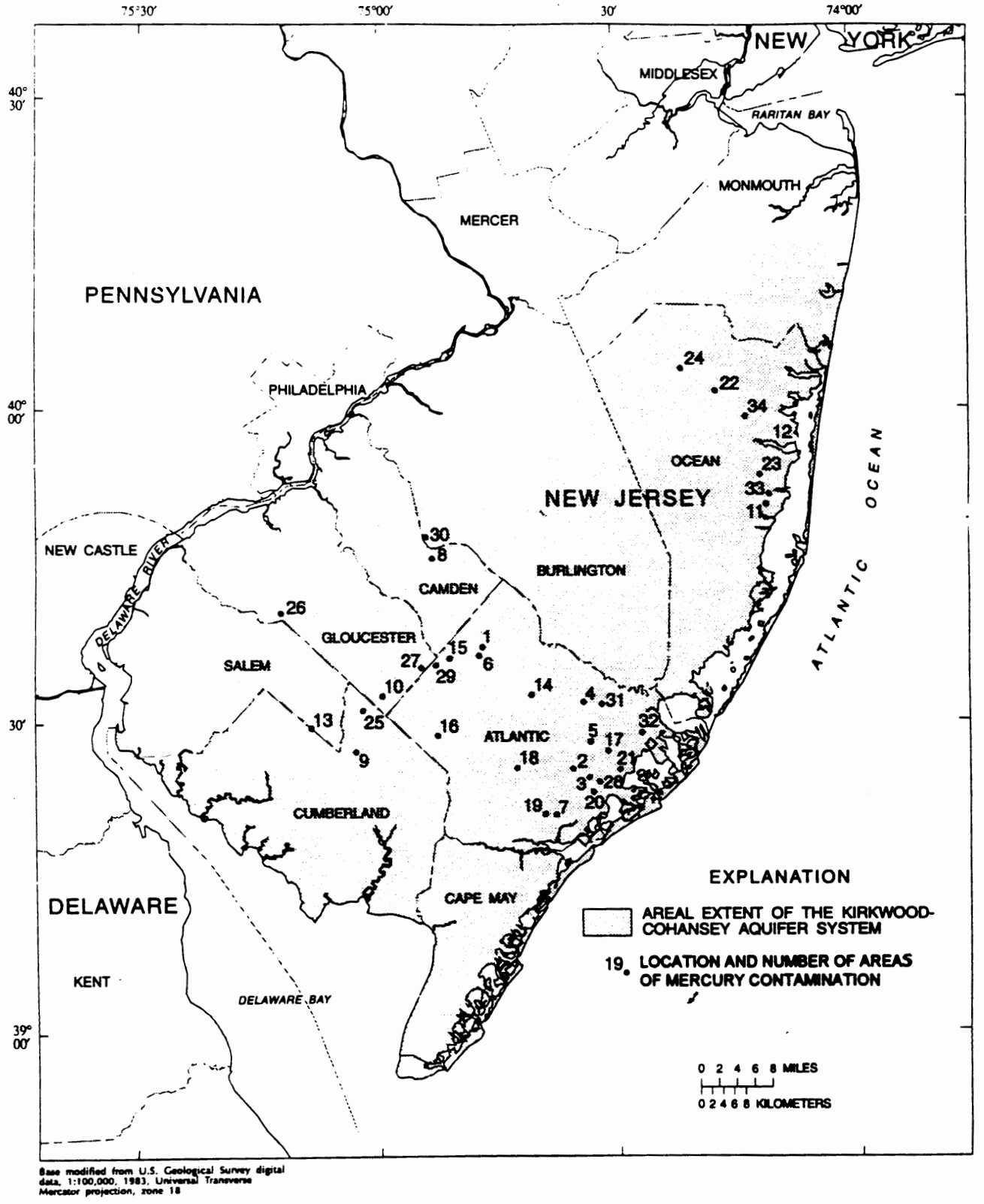
