REPORT TO EPA

A Self-Assessment of New Jersey's Environment

and the Programs of the

New Jersey Department of Environmental Protection

Volumes I & II

National Environmental Performance Partnership System (NEPPS)

NJ Department of Environmental Protection (NJDEP)

March 1998

This Self-Assessment is an integral part of the implementation of the National Environmental Performance Partnership System (NEPPS) in New Jersey. A draft version of this document was submitted to the Environmental Protection Agency (EPA) Region 2 in September 1996, and was used as the basis for negotiations for New Jersey's FY97/98 Performance Partnership Agreement. The full document contained herein also includes detailed indicator information in the companion Environmental Indicators Appendix (Volume III). Information in Volumes I and II is current through June 1, 1997. Publication of these first two volumes has been delayed until this time so that all three volumes could be presented simultaneously.

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The work of the following individuals is gratefully acknowledged in the development of this comprehensive document evaluating New Jersey's environment and the programs of the New Jersey Department of Environmental Protection.

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NJDEP and EPA Region 2 are very interested in receiving comments on all aspects of this document, particularly on the key environmental issues and environmental indicators. Comments may be submitted to:

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To add your name to NJDEP's mailing list to receive notices of NEPPS public participation opportunities, call (609) 984-6071.

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LIST OF ABBREVIATIONS

ADR	Alternative Dispute Resolution
AEQ	Air and Environmental Quality Enforcement (Division of Enforcement Field Operations)
AMNET	Ambient Biological Monitoring Network
ANSP	Academy of Natural Sciences of Philadelphia
AQPP	Air Quality Permitting Program
BER	Bureau of Environmental Regulation
BMP	Best Management Practices
BOD	Biochemical Oxygen Demand
BPC	Bureau of Pesticide Compliance
BPO	Bureau of Pesticide Operations
BSDW	Bureau of Safe Drinking Water
BWA	Bureau of Water Allocation
C&D	Construction and Demolition (Waste)
CAAA	Clean Air Act Amendments of 1990
CAFRA	Coastal Area Facility Review Act
CBOD	Chemical/Biochemical Oxygen Demand
CEA	Classification Exception Area
CEHA	County Environmental Health Act
CEMS	Continuous Emissions Monitoring System
CERCLA	Comprehensive Environmental Response, Compensation & Liability Act
CESQG	Conditionally Exempt Small Quantity Generator
CFR	Code of Federal Regulations
CMP	Comprehensive Management Plan
CO	Carbon Monoxide
CSO	Combined Sewer Overflows
CWEA	Clean Water Enforcement Act
CWS	Community Water System
DLA	Delegated Local Agency
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
DOT	New Jersey Department of Transportation
DSR	Division of Science and Research
DSW	Discharge to Surface Water
DWQ	Division of Water Quality
DWQI	Drinking Water Quality Institute
DWS	Division of Water Supply
EPA/USEPA	Environmental Protection Agency
ESP	Emission Statement Program

FGW	Fish, Game and Wildlife
GIS	Geographic Information System
GPD	Gallons per Day
GPS	Global Positioning System
GWQS	Ground Water Quality Standards
HAA	Haloacetic acid
HHW	Household Hazardous Waste
HSWA	Hazardous and Solid Waste Amendments (to RCRA)
HW	Hazardous Waste
IEC	Immediate Environmental Concern
IOCs	Inorganic Compounds
IPP	Industrial Pretreatment Program
ISRA	Industrial Site Recovery Act
LEV	Low Emission Vehicle
LQG	Large Quantity Generator
MARAMA	Mid-Atlantic Regional Air Management Association
MCL	Maximum Contaminant Level
MGD	Million Gallons per Day
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPN	Most Probably Number
MSW	Municipal Solid Waste
NAAQS	National Ambient Air Quality Standards
NEPPS	National Environmental Performance Partnership System
NESCAUM	Northeast States for Coordinated Air Use Management
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NFA	No Further Action
NJ	New Jersey
NJAC	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NJDOHSS	New Jersey Department of Health & Senior Services
NJGS	New Jersey Geological Survey
NJPDES	New Jersey Pollutant Discharge Elimination System
NPDES	National Pollutant Discharge Elimination System
NOAA	National Oceanic and Atmospheric Administration
NO_x	Nitrogen Oxide
NO_2	Nitrogen Dioxide
NPS	Nonpoint source
NTNC	Nontransient, Noncommunity Water System
O_3	Ozone
O and D	Origin and Destination (Form)

OEP	Office of Environmental Planning
OQA	Office of Quality Assurance
OSP	Office of State Planning
OTC	Ozone Transport Commission
OTIS	Office of Telecommunications and Information Systems
OTR	Ozone Transport Region
PCBs	Polychlorinated Biphenyls
PCP	Pesticide Control Program
PCS	Permit Compliance System (EPA database)
PM_{10}	Inhalable Particulate Matter
PPA	Performance Partnership Agreement
PPB	parts per billion
PPG	Performance Partnership Grant
PPM	parts per million
POE	Point of Entry
PSI	Pollutant Standards Index
PWS	Public Water Supply
QAMP	Quality Assurance Management Plan
QAPP	Quality Assurance Project Plan
RACT	Reasonably Available Control Technology
RCRA	Resource Conservation and Recovery Act
RMW	Regulated Medical Waste
RVP	Reid Vapor Pressure
S-1070	NJSA 58:10B-12 and NJSA 13:1K-9
SCC	Soil Cleanup Criteria
SDWA	Safe Drinking Water Act
SIP	State Implementation Plan
SIU	Significant Indirect User
SNC	Significant Non-Compliance
SO_2	Sulfur Dioxide
SOCs	Synthetic Organic Compounds
SPPP	Stormwater Pollution Prevention Plan
SQG	Small Quantity Generator
SRF	State Revolving Fund
SRP	Site Remediation Program
STP	Sewage Treatment Plan
SU	Standard Units (pH)
SWF	Solid Waste Facility
SWMA	Solid Waste Management Act
SWQS	Surface Water Quality Standards
THM	Trihalomethane

TMDL	Total Maximum Daily Load
TNC	Transient, Noncommunity Water System
TRI	EPA Toxic Release Inventory
TSDF	Treatment, Storage and Disposal Facility
TSP	Total Suspended Particulate
UIC	Underground Injection Control
USGS	United States Geological Survey
UST	Underground Storage Tank
UW	Universal Waste
VMT	Vehicle Miles Traveled
VOCs	Volatile Organic Compounds
WCE	Water Compliance and Enforcement
WHPA	Wellhead Protection Areas
WHPP	Well Head Protection Program
WPCA	Water Pollution Control Act
WQBEL's	Water Quality-Based Effluent Limitations

I. INTRODUCTION

1. Background

1.1. National Environmental Performance Partnership System (NEPPS)

As part of a national effort to reinvent environmental protection for the 21st century, the states and the federal Environmental Protection Agency (EPA) signed an agreement on May 17, 1995 (Joint Commitment to Reform Oversight and Create A National Environmental Performance Partnership System, ECOS/EPA, 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 fosters the identification of state environmental priorities, and allows 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, as well as the environmental challenges which remain.

In many respects, this new partnership approach represents a fundamental departure from the traditional process of federal oversight of state environmental programs. As the partnership agreements are fully implemented, they replace the traditional EPA-state activity-based work plans. Work plans defined detailed 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 achievement of environmental results. With the new agreement process, emphasis is placed on measures of performance that are more directly reflective of environmental outcomes and conditions. Another area of departure from the work plan approach is that the agreement process results in more flexibility and replaces duplicative federal oversight activities with federal-state partnerships. 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 significantly greater general opportunity for public involvement in environmental management.

National implementation of the NEPPS process is still occurring. Six states chose to pilot this new process during its inaugural year (Fiscal Year 1996) - New Jersey, Colorado, Delaware, Illinois, Oklahoma, and Utah. Approximately 30 states are participating during Fiscal Year 1997.

1.2. Self-Assessment and Performance Agreement

Participation in the Performance Partnership system involves the preparation of two major documents. These reports are referred to as the Self-Assessment and the Performance Partnership Agreement documents.

Self-Assessment (initial). The NEPPS 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; current program strengths and limitations; 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 this 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.

For its pilot year (FY 1996), NJDEP chose to include approximately one-half of its programs in its Self-Assessment - Air Quality, Water Quality (freshwater and ground water), Drinking Water, Enforcement and Pollution Prevention. The initial document, Self-Assessment of New Jersey's Environment and NJDEP Programs, Air Quality, Water Quality, Drinking Water, was published in August 1995 (available via NJDEP's Electronic Bulletin Board, 609-292-2006, DSR menu).

Performance Partnership Agreement (PPA or Agreement). Informed by the results of the self-assessment, the PPA replaces the traditional work plans, and governs the actions taken by the states, as well as the evaluation of state performance. The PPA is to be developed mutually between the states and the regional EPA offices. PPAs establish environmental goals, as well as environmental indicators to measure progress toward these goals. Although the focus in these PPAs is primarily on outcomes versus the traditional program activity measures, a level of activity-based reporting is retained in order to assess the effectiveness of these actions.

For fiscal year 1996, New Jersey's PPA included Air Quality, Water Quality (freshwater watersheds only), Drinking Water, Enforcement and Pollution Prevention. This first PPA (New Jersey Environmental Performance Partnership Agreement - 1996, NJDEP/EPA Region 2, March 1996, also available via DEP Bulletin Board) was signed in March 1996. This document remained in effect until October 1996.

Self-Assessment (periodic). After the initial year, subsequent Self-Assessment documents, such as this FY97 report, contain an important additional component which entails the reporting on progress towards the state's environmental goals as described in the PPA. Environmental progress is reported in terms of those indicators developed during the Agreement negotiation process between the state agency and the

EPA regional office. The periodic Self-Assessment documents also report on progress in meeting agreed upon program commitments.

As part of its FY97 self-assessment process, for those programs covered under the FY96 Self-Assessment document, NJDEP reviewed and discussed its key issues with stakeholders, and updated (as necessary) the key issues, program descriptions and program strengths/limitations. The FY97 Self-Assessment also includes new sections describing specific stakeholder involvement activities and pollution prevention activities. Additionally, and of particular importance, environmental indicator progress and progress in meeting program commitments are being reported. EPA Region 2 has also contributed portions to this document in describing progress that the agency has made towards commitments included in the FY96 PPA. For the new areas added in this FY97 document (Land & Natural Resources, Site Remediation, Waste Management, and Pesticides), this self-assessment functions as an initial assessment without reporting on environmental indicators yet, as these measures are just being identified for the first time through the PPA development process.

Performance Partnership Agreement (subsequent). The FY97/98 PPA (Environmental Directions for New Jersey: Performance Partnership Agreement, 1997-1998, NJDEP and EPA Region 2, January 1997) was signed by Governor Whitman, NJDEP and EPA Region 2 in January 1997. This document, which covers an 18 month timeframe, is available electronically through the NJDEP Homepage (www.state.nj.us/dep/dsr) or through the NJDEP Electronic Bulletin Board (609-292-2006, DSR menu) or by calling NJDEP's Division of Science and Research (609-984-6071). As noted earlier in this document, a draft version of this Self-Assessment was used as the basis for the negotiation of the FY97/98 PPA.

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 national Performance Partnership system, which was at least initially, focused on governing those portions of state environmental programs which receive EPA funds for their operation, the basic NEPPS philosophies are being 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, strategic environmental planning involving goal setting. Such planning includes flexible approaches to achieving environmental goals which go beyond the traditional "command and control" regulatory methods and involves stakeholder participation; 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 environmental 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 decision makers both within and outside of NJDEP. Other long-range planning elements that are influencing 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 opportunity 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. A report was published as a result of the information generated at this conference, The Sustainable State 1995 Program Report -- Living with the Future in Mind (New Jersey Future, 1995). In May 1997, a second Sustainable State Leadership Conference was held to, among other things, solicit feedback from stakeholders on a draft of an updated version of the “Sustainable State Report” (Measures and Means: Achieving Sustainable Development in New Jersey, The Sustainable State, Report #2). The NEPPS process provides many components of such long-range environmental planning processes, and also involves a stakeholder participation component in the identification of key issues, goals and environmental indicators.

Another tool used in environmental policy development, which has close ties to the NEPPS process, is the State Development and Redevelopment Plan (New Jersey State Planning Commission, Communities of Place: The New Jersey State Development and Redevelopment Plan, June 12, 1992). The focus of this plan (also known as the “State Plan”) is on the proper management of growth while maintaining various aspects of the quality of life, including, but not limited to environmental quality. NEPPS focuses primarily on environmental quality with some limited consideration of other quality of life issues (e.g.,visibility, recreational opportunities). Two of the eight State Plan general goals speak directly to environmental issues - "protect the environment" and "preserve and enhance...open space and recreational lands". Four of the 17 substantive areas of concern in the State Plan’s statewide policies - air quality, water resources, open lands and natural systems, and waste management - are covered in considerable depth in the NEPPS plan. NEPPS offers the State Planning process specific statewide goals and milestones for consideration in each of these resource areas. As the State Planning Act requires a monitoring and evaluation program to determine the effectiveness of the State Plan, NEPPS provides the State Plan with a fairly extensive system of environmental indicators which can be considered for use in tracking progress in the State Plan's environmental areas. Thus, NEPPS and the State Plan compliment each other, and each plan should assist the other in reaching its mutual environmental goals.