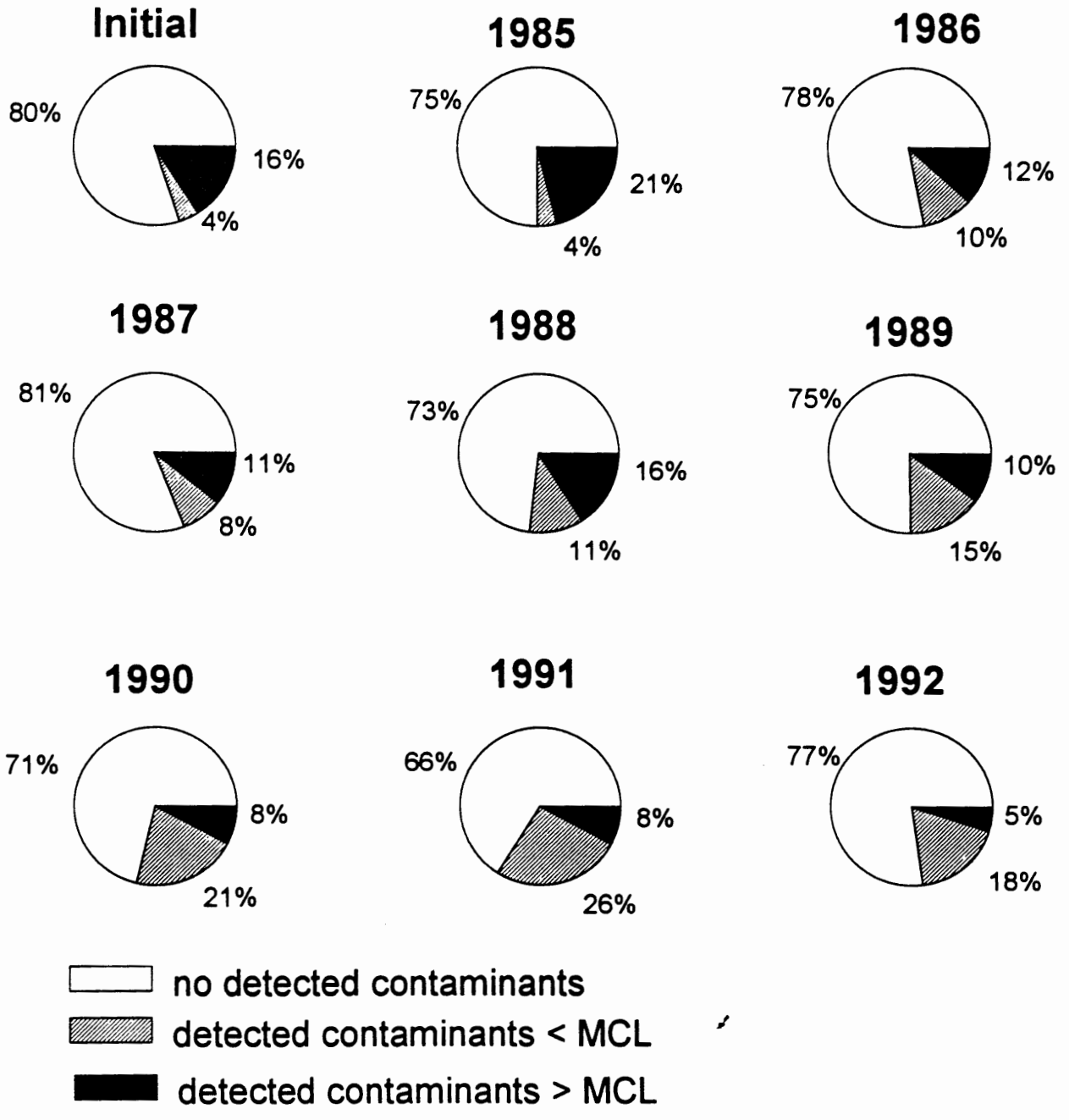