The NEPPS process is not limited to the setting of goals and milestones solely for the federally

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

delegated portions of NJDEP's programs. For many environmental goals, it would obviously be an artificial process to attempt to separate aspects of the goals that are addressed solely by EPA federally funded programs, versus state funded or a combination of EPA/state funded programs. Therefore, there is considerable overlap between state efforts to develop long-range environmental goals and the NEPPS process. NJDEP is currently developing a departmental strategic plan. Elements of NEPPS, including the identification of key environmental issues, goals, and activity commitments designed to achieve the goals are playing a large part in the strategic plan development process.

2.2. Environmental Indicators

A principle component of NEPPS is the increased use of environmental indicators to evaluate environmental quality, program effectiveness, and to 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. Two examples of indicators that NJDEP committed to report during the pilot year of the NEPPS process are: 1) the percentage of the state population served by public community drinking water supplies with no violations of maximum contaminant level standards, and 2) the annual number of exceedances in New Jersey of the ambient air standard for ozone.

The EPA has advocated 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, including "Draft Interim 1995 Indicators Report." Additionally, EPA 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 August 1995, this indicators program published 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. In 1992, NJDEP senior managers had formally recommended that agency performance measures should shift emphasis 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 monitoring 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. Additionally, NJDEP's Policy and Planning program 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 has committed NJDEP to move towards the use of environmental outcomes and indicators as the preferred means of judging environmental progress and departmental performance wherever possible. This emphasis is a departure from the heavy reliance in the past primarily on measurements of activity, such as the number of permits or fines that were issued. New Jersey is working to develop environmental indicators for all of its environmental programs. Such an environmental indicator system is envisioned to be a comprehensive group of indicators that is intimately tied to the state's environmental goals, and involves all relevant state (e.g., Department of Health and Senior Services, Department of Agriculture, Office of State Planning) and local government agencies, as well as other environmental stakeholders. To this extent, NJDEP included representatives from other state agencies among its list of environmental stakeholders invited to a NEPPS workshop, held April 30, 1996 (discussed further under Section II.4. “Outreach and Public Participation to Date”) and has begun to involve these representatives in discussions regarding environmental indicator development.

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 environmental problems across media and program lines. EPA now offers states the option to combine many of the numerous media-specific EPA grants currently received into Performance Partnership Grants (PPG) allowing the states greater flexibility in their use of federal dollars to address their most critical issues. This combined grant should foster the use of federal funds for multi-media programs and efforts, such as environmental indicator systems development or pollution prevention, previously unfunded by media-specific categorical grants. NJDEP applied for, and was awarded, a PPG for FY1997.

Over the past three 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. Many of these formerly dedicated monies are now deposited into the state's General Fund. Such a shift allows NJDEP greater flexibility in allocating resources to high priority environmental 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 through various resource allocation planning efforts and the strategic planning process.

A systematic priority setting process, referred to as a comparative risk project, is also beginning in New Jersey. This approach is supported by EPA, and has been initiated in over 40 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 will clearly benefit New Jersey's NEPPS process, as the resultant priorities could help guide the state's development of environmental goals, milestones and strategies.

3. New Jersey's NEPPS Participation

Commissioner Shinn is the Vice President of the Environmental Council of the States which crafted NEPPS 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. For FY1997, New Jersey is expanding its NEPPS participation through the inclusion of almost all of its environmental programs. New Jersey, through its active involvement in ECOS, is also actively sharing its pilot year experiences to assist new states entering the NEPPS process.

II. SELF-ASSESSMENT PROCESS

1. Scope

As stated earlier, during the pilot year (FY1996), New Jersey elected to include its air quality, drinking water, portions of its water quality programs, enforcement and compliance, and its pollution prevention programs in its Self-Assessment and PPA. For this second year of participation, NJDEP is including the majority of its environmental programs in the Self-Assessment document. This comprehensive Self-Assessment is intended to serve as a reference document for future NEPPS progress update reports, as well as subsequent self-assessment documents.

2. Approach

NJDEP’s NEPPS process is coordinated by a Steering Committee with representatives from across NJDEP who oversee the development of the Self-Assessment and the PPA, as well as make recommendations for integration of the NEPPS approach into departmental activities and other initiatives. The leadership of the Steering Committee receives regular guidance from Commissioner Shinn and NJDEP’s upper management team on the direction and scope of the NEPPS process in New Jersey. A representative from EPA Region 2 is also a member of the Steering Committee.

In order to conduct the detailed self-assessments, develop specific environmental goals and indicators, and negotiate activity commitments, NJDEP created six multi-program work groups; Air Quality/Radiation, Water Quality, Drinking Water, Land & Natural Resources, Site Remediation, and Waste Management. Most work groups are headed by two (2) co-chairpersons; one representing the regulatory program and the other from NJDEP's Policy and Planning programs (Division of Science and Research or Office of Environmental Planning). This approach allows for consideration of regulatory issues, in addition to reviewing the scientific and planning elements of the programs. Membership of each work group was assembled to ensure that all units currently involved in these programs are represented. Additionally, each work group contains representatives from the Compliance & Enforcement, Quality Assurance and Pesticides (where appropriate) areas of NJDEP. EPA Region 2 representatives also serve on a number of the work groups. A list of the members of the Steering Committee, as well as each work group, is included in the Acknowledgments section in the front of this document.

3. Format

Consistent with the format used for NJDEP's FY96 Self-Assessment, NJDEP has developed this FY97 Self-Assessment utilizing the following format:

Cross-Cutting Issues/Programs - a section devoted to a number of areas which are common to all programs, or a number of programs whose responsibilities cross all areas of the department. For FY97, programs/areas included in this section include:

- Quality of Life and A Sustainable State
- Community-Based Planning or Sustainable Communities
- Ecosystem Approach
- Pollution Prevention, Source Reduction and Toxics Use
- Environmental Assessment, Risk Analysis and Research
- Innovative Technology and Market Development
- Pesticides
- Compliance and Enforcement
- Operational Process Changes
- Enhanced Information Management and the GIS
- Environmental Mercury

Topic Area Self-Assessments - for the six topic area self-assessments (air quality/radiation, water quality, drinking water, land & natural resources, site remediation & waste management), the following format was utilized:

- Background (resource description)
- Program description (including prevention activities)
- Stakeholder involvement
- Key environmental issues (significant environmental problems or matters of concern)
- Current program strengths and limitations
- Indicators reporting (this section applies only to those topic areas covered under New Jersey's pilot FY96 PPA)
- References

4. Outreach and Public Participation to Date

Throughout New Jersey's participation in the NEPPS process, various mechanisms to inform and engage the public and stakeholders of NJDEP's NEPPS efforts have been pursued. NJDEP management and staff have given numerous presentations on New Jersey's NEPPS efforts to stakeholder groups, on both the state and national level, such as: 1. advisory committees to NJDEP (e.g., NJDEP's Green & Gold Advisory Task Force, NJ Drinking Water Quality Institute, NJ Clean Air Council); state legislative committees; local and municipal officials; county officials; and 2. national meetings/conferences (e.g., ECOS/EPA All-States Meeting, National Meeting of Environmental Management Practitioners, EPA Oversight Reform Workshop). Internal presentations have also been made to management and staff to keep them up-to-date and receive their input on New Jersey's participation in NEPPS.

Articles have appeared in various NJDEP newsletters describing the different stages of participation as well as the next steps for New Jersey. An initial press release was prepared, in July 1995, announcing New Jersey's intention to participate in NEPPS and a joint press event, with EPA Region 2, was held on March 29, 1996 to announce the signing of the FY96 New Jersey PPA. Additionally, a press release was prepared and a press event held at the Governor's Office on January 8, 1997 to announce the signing of the FY97/98 PPA.

On April 30, 1996, a workshop entitled "Management for Environmental Results in New Jersey, Implementing the National Environmental Performance Partnership System, An Initial Collaborative Workshop" was co-sponsored by NJDEP, EPA Region 2 and the Green & Gold Task Force (see Appendix A for Workshop Agenda). This workshop was designed to bring together a wide variety of environmental stakeholders to help guide the agencies' fundamentally new direction of emphasizing environmental progress through outcomes versus agency outputs. Close to 200 participants representing academia, environmental groups, business and industry, builders, the Governor's Office, other New Jersey state agencies including the Departments of Health and Senior Services, Agriculture, Transportation, and the Office of State Planning, federal agencies, the agricultural community, developers, religious groups, and other states' environmental agencies, along with NJDEP and EPA Region 2 staff, came together to learn about NEPPS in general, New Jersey's participation in NEPPS to date, and to offer comments on progress to date.

Stakeholders were asked to provide feedback on the initial set of key environmental issues and goals/indicators developed for the pilot topic areas in FY96, as well as those which were being developed for the new areas for FY97. Five breakout sessions, including air/radiation, drinking water, land & natural resources, site remediation/waste management, and water resources, provided forums for stakeholders to comment on the key issues and goals/indicators in their particular areas of interest. A detailed survey seeking additional feedback on New Jersey's NEPPS efforts to date, and requesting general guidance on future NEPPS directions, was also provided to workshop attendees. Results of the workshop and the returned surveys may be found in the report entitled "Management for Environmental Results in New Jersey, A Report on the April 30, 1996 Workshop on the National Environmental Performance Partnership System", published by NJDEP in July 1996[2]. A brief summary of stakeholder input, relative to each of the resource areas in this document, may be found under section 3, "Stakeholder Involvement", of the specific topic area self-assessments.

Additional topic area-specific focus group meetings were held from August-October 1996[3] to further refine key issues and goals/indicators for use in negotiating the FY97/98 PPA. Following these focus group meetings and negotiations between NJDEP and EPA Region 2, a "Stakeholder Review" version of the PPA was mailed to over 400 stakeholders for comment. After incorporation of relevant stakeholder comments and conclusion of agency negotiations, the final FY97/98 PPA was signed on January 8, 1997 at a press event held at the Governor's Office. Because only draft goals and subgoals were available for the Land & Natural Resources section of the PPA, a subsequent focus group meeting, to further refine the goal and subgoals and solicit feedback on draft milestones and potential indicators, was held in June 1997.

5. Fiscal Accountability/Resource Availability

5.1. Fiscal Accountability

The 1995 EPA-ECOS NEPPS Agreement requests that the State provide a description of its financial accountability in its Self-Assessment document. 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. Non-salary records are loaded into the Cost Accounting System directly from a Department of Treasury tape of NJCFS non-salary transactions.

NJDEP utilizes the Cost Accounting System and the New Jersey Comprehensive Financial System

[2]Copies of this report are available from NJDEP's Division of Science and Research, 609-984-6071, or through NJDEP's electronic bulletin board, 609-292-2006, DSR menu.

[3]August 6 - Drinking Water & Water Quality, August 9 - Air Quality/Radiation, August 14 - Site Remediation, August 21 - Solid/Hazardous Waste, September 5 - Site Remediation (continuation of 8/14 meeting), & October 8 - Land & Natural Resources

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 and associated Performance Partnership Grant at the level of detail that is determined to be appropriate.

5.2. EPA Funding and Resource Availability

In FY96, NJDEP received approximately 14.1% or $30.0 million of its total operating budget from federal agencies. Of that amount, approximately $23.1 million or 77% of those federal funds are attributed to EPA grants.

For FY97, the NJDEP was awarded its first comprehensive Performance Partnership Grant (PPG), totaling $15.5 million, from EPA. The PPG combines 15 EPA grant programs that were previously funded under 12 different EPA grants. The PPG grant programs included are:

Air Pollution	$4.63	Million
Water Pollution	2.00	“
Nonpoint Source (319H)	1.66	“
Water Quality (104b3)	.48	“
Wetlands	.09	“
Safe Drinking Water	1.98	“
Underground Injection	.08	“
RCRA Subtitle C	3.63	“
Underground Storage Tank	.19	“
Radon	.32	“
Pesticide Enforcement	.27	“
Consolidated Pesticides (4)	.20	“

In FY97, the federal portion of the PPG represents 7% of NJDEP’s total operating budget. Together with the required state matching funds, the entire PPG represents approximately 13% of the NJDEP’s operating budget.

Although most of the major EPA grant programs are included in the PPG, there are several that are funded under the specific grant programs, such as Superfund, Underground Storage Tank (UST) Trust, the State Revolving Fund (SRF) and the Estuary Program grants. In addition to the EPA, NJDEP receives Federal funding from the: National Oceanic and Atmospheric Administration, National Park Service, U.S. Forest Service, U.S. Fish and Wildlife Service, U.S. Geological Survey, Federal Highway Administration, Food and Drug Administration, Department of Housing and Urban Development, Federal Emergency Management Agency, Department of Defense, and Department of Energy.