Figure DW-3. Distribution of Public Community Water Systems Reporting Detectable Levels of Hazardous Contaminants.



These pie charts present the percentage of public community water systems reporting the presence of at least one of the 17 hazardous contaminants. If contaminants were detected above the MCL in some samples and below in others, the purveyor was placed in the > MCL category.

Figure DW-4. Susceptibility of Wells Used by Community Water Systems to Contamination by Pesticides and VOCs.

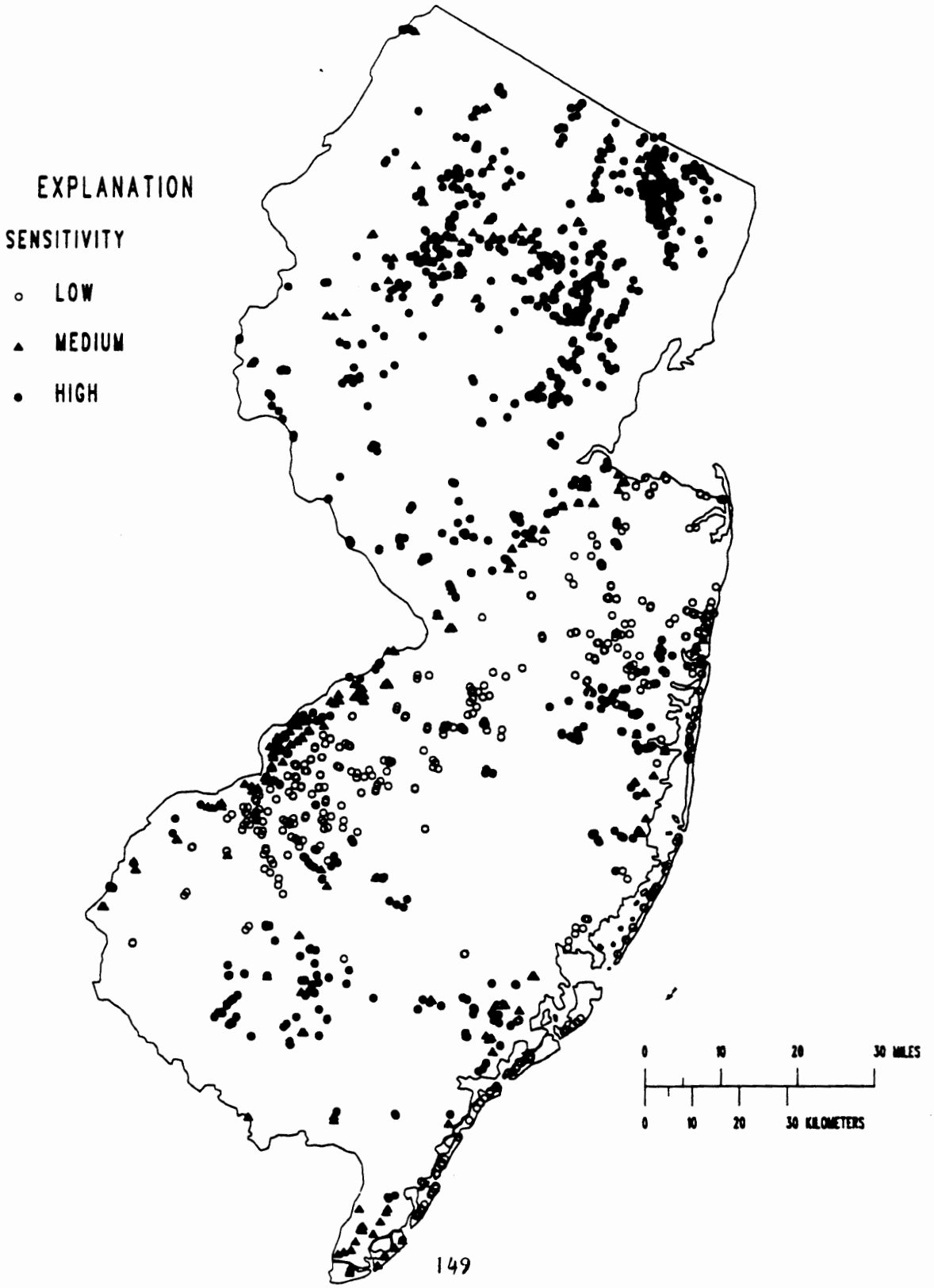


Table DW-1: Sampling Requirements for Major Contaminant Categories in Public Drinking Water Systems 1993-1995