The FY97 adjusted appropriation for NJDEP was $178 million. The FY97 operating budget for

NJDEP was augmented by some $7.6 million in new funding from the passage of the 4% Corporate Business Tax (CBT) dedication. $4.9 million of the adjusted appropriation will be utilized for NJDEP's statewide watershed program, while $2.7 million was available to cover the administrative costs of the Hazardous Waste Cleanup program. In terms of staffing, the NJDEP currently has a personnel complement of 3,123 employees.

III. CROSS CUTTING ISSUES/PROGRAMS

A. ISSUES

1. Quality of Life and a Sustainable State

Typically, environmental issues are described and analyzed in terms of the effects they have on human health and ecosystem structure and function. Occasionally, they are evaluated with respect to the economic costs they impose on society generally or on particular sectors (e.g., increased health care costs, crop damage); similarly, but less often, environmental protection efforts are analyzed in terms of the benefits provided to society (e.g., market value of conserved natural resources, services provided by natural ecosystems such as the ability of wetlands to mitigate floods). There is growing recognition that, from the average citizen's point of view, environmental problems often have significant impacts on the values and social concerns felt by individuals, groups, communities, etc.; these are impacts that go beyond the more well-articulated (and perhaps more tangible) human and ecological health effects but are real nevertheless. This category of impacts is frequently termed **quality of life** (or welfare) effects.

Historically, quality of life impacts have been identified and described during the environmental impact statement or assessment process. More recently, they have been given a high level of importance as a key element of the comparative risk process that states and cities have been conducting since the late 1980's; in fact, most of the these projects place quality of life effects (or risks) on roughly equal par with the health, ecological and economic impacts when analyzing the total risks posed by environmental issues. In assessing the quality of life effects of environmental issues, various criteria can be used to "define" what dimensions comprise quality of life, including *impacts on aesthetics* (e.g., reduced visibility, noise, odors, visual impacts), *economic well-being* (e.g., increased out-of-pocket costs, lower income or higher taxes paid), *fairness* (e.g., unequal distribution of costs and benefits), *future generations* (e.g., shifting costs to people not yet able to vote or not yet born), *peace of mind* (e.g., feeling threatened by possible hazards in environment), *recreation* (e.g., loss of access to recreational opportunities or degraded experience), and *sense of community* (e.g., changes to appearance or feel of a town, loss of community values such as mutual respect and cooperation).[4]

[4] Drawn from Environment 1991: Risks to Vermont and Vermonters, Vermont Agency of Natural Resources, 1991.

Similarly, the concept of creating a sustainable state through sustainable communities, sustainable development and a sustainable economy is receiving greater attention in both the public and private sectors as a desirable goal. On May 19, 1995, nearly 200 leaders in business, the environmental movement, civic organizations and academia came together to talk about New Jersey's future at the first New Jersey Sustainable State Leadership Conference. One of the primary conclusions of the conference was that "environmental quality, economic prosperity and societal health and equity are interdependent and must be considered together in the process for achieving a sustainable state." (Sustainable community efforts are discussed in Cross Cutting Issues, Section 2)

Defining and measuring progress toward sustainability is not an easy task. Sustainability as defined by the New Jersey State Development and Redevelopment Plan "means the finite capacity of any place to support human activities, given a set of impacts that those activities have on the place. Once capacity is reached, the impacts of additional growth or activities harm the integrity of the place and impair its ability to function as intended." Sustainable development is defined by the World Commission on Environment and Development as development that will "meet the needs of the present without compromising the ability of future generations to meet their own needs."

In 1996, Commissioner Shinn ensured the concepts of sustainable development would be furthered at NJDEP through Administrative Order No. 1996-06 which mandates Department programs implement the State Development and Redevelopment Plan. Because of its inherent focus on integrating environmental protection and economic development objectives to make them mutually reinforcing, there is increasing recognition that the sustainable development concept needs to become a basic principle guiding NJDEP decision-making. In addition, NJDEP has made it a priority to incorporate the concepts of watershed management into appropriate programs. Through watershed management it will be possible to direct environmental protection efforts toward priority water quality problems in cooperative efforts with private entities, public agencies and citizens. Watershed management focuses efforts on valuable area wide resources and gears action steps toward carrying capacities of actual water resources.

Though progress is being made in NJDEP on addressing quality of life and sustainability, these environmental protection objectives need to be continuously expanded in ensuing resource-based self-assessments and environmental issues descriptions. Most of the key environmental issues listed are included due to their impacts on human health and ecological health. With respect to programs acknowledging quality of life as a stated objective, one, Green Acres, clearly emphasizes this dimension as an important guiding principle: "Green Acres seeks to enhance the quality of life for existing and future residents of the State by preserving the open space essential for natural and cultural resources protection, provision of public recreation opportunities, and maintaining the state's landscape diversity, and developing the facilities required to provide public recreation opportunities." For other examples of quality of life issues being addressed see: Air Quality/Radiation Self-Assessment, section 4.3 (visibility and odors); Land and Natural Resources, section 4.5 (Urban, Suburban, Rural Quality of Life);. Marine Water, sections 1.4 (quality of life), 4.1 (declines in commercial and recreational fish and shellfish stocks), 4.6 (pathogen contamination in water resulting in beach closings and shellfish bed closures) and 4.8 (floatables and debris).

On a whole, quality of life and sustainability have not yet been sufficiently factored into the determination of the state's key environmental issues. With the forthcoming New Jersey Comparative Risk Project (for setting statewide environmental priorities), intensive effort will be placed on identifying the state's most serious environmental problems and characterizing each in terms of the human health, ecological health and quality of life (including economic) risks they pose to the state's citizens and environment. This extensive analysis will provide greater understanding of the importance of quality of life factors in prioritizing the state's key environmental issues. In turn, these informed priorities can help develop improved environmental goals and indicators under the NEPPS "umbrella".

2. Community-Based Planning or Sustainable Communities

NJDEP encourages citizens and local officials to develop and implement programs to augment state agency efforts to enhance, maintain and protect environmental quality. Integral to maintaining, enhancing and protecting environmental quality is the need for local agencies, citizens and environmental groups to determine local environmental goals and priorities through community-based planning. To determine goals and priorities it is necessary for locals to establish a long-term vision for their environs and their community. Once locals have determined their vision, they can work together with state agencies to ensure their community vision is reached and sustained. As part of New Jersey's FY96 PPA, through the Core Performance Measures, NJDEP committed to provide a description of its main programs currently in place which embody the concepts of empowered community-based planning and **sustainable communities**. These include:

- <u>Estuaries Planning and Management</u>: through the estuary planning and management in the Delaware River Estuary, New York and New Jersey Harbor Estuary and Barnegat Bay Estuary, local organizations have been given significant opportunity to plan and accept responsibility for the protection of these vital environmental and economic resources
- <u>Watershed Planning</u>: this system to comprehensively manage water resources on a geographically defined basis will only be successful if extensive coordination with local officials, business community and environmental organizations occurs; two counties actively involved in this at this time are Morris County (17 communities) and Monmouth County (53 communities)
- <u>GIS Data Access</u>: through the generosity of the Environmental Systems Research Institute, over 40 local educational and environmental groups have received computerized programs of NJDEP data for local planning purposes
- <u>Environmental Service Grants</u>: NJDEP provides matching grants to local environmental agencies to inventory and document environmental resources
- <u>Fish Consumption Advisories and Research</u>: focuses on the Newark Bay complex and involves over 100 people from 30 communities regarding fish contamination issues, including outreach and education of anglers and consumers

- Water Watch: provides education and training in basic water monitoring to over 50 organizations across the state
- Environmental Education: provides information and assistance to over 300 teachers annually
- Urban Initiative: reaches out to urban residents and local officials to encourage and assist with more environmental protection in over 32 urban areas.

Through the above efforts, NJDEP has created a base of cooperation and collaboration for better oversight of the environment at the local level. Through the NEPPS process, local officials and organizations will have access to a comprehensive understanding of both the state's key environmental issues and goals, and the status and trends of environmental indicators, and will have greater insight into the NJDEP programs that are functionally associated with those issues and indicators. Consequently, local environmental planning and implementation will be more effectively aligned with NJDEP's strategic environmental directions and endeavors. It is a goal of the NEPPS process to build on this success and integrate its data, analyses and outputs with the work of the New Jersey Office of State Planning to expand and enhance both of these efforts.

3. Ecosystem Approach

The ecosystem approach is a method for sustaining or restoring natural systems and their functions and values. It is applied within a geographic framework defined primarily by ecological boundaries. The ecosystem approach recognizes the interrelationship between natural systems and healthy, sustainable economies. It is a common sense way for public and private managers to carry out their mandates with greater efficiency. The approach emphasizes:

- ensuring that all relevant and identifiable ecological and economic consequences (long-term as well as short-term) are considered,
- improving coordination among state agencies,
- forming partnerships between federal, state, and local governments, land owners, and other stakeholders,
- carrying out federal and state responsibilities more efficiently and cost-effectively, using the best science,
- improving information and data management, and
- adjusting management direction as new information becomes available.

There are numerous programs and projects that address overall ecosystem protection in New Jersey. As part of New Jersey's FY96 PPA, through the Core Performance Measures, NJDEP committed to provide a description of its efforts in this area. A few of the highlights follow:

The State Development and Redevelopment Plan: a significant factor in creating a holistic, ecosystem approach to integrating natural resource protection with sustainable economies,
The Pinelands National Reserve: through development and implementation of a management plan, balances

human needs with the needs of other species in the Pinelands ecosystem,
National Estuary Programs: the Barnegat Bay Estuary, Delaware Estuary, and New York and New Jersey Harbor Estuary are three ecosystems that have been designated as estuaries of national significance,
The New Jersey Ecological Research Partnership: a consortium of organizations representing government, academia, non-profits, and business promotes the use and development of scientific data for decision making with respect to New Jersey ecosystems,
The NJDEP Geographic Information System: contains various ecosystem-related data layers with statewide coverage,
The GAP Analysis: NJDEP Office of Natural Lands Management and GIS work in conjunction with the US Fish and Wildlife Service to examine biodiversity through geographic display of vertebrate and plant species in concert with land use,
Ecomap: NJDEP Division of Parks and Forestry, with the US Forest Service, is conducting a vegetation-soils association mapping project to identify priority lands for preservation,
The Landscape Project: a statewide effort to maximize protection for rare species in five contiguous, biologically diverse natural habitats and public lands using principles of landscape ecology.

Although, New Jersey has many ecosystem level projects underway, NJDEP recognizes that the ecosystem approach should be integrated with all agency (and local) programs as feasible. The Land Use and Natural Resources Self Assessment in section 6.2 discusses what the gaps in NJDEP's programs are and recommends how to move forward to integrate the ecosystem approach into our planning and daily activities.

B. PROGRAMS

1. Pollution Prevention, Source Reduction, and Toxics Use

Introduction

Pollution prevention, interpreted broadly, means a focus on the sources of pollution, and an attempt to reduce or minimize these sources. A focus on the sources of pollution requires a look at processes or activities that use polluting substances and that generate pollutants. The goal is elimination of pollution before it occurs, rather than treatment or other form of management of pollution after it has been created. The pollution prevention concept can be applied to virtually every NJDEP program and every industrial production process, and will manifest itself in various ways. Generally, it will mean a quantitative look at the causes of the pollution, and implies an effort to reduce the magnitude of these causes where feasible.

Pollution prevention has a specific application in New Jersey to industrial facilities through NJDEP's Pollution Prevention, Community Right-to-Know, Accidental Release Prevention, and Discharge Prevention programs. All of these programs are based upon the monitoring of the through-put or storage of toxic or otherwise dangerous chemicals at industrial and related facilities. Two of these programs, Pollution Prevention and Community Right-to-Know, place special emphasis on public reporting of through-put, inventory, and reduction goals of toxic chemicals, with the implication that what must be reported will be measured, and that what is measured will be managed. The Discharge Prevention, Accidental Release Prevention, and Pollution Prevention programs also require planning by regulated facilities to reduce pollution or prevent accidents or discharges before they occur.

These specific New Jersey pollution prevention-related programs are described in detail below. Since the Pollution Prevention Program, per se, was described in the FY96 Self-Assessment, a brief account of the progress of this program and trends observed in pollution prevention by covered industrial facilities will also be presented.

Also, since the pollution prevention concept can apply in some way to all environmental protection efforts, initiatives in various NJDEP programs which embody this concept will be discussed briefly, and ways in which the NJDEP intends to move toward a deeper and more comprehensive implementation of pollution prevention will be indicated.

Pollution Prevention Program

NJDEP has a well-recognized and established Pollution Prevention Program, the goal of which is to motivate industry to voluntarily reduce its use and generation of toxic chemicals. New Jersey's program combines regulatory facility planning, technical assistance, public reporting and regulatory integration of pollution prevention as its primary tools. The program is overseen by NJDEP's Office of Pollution Prevention which was created in 1989. In 1991, the New Jersey Pollution Prevention Act was enacted which made the NJDEP program part of the law, provided it with a stable funding source, and specified industrial facility pollution prevention planning requirements.

The Office of Pollution Prevention has three objectives:
1) To implement the 1991 New Jersey Pollution Prevention Act
2) To undertake the pilot Facility-wide Permit Program
3) To transform the existing regulatory framework to one based on pollution prevention

There are several key components of NJDEP's Pollution Prevention Program that lend themselves specifically to the evaluation of the regulated community's environmental performance and the development of environmental indicators. These components are as follows:

a) *Collection of facility-specific pollution prevention data*: Since 1987, NJDEP has conducted facility level materials accounting (throughput) data. The 1991 Pollution Prevention Act mandated the collection of process level materials accounting data in industrial pollution prevention plans with summaries of that data being publicly available. These data give NJDEP a unique capability to monitor and track pollution prevention trends quantitatively.

b) *Development of pollution prevention-based facility-wide permits*: New Jersey's Pollution Prevention Act requires that NJDEP undertake a pilot program of issuing single permits to a set of companies that cover all air, water and hazardous waste requirements plus the company's pollution prevention plan. The two goals of the Facility-wide Permit are to streamline permitting requirements and to maximize the use of permitting to promote pollution prevention. Eighteen companies initially agreed to participate in this program. As of May 1997, sixteen companies were actively engaged in the pilot program.

c) *Development of an integrated data format*: As part of NJDEP's Facility-wide Permit Program, the department is developing and testing a prototype of a system that would allow a single document to include most environmental permit compliance data and pollution prevention data.

d) *Industrial outreach and training*: NJDEP has undertaken an aggressive outreach and training program geared toward industry. This training includes both the development of workshop and training sessions as well as on-site consultations to assist companies in developing meaningful Pollution Prevention Plans. Another part of NJDEP's outreach includes the provision of $400,000 annually to establish and maintain a Technical Assistance Program at the New Jersey Institute of Technology.

<u>Community Right-to-Know Program</u>

The Community Right-to-Know (CRTK) Program collects, processes and disseminates chemical inventory and environmental release data pursuant to the New Jersey Worker and Community Right-to-Know (W&CRTK) Act, and the federal Emergency Planning and Community Right to Know Act (EPCRA), also known as Title III of the Superfund Amendments and Reauthorization Act (SARA). Coverage under the W&CRTK is determined by the Standard Industrial Classification (SIC) code of a business. Businesses not covered under the state law are required under Section 312 of EPCRA to file Community Right-to-Know surveys listing their chemical inventories when quantities of hazardous substances manufactured, used or stored on site exceed federal thresholds. Over 33,000 New Jersey businesses are required to annually submit Community Right-to-Know Surveys under state and/or federal Community Right-to-Know laws for use by emergency responders, employees, local governmental agencies and the general public.

Approximately 700 of these companies are also required under these laws to report their environmental releases, throughput, waste transfers and progress in achieving pollution prevention goals for over 600 toxic chemicals. These companies are manufacturers that have 10 or more full-time employees and exceed an established quantity threshold.

<u>Accidental Release Prevention Program</u>

In addition to collecting and managing Community Right-to-Know data, the Bureau of Chemical Release Information and Prevention identifies and monitors facilities that handle extraordinarily hazardous substances to ensure that procedures are in place to prevent the occurrence of accidental chemical releases.

The goal of the Toxic Catastrophe Prevention Act (TCPA) program is prevention of catastrophic releases of extraordinarily hazardous substances (EHSs) through risk management planning. Operators of facilities handling regulated quantities of EHSs are required to prepare and implement risk management plans.

New Jersey's TCPA program, established in 1986, served as a model for the federal Accidental Release Prevention (ARP) program at Section 112(r) of the 1990 Clean Air Act Amendments. New Jersey is currently preparing to align its TCPA program with the federal ARP, which will increase the number of substances covered and the number of facilities regulated. This alignment will enable the NJDEP to implement the requirements of Section 112(r) and to obtain federal approval of the Air Operating Permit program.

Discharge Prevention Program

The Discharge Prevention program is administered by the Bureau of Discharge Prevention. Its primary function is to assist and provide guidance to major facilities, as defined by the Spill Compensation and Control Act, assuring the best technology is planned and applied to prevent pollution from discharges of hazardous substances in the most efficient and practical manner. Also, the program assures that major facilities are adequately prepared to clean up any discharges that may occur in a manner that provides maximum protection of the environment and the public's health and safety.

The major environmental concerns are:

a. The prevention of discharges of petroleum and other hazardous substances from process, storage, handling and transfer operations at major facilities; and

b. The planned response to discharges such that they are cleaned up and removed in an expeditious manner to minimize their impact on the lands and waters of the state.

Since the bureau's formation and the subsequent adoption of the amended Spill Compensation and Control Act rules in September 1991, nearly 500 major facilities have submitted discharge prevention, containment and countermeasure and discharge clean up and removal (DPCC/DCR) plans which have been reviewed and approved by the bureau and are being implemented by the regulated community. This has greatly raised the procedural, operational and physical standards of care at these facilities, resulting in a nearly 30% reduction in the number of accidental discharges from major facilities to the state's lands and waters. Also, the discharges that do occur are responded to, cleaned up and removed in a planned and structured manner such that their volume and environmental impact has been substantially reduced.

The bureau has made a concerted effort to coordinate with other departmental programs, such as

Hazardous Waste Engineering, TCPA, ISRA, Stormwater Permitting and UST, as well as Federal programs, such as OPA 90 and EPA's Spill Prevention, Control and Countermeasure (SPCC) requirements so that facilities can prepare plans that address the concerns of all these programs. This has led to an exceptionally high level of compliance while providing flexibility and economic viability for the regulated facilities in implementing their plans in a practical and efficient manner.

Even though nearly 500 major facilities are regulated by the discharge prevention program, there are many times that number that store petroleum in quantities of less than 200,000 gallons and less than 20,000 gallons of other hazardous substances. These facilities receive little or no oversight by this program, but do have the potential for discharges which could result in significant environmental harm and, in some cases, set back years of progress achieved due to improvements in water quality. Some additional departmental oversight of these facilities could benefit our state's citizens and environment, as well as the department and these facilities.

The bureau and EPA Region 2's Response and Prevention Branch currently have an agreement which provides guidance to major facilities desiring to combine the federal requirements of their SPCC Plan, and their state DPCC/DCR Plan, into one. This is a step in the right direction; however, it addresses only major facilities. A more formal agreement could provide the mechanism for providing beneficial oversight of many of the facilities below the major facility threshold. This would further enhance the high quality of the state's lands and waters by preventing or minimizing pollution from petroleum or other hazardous substances.

Pollution Prevention Progress

During FY96, NJDEP has monitored industrial pollution prevention progress in New Jersey and tracked pollution prevention trends. These efforts are state initiatives, not federally funded, and are components of NJDEP's Pollution Prevention program that is defined by the 1991 New Jersey Pollution Prevention Act. NJDEP has monitored and tracked:

1) Changes in throughput, nonproduct output and releases of hazardous substances at a facility-wide level,
2) Changes in throughput, nonproduct output and releases of hazardous substances statewide per unit of product,
3) Changes in throughput, nonproduct output and releases resulting from changes in economic activity,
4) Changes relating to certain classes of chemicals, and
5) Comparisons of New Jersey pollution prevention trends with national trends.

Findings

At both the national and state level, direct releases of toxic chemicals by covered industrial facilities to environmental media, and transfers to treatment and disposal facilities have shown marked declines since at least 1988. At the national level, however, nonproduct output (total production-related wastes before treatment) has not declined. Nonproduct output does show a declining trend in New Jersey which does not appear to be explainable by reduction of economic activity by covered facilities. Total use of toxic chemicals also appears to show a decline in New Jersey. Nonproduct output as percent of total use also shows a decline, which indicates that New Jersey may be making more progress in pollution prevention than U.S. facilities generally.

For a more detailed discussion of these findings, please see the Environmental Indicators Appendix.

Pollution Prevention in Other NJDEP Programs

Most of NJDEP's programs have some focus on the causes of the pollution they are charged to manage and control. To the extent that they monitor these causal factors quantitatively, and make efforts to lessen the actual quantities of factors or their severity, they are doing pollution prevention.

There is a clear pollution prevention aspect to a number of programs, including the air operating permit program, which, like the facility-wide permit program, is working to consolidate permits (albeit air permits only) at a facility-wide level. Several of the Water Quality permitting programs and the related financing programs which address future water quality needs have a pollution prevention aspect, as do the watershed management concept and the wellhead protection program. NJDEP's Division of Science and Research (DSR) has also consistently been involved with efforts to expand the role of pollution prevention within NJDEP and within the state. DSR manages research projects involving potential pollution prevention policy tools such as tax incentives. It also brings a pollution prevention perspective to departmental task forces and administers a regular forum within NJDEP to study emerging environmental issues and pollution prevention ideas.

In the future, NJDEP intends to expand the role of the pollution prevention concept to ensure that pollution is prevented in the most efficient and practical ways possible. Central to the expansion of this concept will be:

1) The collection of more and better data that reflect the primary causes of pollution and enable the tracking of trends in these causal factors. Included in this category will be economic and other data that represent the broad spectrum of environmentally-important human activities.

2) The elimination of redundant reporting by covered facilities and other regulated entities and the streamlining of reporting requirements, and the development of incentives to the voluntary development and implementation of pollution prevention.

3) Increased dissemination of relevant data and educational material to the public to increase their investment in, and control of, decisions relevant to controlling the impacts of human activities on the environment.

2. Environmental Assessment, Risk Analysis and Research

Environmental assessment and risk analysis are multi-media functions that are essential components for critically understanding environmental issues and potential management options. Consequently, they are relevant to and/or can be used by every resource-based program within NJDEP. These activities are also integral to the implementation of many of the new initiatives currently being developed and implemented within NJDEP. With respect to these functions, responsibility for: developing and/or understanding associated techniques and approaches, coordinating their agency-wide application, and performing these functions for special projects and initiatives primarily lies with the Environmental Assessment and Risk Analysis (EARA) Element, located within the Division of Science and Research (DSR). This element, comprised of a multi-disciplinary, highly trained and experienced staff, using various tools such as research and investigations, monitoring and sampling activities, environmental data assessment, health risk assessment, development of innovative risk management options, etc., provides NJDEP and the state with critical information concerning environmental exposures to toxic substances, assessments of the potential risks to human health and ecosystems posed by those exposures, and strategies for managing the risks. Research continues to be one of the EARA's primary tools for obtaining new information and understanding of persistent as well as emergent environmental issues. Although the program regularly examines a broad range of issues, it has a particularly strong research focus on areas such as environmental indicators (all resources and media), drinking water and hazardous substances management. Overall, EARA provides NJDEP programs with, as needed, scientific and technical leadership, coordination, or assistance by developing and integrating current scientific knowledge into departmental policy development.

EARA also provides NJDEP, the legislature, the public and the regulated community with fundamental information and analysis on a broad range of critical environmental issues, current as well as emerging. This group currently either directly coordinates or plays an integral role in the coordination of NJDEP's efforts in the areas of comparative risk, indicator development and assessment, strategic planning, watershed implementation, as well as development and coordination of New Jersey's NEPPS efforts. Descriptions of other specific activities managed/performed by this group can be found under the Mercury section of the Cross-Cutting Issues/Programs section as well as within the Drinking Water, Water Quality, and Land & Natural Resources Self-Assessments.

3. Innovative Technology and Market Development

3.1. Introduction

New Jersey has positioned itself as a leader in the field of environmental technology. In support of this leadership role, the Office of Innovative Technology and Market Development (OITMD) was established in the Department of Environmental Protection in February of 1995. The role and scope of the OITMD involves working on state, national and international environmental technology efforts.

The goal of the OITMD is to maximize the availability of information about innovative environmental technologies and encourage their commercialization and use. OITMD is moving toward these goals through a variety of activities.

3.2. Activities

Since its creation, OITMD has been involved with a variety of diverse activities:

A. Six State MOU

The states of California, Illinois, Massachusetts, New Jersey, New York and Pennsylvania have formed a partnership designed to define a process for the reciprocal evaluation, acceptance and approval of environmental technologies. Through a Memorandum of Understanding (MOU) signed in June 1996 by the Environmental Commissioners/Secretaries of all six states, the states are working on a pilot project to evaluate 12 innovative environmental technologies (two from each state). Through this evaluation, states are working toward the goal of sharing common data, review protocol and information relevant to permitting environmental technologies. This process will enable the MOU states to take advantage of the similarities in their permitting processes to possibly shorten the review time of a new technology that has already been reviewed by another MOU state. Throughout this process the states recognize that site-specific conditions and individual state regulatory requirements will always be necessary.