Contaminant	Sampling Frequency	Types of Systems Required to Sample	No. of expected reports/ year
Microbiological	Monthly Quarterly	CWS[1] NTNC, TNC	7,548 16,716
Turbidity[2]	Daily	CWS NTNC	816 36
Inorganic Chemicals			
Surface Water	Annual	CWS,NTNC	71
Nitrate	Quarterly	CWS,NTNC	284
Nitrite	Once in a cycle	CWS,NTNC	71
Ground Water	Once every 3 Yrs (1/1/93 to 12/31/95)	CWS,NTNC	600
Nitrate	Annual	CWS	4,747
Nitrite	Once in a cycle	NTNC, TNC,CWS, NTNC	4,747
Lead and Copper	Every 6 months[3]	CWS, NTNC	1778 (1992-1994)
Volatile Organic Chemicals	4 quarterly samples every 3 years[4]	CWS, NTNC	2,400

Synthetic Organic Chemicals	4 quarterly samples every 3 years[5]	CWS, NTNC	100
Radionuclides	Once every 4 years	CWS	158
Total Trihalomethanes	Quarterly[6]	CWS	150

[1] The number of samples each month varies depending on population served. A NTNC using surface water, ground water under the direct influence of surface water, or supplying a population >1,000 must monitor at the same frequency as a CWS.

[2] Turbidity is only measured at water systems using surface water sources.

[3] The initial monitoring periods are at 6 month intervals, a frequency that continues after installation of corrosion control. A monitoring reduction may be granted if two consecutive 6 month monitoring cycles meet the action levels for lead and copper.

[4] Four consecutive quarterly samples every three years (1993-95), reduced to 1 sample annually if no detections. A sampling waiver based on susceptibility and use can be issued to further reduce monitoring in 1993-95.

[5] Four consecutive quarterly samples every three years (1993-95), reduced to 2/yr every three years or 1/3 years (1996-98). A sampling waiver based on susceptibility and use can be issued to further reduce monitoring in 1993-95.

[6] A CWS using only ground water sources may have the sampling frequency reduced to annually.

APPENDIX

Letter of Self-Nomination

Press Release Announcing NJDEP's Participation in NEPPS

State of New Jersey

Christine Todd Whitman
Governor

Department of Environmental Protection

Robert C. Shinn, Jr.
Commissioner

June 29, 1995

Ms. Jeanne Fox
Regional Administrator
U.S. Environmental Protection Agency, Region II
290 Broadway
New York, NY 10007

Dear Administrator Fox:

In accordance with the joint agreement signed on May 17, 1995, by the U.S. Environmental Protection Agency (EPA) and the Environmental Commissioners of the States (ECOS), this letter serves as New Jersey Department of Environmental Protection's (Department) declaration letter to participate in the Environmental Performance Partnership System beginning in federal fiscal year 1996.

As specified in the Performance Partnership System document, this Department will submit to your office a self-assessment of its efforts for the federally delegated programs related to air, water quality and safe drinking water. Additionally, an environmental performance agreement for the programs specified above will be negotiated with EPA Region II resulting in a signed agreement on or before October 1, 1995. The Department will continue negotiations with Region II EPA on a performance partnership agreement of all remaining federally delegated programs for consideration in federal fiscal year 1997.

In the months to come, I look forward to working cooperatively with you and your colleagues at the EPA as we make the transition from the current EPA/state oversight system toward a more meaningful expression and evaluation of our environmental programs.