The pilot project began in July 1996. OITMD staff are coordinating the agency review of these pilot technologies through a network of program staff with expertise in a variety of permitting and program areas. The reviews for the first four pilot technologies are nearly complete. Final reports on these technologies are expected in spring/summer of this year. Final reports on the remaining eight technologies are expected in the winter of 1997.

To further advance the success of this pilot project and the overall MOU effort, the Office, in conjunction with a federal DOE-sponsored consultant working with the MOU group, conducted a series of internal interviews to gather information about how programs currently handle innovative technologies and how the goals of the MOU effort may help or change their current methods of operating. These interviews represented a first step in understanding how the final results of the pilot project can be incorporated throughout NJDEP.

B. Environmental Technology Acceptance Workshop

As part of the pilot project technology review process, the MOU states sponsored a workshop for permit writers/regulators in July 1997. New Jersey will be the host state for this event. The goal of this workshop was to allow the permit writers/regulators from the six MOU states to discuss their programs and identify the similarities and differences in how they would review and approve the 12 pilot project technologies. They also discussed how the information gathered for the pilot project can be applied to other, similar technology types.

The identification and discussion of this information is critical to the success of the overall MOU goal which is to define a process for the reciprocal evaluation, acceptance and approval of a broad range of environmental technologies.

C. Guidance Document and Partnership Agreements

OITMD is developing a guidance document that will provide the framework for establishing a departmental protocol for consistent review and evaluation of innovative environmental technologies. This document identifies definitions of innovative technology, New Jersey statutes and regulations relating to innovative technologies and the review and approval processes.

This document is currently being evaluated by an internal NJDEP review team. The goal is to establish a single point of entry with clear procedures for the review, demonstration and approval of innovative environmental technologies, as well as establishing clear criteria for participation in the program for technologies documenting net or overall beneficial environmental improvement.

In conjunction with the internal NJDEP review, the OITMD is working with six companies through an Innovative Environmental Technology Performance Partnership Agreement. Through these agreement, companies will participate in the development of the guidance document. The participating companies are submitting the necessary data/information to be used in developing a technology verification process.

A draft copy of the guidance document will be available in late 1997.

D. NJ Corporation for Advanced Technology (NJCAT)

OITMD provides support to NJCAT, a public-private partnership. NJCAT pools the resources of business and industry, entrepreneurs, university research centers, utilities and government to promote the development and commercialization of new technologies. NJCAT can accomplish this goal by providing technology innovators with the technical, commercial, regulatory and financial assistance required to bring new ideas to market. Clearly, the goals of NJCAT compliment those of NJDEP and the OITMD.

NJCAT also sponsors conferences and workshops designed to bring together representatives from the business, financial and environmental communities to focus on regional, and state environmental technology issues.

Staff from the OITMD provide support to NJCAT and provide the necessary linkage between NJDEP and NJCAT activities.

4. Pesticides

The use of pesticides, a generic term which includes insecticides, herbicides, fungicides, etc., is a recognized means of controlling various pests. Under the authority of the Pesticide Control Act (N.J.S.A. 13-1F-1 et seq.), New Jersey has promulgated the Pesticide Control Regulations (N.J.A.C. 7:30-1 et seq.). These regulations govern all aspects of commercial, agricultural, and homeowner pesticide use and distribution in the state.

The Pesticide Control Program (PCP) is the lead state agency controlling pesticides and enforcing pesticide regulations in New Jersey. The primary goal of the PCP is to ensure that those who choose to apply pesticides do so in a safe and proper manner, thereby minimizing pesticide exposure for the public and environment and reducing the potential for adverse impacts from pesticide use. Promoting the decision to use pesticides "only when needed" is also a major part of the Program's outreach efforts. The Training/Outreach component of the Program also provides education and training on the regulations, use reduction initiatives, and other pesticide issues to the regulated community and the general public.

The Bureau of Pesticide Compliance (BPC) is responsible for enforcing the pesticide control regulations. This Bureau investigates complaints of pesticide misuse, as well as performing routine inspections of pesticide applicators, businesses, and dealers. BPC enforces farmworker protection regulations and coordinate enforcement activities performed by counties through the County Environmental Health Act.

The Bureau of Pesticide Operations (BPO) develops and administers certification exams for pesticide applicators and dealers to ensure competency of pesticide handlers. The Bureau also registers pesticide products, dealers, applicators, operators, businesses and beekeepers on an annual basis, and issues permits for fly and mosquito control and for aquatic pesticide applications.

Other functions of the BPO include conducting pesticide use surveys, risk assessments, new product registration reviews, and environmental monitoring projects involving pesticide residues. BPO also houses various forms of data - in-house databases and chemical profiles as well as external EPA and pesticide manufacturer data.

The PCP recognizes two key environmental issues regarding the use of pesticides in the State: the reduction of pesticide misuse and the minimization of adverse effects resulting from proper use. For the purposes of this self-assessment, the term "Misuse" is defined as any act of handling or release of a pesticide inconsistent with its Federal or State registered labeling instructions and the Pesticide Control Regulations (N.J.A.C. 7:30). This definition also includes accidental occurrences such as spills. "Proper Use" is defined as any act of handling or release of a pesticide consistent with its Federal or State registered labeling instructions and the Pesticide Control Regulations (N.J.A.C. 7:30).

Associated with these key environmental issues is pesticide information management. Without the various activities such as the Pesticide Use Survey, ongoing environmental monitoring projects, and expanded use of the Geographic Information System, the Pesticide Control Program could not make intelligent and informed decisions regarding the use or distribution of pesticides in New Jersey. Analytical capacity and development is needed to maintain the ability to detect pesticide residues in the environment. Extensive databases are necessary to track enforcement investigations and actions, licensing status of applicators, and pesticide product registrations.

The following areas are ways in which the PCP attempts to address these areas.

4.1. Reducing Pesticide Misuse

The misuse of pesticides, whether intentional or accidental, results in the potential to cause adverse impacts on human health or the environment. Therefore, reducing the incidences of misuse through the education of applicators and the deterrent effect of possible enforcement actions should minimize the risk to New Jersey's residents and environment.

- Compliance and Enforcement. The Pesticide Control Regulations establish the parameters of proper and legal pesticide applications. The Pesticide Control Program investigates citizens' complaints, performs routine compliance inspections, issues citations for violations and, when necessary, assesses penalties and orders site clean-ups. An impartial and consistent enforcement presence is a key to promoting compliance with the regulations and preventing pesticide misuse. This component of the Program could benefit from an increased and regimented inspector training schedule, both on the Federal and State levels, to ensure consistent interpretation and enforcement of the regulations. Presently, a greater percentage of investigative time is spent reactively (i.e., complaint inspections) instead of proactively. The Pesticide Control Program needs to increase proactive compliance in order to increase the enforcement presence, enhancing its deterrent value while also providing more "in-the-field" education for the pesticide applicators.

- Education of Pesticide Applicators. The education of pesticide applicators serves as a preventative to pesticide misuse. The Pesticide Control Program has a strong and varied cache of educational forums. These forums focus on regulations in addition to the potential impacts of pesticide misuse on human and environmental health. Various types of education include: applicator training, testing, and certification; continuing education through the PCP's recertification program; and compliance inspections. In addition, "How to Comply" workshops and Applicator Business Training sessions are conducted to enhance the regulated community's understanding of these regulations. The PCP also works in conjunction with the Rutgers Cooperative Extension offices in their educational efforts. This aspect of the PCP could also benefit from additional training programs which would provide the PCP staff with unified, comprehensive interpretations of the regulations. The PCP would like to increase the amount of educational materials produced as well as improve the distribution process.

- Integrated Pest Management (IPM). IPM emphasizes active pest pressure monitoring and a thorough examination of all available control strategies instead of relying solely on pesticides. The ideal result of IPM is an overall reduction in the amount of pesticides used and a more judicious use of those that are applied. This approach has been developed and implemented primarily for agricultural purposes, however, the PCP encourages the assimilation of these techniques by all appropriate pesticide fields. The merits of IPM methods have already been seen in the success of a pilot project for indoor pest control, implemented at NJDEP headquarters. The promotion of IPM, along with the PCP's compliance and educational components, serves to reduce the risk of pesticide misuse in the State. Emphasizing the employment of IPM practices whenever possible is a policy of the PCP and is a requirement in the Executive Order for state buildings and grounds. The success of this policy is limited by overall availability of IPM programs in a variety of potential settings. The PCP would like to expand the use of IPM programs into all pest control settings; such expansion would be major step forward towards the goals of pesticide use and pesticide risk reductions.

4.2. Reducing Adverse Impacts of Proper Use

The potential for harm from the use of pesticides may not always be due to a "misuse". There are numerous types of pesticide applications which, though done legally and properly, have the potential to adversely affect human or environmental health. The PCP works to identify these problem areas and to develop strategies for managing them.

- Information and Outreach - As mentioned above under reducing misuse, PCP strives to provide educational forums for pesticide users in the regulated community. The PCP also provides information and outreach programs to the general public which serves to increase awareness about potential impacts from pesticide use. Pesticide usage from this group is greater than that from the regulated applicators, therefore the risk of non-point source pollution and associated adverse impacts is greater. As with other educational forums, IPM is advocated as a key strategy in reducing pesticide use and encouraging use of less hazardous pesticides when possible.

- Agricultural Worker Protection - New Jersey is host to a very large, seasonal agricultural work force. The nature of this work creates the potential for exposure to highly toxic pesticides. The PCP has implemented State regulations, based on the Federal Agricultural Worker Protection Standards, designed to reduce the potential for harmful exposure to farmworkers. A comprehensive outreach and training program to promote compliance is currently underway. A limitation to complete fulfillment of this program is the infrequency of agricultural visits by Compliance Inspectors. The PCP would like to increase the frequency of such visits in order to more fully assess the progress of this program.

- Permits - A permitting process exists for specifically tracking pesticide use for aquatic (algae and aquatic weed control) and large-scale mosquito/fly pest control. This permit process gives the PCP an opportunity to review and set the conditions for pesticide application, thereby preventing potentially adverse impacts on the aquatic environment. Site inspections are performed in order to assess permit accuracy and compliance. Inspection information is also used to judge the effectiveness of permit conditions and whether conditions need to be modified. However, an additional tool to help determine permit modifications could be the application records of each treatment site. These records are submitted to the Permit Program, as required under N.J.A.C. 7:30. The PCP would like to decrease the time between submission and analysis.

- Pesticide Evaluation & Monitoring (PEMS) - The PCP is actively studying the State of New Jersey's human and environmental health in relation to pesticide use. The PCP assesses the effect of pesticides on various parameters in the State and develops strategies to monitor their impacts. The information generated by these activities is then used to make sound environmental decisions and to support actions recommended by the PCP. Areas of ongoing and projected study are delineated below.

  Food Safety - Pesticides are used extensively in the agricultural industry and the potential exists for residues on crops to reach the tables of New Jersey consumers. The PCP is dedicated to maintaining the safety of the food supply while monitoring the activities of the State's agricultural pesticide applicators. The PCP also supports the FDA in their national sampling program. This is a high priority component of the Program. The PCP would like to expand its efforts in both sample collection and sample analysis.

  Ground Water Protection - Various pesticides are known for their capacity to leach through the soil into ground water in vulnerable areas. This may pose a risk to public health if drinking water supplies are impacted. The PCP is interested in identifying and monitoring these pesticides and, if necessary, managing their use to reduce adverse environmental impacts. The PCP is developing and implementing a pesticides and ground water State Management Plan for New Jersey in cooperation with the EPA. The PCP is awaiting Federal implementation of the State Management Plan within the next year.

  Ecological Impacts - Non-target species (those species not intended to be impacted by the use of the pesticide), whether animal or plant, may be harmed by pesticides even when applied according to directions and regulations. The PCP reviews any use-directions or regulations involved when ecological impacts are seen and makes recommendations for appropriate changes when necessary. PEMS also works in conjunction with the EPA's Endangered Species Program to evaluate potential problems arising from pesticide use throughout the State. This component of the Program needs to develop and implement a tracking system for these impacts, which could be utilized for proactive prevention planning.

4.3. Pesticide Information Management

In order to make scientifically sound decisions regarding pesticides in the State, the PCP must acquire and assess large amounts of information concerning their use. This information is then used to support any actions recommended by the PCP. This is a continually evolving process and utilizes the numerous information-gathering tools of the PCP.

- Pesticide Use Surveys - Licensed applicators are required to maintain records of use and make these records available to the PCP upon request. The PCP uses this requirement to perform various use surveys, which give a detailed account of the types, amounts and locations for pesticide use statewide. These surveys are a cost-effective means to gauge pesticide use. The data's entry into the Geographic Information System (GIS) provides a mechanism to relate use patterns and environmental loading.

- Environmental Monitoring - To increase the knowledge concerning pesticide issues specific to New Jersey, the PCP conducts monitoring projects involving sample collection and analysis which allows the program to respond to newly developed problem areas, as well as continue ongoing review into pesticide impacts. Limitations on this section of the program are due to the scale of the projects that can be performed - projects are limited to the information from existing studies only. There are other areas of pertinent research on pesticides (i.e., synergistic and additive effects) which the PCP would be interested in pursuing.

- Analytical Development - New pesticide active ingredients are introduced every year. These compounds may impact a cross section of environmental media. In order to detect pesticide residues in environmental samples, analytical methods must be developed and appropriate sampling methodologies must be devised. The PCP works in conjunction with laboratory personnel to determine the optimum sampling criteria for each parameter. Efforts need to be made to keep the PCP's environmental sampling and analysis methods useful and current.

- Enforcement Database - The information gathered in every BPC inspection potentially provides the Program with the ability to assess pesticide use and misuse patterns throughout the State. The PCP has been entering this information into a database since 1987, however, the data is invalidated and the database design needs upgrading. Once done, the database will prove invaluable as an information retrieval tool, indicating status and trends for enforcement actions taken by the Program.

- Licensing and Product Registration - Three mainframe databases storing information on pesticide product registration, pesticide dealer certification and licensing, and beekeeper registrations are maintained. An additional database, the Pesticide Applicator System (PAS), was a mainframe database rewritten to run on the PCP local area network. The changes made to this system, and the availability of the data on-line, allows staff to certify and license pesticide applicators quickly and provide accurate information on certification and licensing to the general public and regulated community. The three remaining mainframe databases should similarly be rewritten to run on the

PCP LAN, providing staff with on-line access to the most up-to-date information possible and improving processing times for issuing licenses and registrations. In addition, the pesticide product registration system requires a document imaging system to manage the 25,000 plus pesticide labels now in paper files, and EDI capability to allow registrants to register their products electronically.

- Geographic Information System (GIS) - This system is a means by which various types of data can be electronically entered into a computer system and displayed geographically. The PCP can utilize this system to graphically map data gathered using other tools, such as the Enforcement Database described above. The result is an ability to determine local pesticide use patterns throughout the State, which in turn can prove vital for developing site-specific action plans. This system is limited, however, by the fact that only information from Registered Pesticide Applicators can be obtained. The PCP does not have the ability to determine the pesticide use patterns of those applicators who do not maintain treatment records. Examples of these are homeowners, farmers that use general-use pesticides, and unregistered pesticide applicators. These types of applicators may be more likely to misapply or misuse pesticides, due to their lack of training and certification.

Descriptions of other functions of the PCP may be found in the Air Quality/Radiation, Surface Water, Ground Water, and Land & Natural Resources Self-Assessments.

5. Compliance and Enforcement

The NJDEP compliance and enforcement program supports the Department's mission through the consistent and fair administration of a compliance assistance, compliance monitoring and enforcement program that helps maintain and improve compliance with the State's environmental laws. The NJDEP continues to evaluate and improve the strategies and tools it employs to ensure compliance. These strategies include (1) providing on-site compliance assistance to small business entities on a multi-media basis that stresses pollution prevention strategies where applicable; (2) promoting voluntary audits and environmental management systems through the adoption of fair and predictable enforcement response policies for violations voluntarily discovered, reported and corrected; (3) performing periodic compliance inspections and reviewing self-reported compliance data for regulated activities and operations to determine compliance with environmental requirements; (4) suspending penalties during a set correction period for minor violations; (5) commencing civil or administrative enforcement actions, which may include penalties, for repeated or uncorrected minor violations and non-minor violations; (6) obtaining compliance quickly and avoiding litigation through alternative dispute resolution mechanisms and early settlement strategies; (7) seeking injunctive relief for continuing violations that cause or threaten to cause serious harm to human health or natural resources, or that present an imminent or substantial endangerment to human health or safety; (8) referring cases involving criminal conduct to the Division of Criminal Justice for criminal investigation and prosecution.

In FY97 and FY98, NJDEP will continue to administer strategies in its compliance and enforcement program that reflect the program's sharper focus on improving compliance, thereby reducing risks and preventing impacts to human health and natural resources. These strategies are further outlined below. A media-specific (e.g., air, solid waste, etc.) assessment of the NJDEP compliance and enforcement activities is included in each topic area self-assessment.

5.1. Compliance Assistance

Currently, in the course of inspections and other routine functions, NJDEP inspectors provide assistance to regulated entities, including small businesses, on an informal basis. In addition, in FY96, the hazardous waste and NJPDES compliance and enforcement program expanded outreach and education initiatives to new hazardous waste generators and new NJPDES permittees respectively throughout the state. The NJDEP believes that these efforts help prevent violations and improve compliance and will continue to administer these outreach programs in FY97/98. In addition, under a pilot program beginning in FY97, a small business entity may request on-site compliance assistance on a multi-media basis. Through this pilot program, one or more NJDEP compliance inspectors will work in a problem solving fashion with small business owners and operators who request assistance, to help them understand and satisfy their environmental compliance obligations. This pilot program is intended to improve compliance on a multi-media basis among small business entities, through pollution prevention strategies whenever possible. Upon the completion of the pilot period, the NJDEP will evaluate the success of the program, make any adjustments or improvements to the program deemed necessary, and either extend the pilot or make the initiative a permanent function with the compliance and enforcement program. The NJDEP will share the results of its evaluation with the EPA.

5.2. Incentives for Voluntary Compliance Programs

Voluntary environmental compliance efforts, such as the establishment of environmental management systems and the performance of periodic audits, undertaken by regulated entities help prevent violations from occurring, and when violations do occur, these practices help ensure their timely identification and correction by the regulated entities themselves. These voluntary practices help improve compliance and protect human health and natural resources. In FY96, the NJDEP continued developing an enforcement response policy to encourage regulated entities to perform voluntary environmental audits and establish environmental management systems by establishing a fair, consistent and predictable enforcement response that provides for the waiver or mitigation of penalties for violations that are voluntarily discovered, reported and corrected. In FY96, the NJDEP waived or reduced penalties on a case-by-case basis for violations that were voluntarily discovered, reported and corrected. NJDEP plans to finalize this enforcement response policy and consider other incentives to encourage voluntary compliance efforts in FY97/98.

5.3. Compliance Monitoring and Enforcement

In FY96, NJDEP continued to perform periodic compliance inspections and review self-reported compliance reports, such as Excess Emission Reports, CAA Title V Compliance Plans, and Discharge

Monitoring Reports. The performance of compliance inspections and reviews establish an expectation among regulated entities that their performance will be evaluated periodically to verify compliance with their environmental obligations, thereby providing a necessary deterrence to noncompliance. NJDEP will work with EPA in FY97/98 to improve its ability to effectively target inspection and other compliance monitoring and assurance resources to obtain the greatest possible environmental benefits. NJDEP will work to improve its ability to effectively target its resources by, among other things, tracking additional compliance information, focusing on geographic areas with high rate of releases based upon TRI reporting, facilities impacting the NY/NJ Harbor and Delaware Estuaries, facilities in industry sectors with low compliance rates, and facilities that are significant sources of substances of special concern.

NJDEP will continue to initiate civil and administrative enforcement actions for uncorrected and repeated minor violations and non-minor violations, seeking penalties, when necessary, that are commensurate with the violations and that prevent violators from benefitting economically from their noncompliance. Administrative and civil penalties function as an important deterrent against repeated, chronic and recalcitrant violators.

5.4. Fast Track Compliance for Minor Violations

In December 1995, the Legislature enacted a law providing for the suspension of penalties for minor violations during a 30 to 90 day correction period, as part of the NJDEP's compliance and enforcement program. The suspension of penalties during a correction period is an effective enforcement tool and an efficient and sensible way to obtain the prompt correction of minor violations. Under the law, upon the discovery of a minor violation of an environmental law, NJDEP will suspend the imposition of penalties during a 30 to 90 day correction period. If compliance is achieved within the specified period of time, no penalty is assessed; 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. The new law applies to most environmental statutes administered by NJDEP.

The Fast Track Compliance law requires NJDEP to adopt regulations designating specific types and categories of violations as either minor or non-minor based upon criteria specified in the law. Specifically, a violation must be designated as minor if each of the following criteria are met: (1) the violation is not the result of purposeful, knowing, reckless or criminally negligent conduct, (2) the violation poses minimal risk to human health safety or natural resources, (3) the violation does not materially and substantially undermine or impair the goals of the regulatory program, (4) the activity or condition constituting the violation has existed for less than 12 months, (5) the violation is not a repeat offense, and (6) the violation is capable of being corrected within the time prescribed. The law also requires that NJDEP establish in the regulations the length of the correction period for each type or category of minor violation based upon the seriousness of the violation and the length of time reasonably necessary to correct the violation. In FY96, NJDEP began to implement the law on a case-by-case basis, and commenced development of this rulemaking. NJDEP plans to continue this rulemaking effort through the interested party review of draft regulations and a series of workshops in FY97. In FY97, NJDEP and EPA will evaluate the need to revise existing enforcement agreements based upon this rulemaking and other Federal and State enforcement response policies.

5.5. Early Settlement and ADR

NJDEP established the Office of Dispute Resolution in 1994 to help resolve issues 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 site remediation, permitting and enforcement cases, including matters that have been referred to the Office of Administrative Law for an adjudicatory hearing as a contested case, as well as problems or disputes that are not yet the subject of a formal administrative proceeding. The Office of Dispute Resolution provides a forum other than the administrative and trial courts for resolving a wide range of compliance issues through mediation or facilitation.

In enforcement matters, this forum allows the parties to resolve technical and other issues more quickly and at less cost than through litigation. In addition, this forum allows the parties to address all compliance issues between them, while litigation sometimes results in the resolution of some issues, but not others. The Office of Dispute Resolution is especially well suited for resolving complex compliance issues that could not be effectively addressed through litigation. For example, the Office of Dispute Resolution recently mediated a case in which the department had commenced an enforcement action against a permittee. NJDEP would not settle the enforcement case until the facility achieved compliance. To achieve compliance, the permittee had to obtain a permit modification from NJDEP's permitting group. To obtain the permit modification, the permittee had to obtain other approvals from NJDEP's planning group. The Office of Dispute Resolution helped the parties resolve these compliance issues in a mediation session in which the Department's enforcement, permitting and planning groups actively participated. Had this matter been litigated, NJDEP may have obtained a favorable decision, but the planning and permitting issues would not have been resolved in the litigation, and compliance could not have been achieved as quickly.

Since its inception, the Office has mediated or facilitated the resolution of 39 matters, another ten are in progress. Thirty three of these 49 matters involve enforcement issues, though many of them also involve permitting issues in one or more media or program areas.

5.6. Supplemental Environmental Projects

NJDEP believes that significant environmental benefits may be obtained through the appropriate use of Supplemental Environmental Projects (SEPs). The EPA policy for SEPs provides a good framework for evaluating specific projects through generally appropriate parameters for assessing the value of projects and considering that value in the calculation of a settlement penalty. Currently, NJDEP does not have regulations or written guidelines explicitly for the appropriate use of SEPs in the settlement of enforcement actions, and did not consider or approve any SEPs in FY96. In FY97/98, NJDEP will consider specific proposals for SEPs on a case-by-case basis, and use the EPA policy as guidance.

5.7. Performance Measures

Historically, the performance of environmental compliance and enforcement programs were measured based mainly upon the number of inspections performed, enforcement actions initiated and the amount of penalties assessed. More enforcement actions and higher penalty assessments were correlated with greater success. However, it has become increasingly clear that the number of enforcement actions initiated and penalties assessed do not, by themselves, indicate progress toward improving compliance, and should be supplemented by more appropriate performance indicators. Performance measures should indicate progress toward meeting established goals, subgoals and milestones. The performance of the NJDEP compliance and enforcement program should be measured based upon whether the application of compliance and enforcement strategies result in the timely achievement, maintenance and improvement in compliance, thereby reducing the risks and impacts to human health, safety and natural resources posed by regulated activities. For example, the percentage of regulated entities in compliance or the relative compliance rate may be appropriate indicators of performance.