Sincerely,

Robert C. Shinn, Jr.
Commissioner

c: Shelley Metzenbaum
Mary Gade
Robert Roberts

New Jersey
Department of Environmental Protection

PRESS OFFICE
CN 402
Trenton, New Jersey 08625-0402

Christine Todd Whitman, *Governor*
Robert C. Shinn, Jr., *Commissioner*

NEWS

RELEASE: JULY 13, 1995
STATEWIDE 95/79

CONTACT: Amy Collings or Elaine Makatura
609-984-1795 or 609-292-2994

DEP & EPA AGREE TO TEST NEW APPROACH TO ENVIRONMENTAL PERFORMANCE

New Jersey Environmental Protection Commissioner Robert C. Shinn Jr. today announced the state Department of Environmental Protection (DEP) will voluntarily participate in a new federal/state partnership to better evaluate how well the state's environmental programs are protecting human health and the environment.

New Jersey is one of about a dozen states to participate in the pilot project with the U. S. Environmental Protection Agency (EPA).

In a letter to EPA Regional Administrator Jeanne Fox, Shinn pledged the state's involvement in the National Environmental Performance Partnership System, which calls for setting environmental goals and provides states greater flexibility to achieve them.

"Under this program, EPA will begin to rely less on counting the number of permits issued and the number of enforcement actions taken to evaluate how well DEP carries out its responsibilities, and instead will rely more on environmental improvement as the measure of success," said Shinn.

According to Shinn, the DEP's clean air, drinking water and water quality programs will be the first areas within the department where this new approach to environmental management will be tested, beginning October 1, the start of the federal fiscal year. Shinn plans to continue on-going negotiations with EPA so that all of its remaining EPA delegated programs participate as of October 1, 1996.

The new approach will allow EPA to devote more time to states that require greater attention and decrease routine oversight activities in states with stronger environmental protection programs, such as New Jersey.

"This partnership will result in a shift from accounting to accountability. It will allow us to set priorities and goals specific to New Jersey, and will involve developing good environmental indicators to meet those goals. It will enable us to make better decisions about environmental management," Shinn said. In a move that will support this new approach, EPA will seek Congressional authorization that would allow various EPA grants to be combined into partnership grants, providing the states with the flexibility to devote resources to areas of greatest need.

This change in the way DEP will report to the EPA could take the following form in the DEP's clean air program. While staff will continue to measure the tons of emissions reductions in the state each year, they might also measure the impact of those reductions on human exposure to air pollutants. At the end of each year, the program could report on how many fewer residents in New Jersey were exposed to air pollution at levels exceeding air quality standards.

(more)

"Expressing the results by using environmental indicators will help the public better understand the work we do and how it affects them," said Catherine Cowan, DEP's assistant commissioner for environmental regulation. DEP staff members are currently developing environmental indicators for the three programs involved in this year's pilot.

A notice of the new federal/state partnership will be published in the Federal Register this winter to solicit public comment. DEP's plans also call for public participation in this new environmental management partnership. It will seek input from the environmental and regulated communities, as well as local and county officials, later this year.

While New Jersey develops its environmental indicators, the EPA, in conjunction with the states, will assess national environmental conditions and will identify national environmental goals and indicators to measure how well programs attain those goals. These indicators could include, for example, the miles of streams where swimming or fishing is prohibited. New Jersey will consider the national indicators as it establishes state specific environmental indicators.

"This effort requires significant data collection which we are confident we can accomplish through environmental monitoring and other means," said Shinn. "Furthermore, our Geographic Information System will help us analyze this data," he said, referring to the state's computerized mapping program that inventories and charts numerous environmental factors statewide. For the partnership project, DEP currently is evaluating all its monitoring programs to prioritize those areas with the greatest data collection needs.

In the first year of the partnership, each state, in cooperation with the EPA, must develop a performance agreement by Oct. 1, which is a proposed action plan for environmental improvement. In subsequent years, the states will submit reports measuring how successfully environmental improvement plans were carried out.

The initiative was developed over the past year by state and federal officials, and was spurred by the Environmental Commissioners of the States, an organization of state-level environmental officials of which Commissioner Shinn is an executive committee member.

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