Some "performance measures" sought by the Office of Enforcement and Compliance Assurance (OECA), including the number of inspections and other compliance reviews performed, reflect work outputs, not outcomes. This information is useful in limited ways in evaluating compliance and enforcement efforts. For example, if compliance improves among a certain class of regulated entities, reviewing the mix of tools applied to that class of entities (i.e., compliance assistance, inspections, corrections periods, formal enforcement actions) may help determine the extent to which one or more of these tools contributed to the improved compliance rate. This information may help NJDEP and EPA select the mix of compliance and enforcement tools that yield the greatest improvements in compliance for certain classes of regulated entities. In FY96, information regarding inspections and other compliance monitoring activity was provided to EPA through EPA's national data bases (AIRS, RCRIS, PCS, etc.). Information regarding compliance monitoring activity is also summarized for the air quality and hazardous waste programs in their respective sections of this self assessment. Inspection and compliance monitoring information for the NJPDES program is published annually in the Clean Water Enforcement Act Report. However, other "performance measures" sought by OECA, including the number of enforcement actions commenced and penalties collected, do not, by themselves, indicate progress toward achieving our goals, subgoals or milestones, (i.e., whether compliance is being achieved, maintained, and improved), and are not appropriate "performance" measures. Therefore, in FY97, NJDEP and EPA will work together to develop more appropriate ways to measure the progress of the compliance and enforcement program toward meeting environmental goals, subgoals and milestones. For FY96, NJDEP supplied facility specific data regarding enforcement actions to EPA's national data bases. In addition, information regarding enforcement actions in FY96 is summarized for the air and waste management programs in their respective sections of this Self-Assessment document. Information regarding enforcement activity for the NJPDES program is reported annually in the Clean Water Enforcement Act Report. NJDEP does not currently track or manage data in a way that allows NJDEP to determine a relative compliance rate for industry sectors. In FY97/98, NJDEP will begin tracking additional data and improving the manner in which data are managed, and thereby improve the NJDEP's ability to measure the effectiveness of the compliance and enforcement program, identifying trends and targeting resources more effectively.

6. Operational Process Changes

Following conclusion of the performance review of NJDEP, conducted in 1995 by A.T. Kearney, NJDEP has been implementing some of the recommendations made by the consultants. The performance review was designed to help identify ways in which NJDEP could reengineer the way it operates to be more efficient as well as develop an effective and comprehensive information system. As a first step, NJDEP established ten cross-functional process teams to detail the A.T. Kearney recommendations and determine how they can best be implemented. The ten process teams are: Permit Elimination, Permit Evaluation, High-Level Enforcement, Single Point of Entry, Budget, Rule Development, Analytical Services, Air Workload, Green Acres, and Strategic Planning.

These process teams, who also provide support for NJDEP's Innovation through Quality Program, tap the creative and intellectual talents of all the staff and management in order to initiate and sustain ongoing improvement efforts. Key accomplishments of these process teams for FY97 include:

- Functioning one-stop permitting office
- Fully implemented coordination of inspection and enforcement activities (Compliance Assistance) for all major industrial facilities
- Implementation of a simplified process and associated information system to plan, develop and manage NJDEP's budget
- Reengineering of 10-12 permit processes and elimination of several permits with little/no environmental impact
- Functioning Strategic Planning process and development of a comprehensive annual and three year plan
- Design of a streamlined Green Acres process
- Functioning staff suggestion submittal process (Opportunity for Innovation)
- Streamlined Rulemaking process, including staff handbook guidance
- Simplified procurement process for analytical services

An additional area of recommended change for NJDEP was the creation of an integrated information management system which will support these redesigned business processes, and provide staff and managers with the tools to increase productivity, effectiveness and decision-making abilities. A more detailed description of this effort may be found below.

7. Enhanced Information Management Systems and the GIS

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 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 goals and indicators. NJDEP recognizes the importance of information management in the overall management of environmental resources. As NJDEP moves toward management of New Jersey 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.

7.1. Successes and Limitations

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 the development of a significant statewide geographic database.

Additionally, NJDEP is currently involved in a high-priority initiative to design and develop an Integrated Information System which will link the department's mission with critical data. A Site Masterfile, housing NJDEP's core data, is the centerpiece of the system. The Masterfile will serve as a "pointer" to detailed program area data and will also enable the linking of this data with NJDEP's Geographic Information System's spatial data. Beyond the obvious advantages of accelerated environmental decisions based on accurate, timely data, the Integrated System will provide support to the process reengineering initiatives currently underway in NJDEP. Highlighted among these is the Single Point of Entry for the regulated community and facility-wide permitting (where applicable) to reduce the report burden on industry. High Level Enforcement initiatives will also be supported by the multi-media reports to be generated by the Integrated System. Among the far-reaching goals of the project is the ability to share real-time meaningful access to environmental data with the public, thus maximizing the State's ability to deal with its environmental challenges in the most rapid and efficient manner possible.

7.2. Cross-Cutting Data/Information Priorities

The self-assessment process has led to the recognition of the following 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.

* **GIS Usage** - NJDEP intends to more fully utilize the capabilities of the GIS in both its development and display of environmental indicators.

* **Electronic 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 environmental data 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 New Jersey. 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 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.

ENVIRONMENTAL MERCURY

1. Background

There are certain environmental contaminants for which there is a particular need for consideration from a multi-media perspective; contaminants that are ubiquitous in the environment and whose fate and transport transcends single medium regulation. In this Self-Assessment, NJDEP is suggesting a cross-media strategy for evaluating the fate, transport and impacts of mercury as a cross-cutting contaminant. In subsequent years, other contaminants (e.g., lead) may be selected for evaluation using a similar cross-media model.

Mercury, in its various chemical forms, has long been known to be toxic to humans, with a specific and unique spectrum of effects on the nervous system. Recent reports in the scientific literature indicate that global levels of mercury are increasing due to anthropogenic activity. The physical properties of elemental mercury, i.e., its extreme volatility compared to all other metals, makes its pervasiveness in the environment unique. Mercury is persistent, mobile and bioaccumulative in the environment, factors which make this contaminant, more than most others, a potentially significant human health risk from environmental exposure. Further, there is much uncertainty regarding the ultimate fate and transport of mercury once it is introduced into the environment. It is difficult to apportion global levels of mercury from local or regional data and vice versa making it difficult for a single state to determine its impact on global, regional or local mercury levels. By virtue of its various interconvertible forms, mercury cycles through the environment from air to soil to water to biota. The most significant environmental compartment for mercury from the standpoint of human exposure is aquatic biota, which may be consumed by humans. Mercury is stored in the tissue of aquatic biota predominantly in the form of methyl mercury. Mercury reaches water bodies from a number of routes: the air-water interface; washout of mercury-containing particulates with precipitation; runoff of soil which has received mercury from atmospheric deposition and from land-applied mercury-containing materials; and direct point source release to water bodies. Thus, mercury cannot accurately be classified as a contaminant of one particular medium; its appearance in any one medium affects its concentration and behavior in other media.

To warrant consideration as an environmental contaminant of significant concern, however, it is not merely sufficient for a chemical to be ubiquitous in the environment; the chemical must also result in levels of exposure which present the potential for adverse human health or environmental effects. While inorganic mercury produces adverse health effects in humans, it is the organic form, methyl mercury, that is considered most toxic to humans. Very low concentrations of methyl mercury can result in deleterious health effects in humans. Recent estimates of human exposure have suggested that a significant fraction of women of childbearing age are exposed to methyl mercury from commercial fish consumption at levels which exceed the current EPA Reference Dose, based on prevention of adverse fetal developmental effects. This exposure is not only of concern in its own right, but suggests that there may be little margin for increases in methyl mercury exposure from other sources such as sport and subsistence fishing. For these reasons, mercury presents a unique and significant cross-cutting issue.

2. Program Descriptions

Since mercury is a cross-cutting issue, its assessment and control in the environment is handled by many programs throughout NJDEP. The programs that conduct monitoring, permitting and research activities pertaining to mercury in the environment are listed below.

Policy and Planning
- Air Quality Management
- Division of Science and Research
- Water Monitoring Management

Environmental Regulation
- Air Quality Permitting
- Division of Water Quality
- Division of Water Supply

Enforcement
- Air Quality Enforcement
- Water Compliance and Enforcement Element

Natural & Historic Resources
- Division of Fish, Game and Wildlife

Additional descriptions of most of these programs may be found in the Environmental Assessment and Risk Analysis description of the Cross-Cutting Programs section, the Air Quality/Radiation Self-Assessment, the Water Resources Self-Assessment and the Drinking Water Self-Assessment.

3. Stakeholder Involvement

Preliminary efforts have been made to discuss the issue of mercury with interested parties outside NJDEP. However, there has been no separate focus group meetings specifically for mercury; rather, comments on mercury from the other groups (i.e., the air and the water focus group meetings) have been incorporated, as appropriate. Suggestions that were made in the sessions, which were considered in the preparation of the FY97/98 Performance Partnership Agreement (PPA), will help NJDEP and EPA Region 2 to continue to fine-tune the goals and upgrade the list of environmental indicators.

4. Key Environmental Issues

The basic key issues surrounding mercury are elevated levels in environmental media and its bioaccumulation in biota. These issues are important for two reasons: 1) human consumption of biota in which mercury is elevated (i.e., fish); and 2) detrimental ecological effects of mercury. Mercury has been found in air, precipitation, surface water, sediments, ground water, and fish and other biota throughout the state. In some cases, established standards have been exceeded. In others, standards have not been developed so regulators must interpret the levels. Mercury does not degrade but it can transform either chemically or biotically. While methyl mercury is of most concern for human health, other forms of mercury are important to measure as well. The following subsections describe the issues of concern to the state and report, where available, concentrations of mercury in New Jersey media and biota along with exceedances of standards, where they exist.

4.1. Levels of Mercury in Air and Precipitation

Background mercury levels in the pristine global environment are generally agreed to be 0.001 to 0.009 ug/m^3 (NJDEP, 1993). It is not known what percentage of these mercury levels are due to anthropogenic point or global sources of mercury or to natural global sources.

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 (MSW) 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 from MSW incinerators into the air by 1996 be reduced by nearly 91% from 1990 baseline levels. By the year 2000, emissions would be cut by over 96% 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 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 collection of additional information for other sources of mercury emissions, such as incineration of hospital waste and sewage sludge, and the burning of coal in power plants.

Research conducted by the Division of Science and Research has demonstrated that mercury levels in precipitation and air may be elevated above background in certain regions of the State. Levels measured ranged from 0.005 to 0.094 ug/L in precipitation, with the higher values in urban areas and lower values in undeveloped, forested areas. Information will also be sought on possible mercury sources that are at present poorly characterized but may be significant, such as refining of crude oil and landfill emissions.

4.2. Surface Water, Sediment, Aquatic Vegetation and Non-fish Biota Mercury Levels

4.2.1. Mercury in Surface Waters

Mercury is seldom found at elevated levels in the surface water column. The solubility of metallic mercury in water is low but contact with oxygen-containing water may increase solubility. The mercury that does reach surface waters accumulates in sediments and is taken up through the aquatic food chain. The end result is the bioaccumulation of mercury in higher trophic level fish. Some areas of the state may be impacted by direct discharges of mercury and these discharges may result in increased water mercury levels.

Global mercury values in lakes, rivers and streams have been reported in the literature to range from 0.001 to 0.075 ug/L. As part of a multi-media project conducted by DSR, surface water mercury levels were measured at 0.0015 to 0.0198 ug/L.

Ambient Stream Monitoring Network

The Ambient Stream Monitoring Network, operated cooperatively by NJDEP and USGS, consists of 79 fixed stations monitored five times per year for conventional parameters (i.e., dissolved and total nutrients, dissolved oxygen, pH, etc.) and microbiological parameters. Metals, including mercury, are monitored in water twice per year.

Surface Water Mercury Criteria

The freshwater mercury criteria is 0.144 ug/L to protect human health. Concentrations of mercury in excess of the criteria occurred at 16 stations between 1990-94. Since studies conducted on a national basis indicate potential contamination of metals samples, additional sampling, using clean-methods techniques, is needed to confirm these data. Insufficient data are available for trend analysis. Spatial analysis is needed to compare water column, sediment and fish tissue concentrations of mercury. 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. The specific source(s) of mercury at the 16 stations have not been identified.

4.2.2. Mercury in Sediments

Trophic transfer of toxic pollutants from sediments to biota (i.e., bioaccumulation) has resulted in elevated levels of 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. Ingestion of organisms with high levels of contaminants poses a risk to humans and other wildlife. Sediment levels of mercury are monitored every three years as part of the Ambient Stream Monitoring Network.

Global mean mercury concentration for uncontaminated, background sediments are reported to be within the range 0.04 to 1.3 ug/g. Surface sediments tend to have higher concentrations of mercury than deeper cores. Some New Jersey lakes have been analyzed for sediment mercury concentrations. In Monmouth County, nine lakes were sampled by the local health department. The median ranges reported were 0.07 to 0.09 ug/g. The Division of Science and Research has also sampled lakes in the state with mercury levels ranging from 0.13 to 0.33 ug/g.

4.2.3. Mercury in Aquatic Vegetation and Non-fish Biota

It is important to evaluate mercury levels in aquatic biota to understand the fate and transport, and the bioaccumulation of mercury in whole surface water systems. There is scant data available on mercury levels in aquatic vegetation and non-fish biota in New Jersey. Some research studies, however, have provided some data. Mercury has been measured in piping plover eggs up to 1.07 ug/g and in osprey eggs up to 0.1 ug/g. Analyses of the carcasses of three peregrine falcons found dead near Barnegat Bay revealed mercury levels ranging from 0.232 to 3.540 ug/g. Mercury levels in aquatic vegetation have been measured in New Jersey: pond lilies in lakes were reported to be 0.008 to 0.0132 ug/g. More information on mercury levels in aquatic vegetation and non-fish biota are needed in order to fully assess the issue.

4.3. Mercury in Freshwater and Saltwater Fish

4.3.1. Freshwater Fish

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

NJDEP has recently issued statewide consumption advisories on pickerel and large mouth bass due to mercury contamination. Numerous freshwater bodies also have advisories that are more stringent than the statewide advisories. 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 target "at risk" segments of the population: pregnant women, women planning pregnancy within a year, nursing mothers, and children under five years old.

4.3.2. Saltwater Fish

Consumption of saltwater species of fish is probably high in New Jersey as well as elsewhere in the country. However, consumption of locally-caught marine fish is probably higher here. There is currently no data on mercury levels of marine fish caught on the shores of New Jersey. Information in the literature reporting mercury levels of saltwater species of fish indicate that this is a potentially high exposure route. Canned tuna has been reported to contain 0.1 to 0.75 ug/g and non-tuna species have been reported to contain 0.24 to 0.94 ug/g.

4.4. Mercury in Soil, Ground Water and Aquifer Sediments

Mercury levels exceeding the drinking water maximum contaminant level (MCL) of two parts per billion (ppb) have been found in private wells tapping the Kirkwood-Cohansey aquifer in southern New Jersey. Over 2,300 private, potable wells have been sampled in southern New Jersey for mercury. Of these wells, approximately 300 have yielded water samples with mercury levels exceeding the MCL of 2 ppb. The highest mercury concentration found in a water sample was 72 ppb. Many of the affected wells are located in areas with no obvious potential source of mercury.

Research by Skidaway Institute of Oceanography, in conjunction with NJGS and DSR (Murphy et al., 1994), indicates that ambient mercury levels in ground water in the New Jersey coastal plain to be 0.001-0.040 ppb and concentrations higher than this indicate contamination by anthropogenic (i.e., human) sources. Further, an assessment of the mineralogy in the area indicates that the mercury found in ground water cannot be contributed from natural aquifer sediments (Dooley, 1992). 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; and 4) atmospheric deposition. A draft report, completed by the USGS for NJDEP, has identified 32 contaminated areas in southern New Jersey 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. Preliminary investigation suggests 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 drinking water sources to affected residences, and determine the potential source(s) of the contamination.

4.5. Mercury Levels in Finished Drinking Water

The BSDW maintains a database on mercury results reported by community water systems and noncommunity, nontransient water systems throughout the State. Mercury in finished drinking water is described in more detail in the Drinking Water section of this Self-Assessment document.

Drinking water supplied from waters where elevated fish tissue mercury has been found has been tested and shown to be safe - mercury levels were well below the federal and state drinking water standards. This is primarily because the mercury resides primarily in sediments and aquatic life rather than in the water column.

Over 3,000 public water system samples have been analyzed for mercury since 1993. During this period, four CWS samples and three NTNC samples exceeded the MCL of 2 ppb. In each case, alternative water sources have been developed or the contaminated water has been eliminated from the system. Mercury would not appear to be a significant problem in New Jersey PWS.

4.6. Mercury Levels in Terrestrial Biota and Vegetation

Some global investigators have measured mercury in pine needles, grasses, lichens and sugarcane and the values vary widely. There is little information in New Jersey. Mercury in terrestrial vegetation and biota may help determine major areas of deposition in the state and may serve as living indicators of mercury contamination through atmospheric deposition. Mercury levels in rye grass and sphaghnum moss were measured near the Warren County Resource Recovery Facility (Carpi et. al., 1994). Total mercury in moss exposed at sites within 1.7 kilometers of the incinerator averaged 206 ug/g while samples exposed at greater distances from the facility averaged 126 ug/g. The difference between samples collected near the incinerator were significantly higher than those collected form remote locations.

5. Program Strengths

5.1. Mercury Air Standard Promulgated

Adoption of strict Mercury emission standards for municipal incinerators occurred 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% from 1990 baseline levels. By the year 2000, emissions would be cut by over 96% 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. 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.

5.2. Issuing of Fish Advisories

New Jersey is active in researching and understanding levels of mercury in freshwater fish. Vital information that has not been investigated, however, is the impact of mercury in marine fish. Future activities should include an assessment of the levels of mercury in marine fish and fish products (including canned tuna) and the consumption of these items by New Jersey residents.

In early 1994, DSR released a report entitled " A Preliminary Assessment of Total Mercury

Concentrations in Fish from Rivers, Lakes and Reservoirs in New Jersey", by Dr. Richard Horwitz, Academy of Natural Sciences of Philadelphia (ANSP), that identified mercury levels in selected freshwater fish species collected from around the state. Mercury concentrations in specimens of largemouth bass, chain pickerel and yellow bullhead were elevated above the 1.0 ppm FDA tolerance for food consumption, and on February 4, 1994, the NJDEP/DOHSS issued public health notices advising the public not to consume these species at the 15 water bodies that exhibited the elevated concentrations.

On the basis of the data generated in the ANSP study, DSR, in conjunction with the New Jersey Interagency Toxics in Biota Committee, undertook the development of fish consumption advisories for consumers of the two species of New Jersey freshwater fish most represented in the study, largemouth bass and chain pickerel. This advisory required several steps. The development of risk-based guidance for acceptable daily intake of methyl mercury for the most sensitive population (pregnant women) followed from the work done by DSR in the Mercury Emissions Task Force report. Late in the course of the advisory development, this acceptable intake guidance was confirmed by essentially identical guidance from the EPA's Office of Water. Consumption frequency categories (e.g., eat once per week) were developed and were associated with ranges of mercury concentrations in fish based on the acceptable daily intake guidance. The data from the ANSP study were statistically summarized by water body and species and each species in each sampled water body was assigned to a specific consumption frequency category. Finally, based on a summary of results from the sampled water bodies, consumption frequency guidance was derived for those water bodies which have not yet been sampled. These consumption advisories were consistent with guidance from the EPA and from several other states.

In March 1994, Commissioner Shinn approved a follow-up investigation of mercury concentrations in fish from the 15 water bodies with elevated mercury concentrations. The data generated from this project will provide important additional information on mercury concentrations in these waterways and in several gamefish species not previously tested.

5.3. Reduction in Point Source Loadings

Solid Waste

In municipal solid waste (MSW), batteries are the major source of mercury, accounting for an estimated 84% of the mercury in 1992 in New Jersey MSW. The mercury in batteries, however, is declining rapidly and is expected to reach close to zero by the end of 1996. Other mercury contributors to the waste stream are fluorescent lamps (6.1%), fever thermometers (3.5%), paint (2.2%) and pigments (1.4%), thermostats (2.05%) and mercury light switches (0.3%). Passage of the Dry Cell Battery Management Act (N.J.S.A. 13:1E-99.59) in 1992 resulted in a 70-80% decline of mercury content in New Jersey's MSW and will greatly reduce the mercury levels in pigments used in packaging.

In hospital waste, the major sources of mercury are mercury oxide batteries, fluorescent lights and fever thermometers. Requiring separation of these items from the waste stream and separate treatment or disposal could significantly reduce mercury emissions from hospital incinerators and MSW incinerators which receive hospital waste. Although hospital waste makes up only about 1% of the total MSW, it could contribute about 20% of the mercury in the MSW stream because of the significant use of mercury oxide batteries and other mercury-containing products by hospitals.

Hazardous Waste

Hazardous waste manifests and stack test results indicate that very little waste-containing mercury is burned in New Jersey hazardous waste incinerators. Permit limitations do allow for mercury emissions up to 1790 pounds/year, but stack tests indicate that less than 1% of this amount is actually emitted. It appears that allowable mercury emissions from hazardous waste incinerators can be significantly reduced to assure maintenance of a low mercury emission rate from this source category. The mercury in waste directed to hazard waste incineration will continue to be managed through New Jersey's hazardous waste manifest system.

Crematoriums and Apartment House Incinerators

Crematoriums may emit about 100 pounds of mercury per year, based on the amount of amalgam fillings estimated in the teeth of the average human being. Small apartment house incinerators may also contribute about 100 pounds of mercury per year. It should be noted that apartment house incinerators in New Jersey are being shut down rather than upgraded to meet air pollution control requirements; thus, this source of mercury emissions will be largely eliminated within the next few years.

5.4. Monitoring, Research and Databases Inform Decision-making

Numerous research and special projects have been conducted by the 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 feshwater fish and sediments. The NJPDES database provides information on loadings to water bodies from discharge monitoring reports. This database is used to assess permit compliance and set fees.

5.5. Reduction of Mercury Entering Sewage Treatment Plants

The Industrial Pretreatment Program activities have resulted in a reduction of loads of toxics to sewage treatment plants in general, including mercury, with a subsequent decrease of metals levels in the sewage sludge. This program success is discussed in detail in the freshwater section of the Water Resources Self-Assessment. Since mercury is one of the toxics considered, it is important to mention this success here.

5.6. Sludge Regulations

Changes have been proposed to the NJPDES rules to adopt federal standards for the use or disposal of sewage sludge. In developing these rules, NJDEP carefully considered, and placed heavy emphasis on, those regulatory approaches that support its policy of beneficial use. In addition, secondary benefits of beneficially using sewage sludge include a decreased dependence on chemical fertilizers. This success is discussed in detail in the freshwater section of the Water Resources Self-Assessment.

Pursuant to the Water Pollution Control Act (N.J.S.A. 58:10A-6(f)(7)), a NJPDES permit issued by NJDEP requires the permittee to limit concentrations of heavy metals, including mercury, in the sludge in conformance with land-based sludge management criteria. On February 19, 1993, the EPA promulgated Federal sludge management regulations at 40 CFR Part 503 to protect public health and the environment from any reasonably anticipated adverse effects of certain pollutants that may be present in sewage sludge.

6. Program Limitations

6.1. Gaps in the Ambient Air Monitoring Program

Mercury levels are not monitored.

6.2. Lack of Sediment Standards Hampers Protection of Fish Consumption and Aquatic Life Designated Uses

Finfish contamination by mercury has been documented in New Jersey. This contamination of finfish may reflect sediment concentrations which are too high to protect against bioaccumulation. 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. 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.

6.3. Limitations of Current Data and Monitoring Programs

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

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

- National studies have indicated widespread metals contamination in ambient stream monitoring data. As a result, NJDEP is implementing clean-methods sampling techniques for metals, including mercury. These data can be used to evaluate the extent of metals contamination in historical data. Until this analysis is completed, ambient metals data must be considered questionable.

- Additional cuts in parameters including mercury and stations monitored are possible as more expensive clean methods metals sampling are implemented or if funding decreases.

- To protect human health, additional research on mercury in biota and fish consumption patterns are needed. Trophic transfer, bioaccumulation, bioconcentration, and biomagnification of toxics in freshwater systems are not well understood. Further, saltwater fish mercury levels have not been assessed in New Jersey and may be an important route of exposure in this State.

- Ambient mercury 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.

- The current sludge generator reporting requirements and database are insufficient to accurately track the concentrations of mercury in sludge which is being removed per use or disposal method.

- County data on mercury levels in potable wells are difficult to retrieve and are inconsistent, and NJDEP does not maintain computerized records on wells.

7. Indicators

Many of the indicators represent on-going State activities and some are research projects that have already been initiated. It is important to note that many of the activities surrounding the issue of mercury in New Jersey, and presented in the FY96 PPA, are State-initiated and therefore not subject to EPA oversight. Because the State feels that this issue is a priority and intends to continue to evaluate the occurrence, fate and transport of mercury in the environment, it was included as part of the FY96 NEPPS PPA.

The following mercury goal statement was developed to reflect broad societal values for environmental quality in relation to mercury: ***To protect human health and the environment from the adverse effects of mercury.***

Five milestones were developed and are described below. Progress toward milestones is measured using three types of indicators: *cause indicators*, which describe causes of pollution problems; *condition indicators*, which describe current and/or historical ambient conditions; and *response indicators*, which describe societal responses to problems identified by cause and condition indicators.

Additional data analysis and interpretation are needed to link the selected indicators spatially and temporally, allowing evaluation of sources and causes of mercury contamination. These assessments are essential to the successful integration of indicators into NJDEP policy and decision-making.

Below are the environmental indicators that the State committed to reporting in the FY96 PPA. More detailed reporting on these indicators is included in the Environmental Indicators Appendix. Other indicators have been developed for mercury but, because they were not committed to being reported this year, do not appear here (see the FY96 PPA).

Goal: To protect human health and the environment from the adverse effects of mercury.

Milestone: Reduce human exposure to mercury.

Cause Indicators:

There were no cause indicators identified with this milestone.

Condition Indicators:

No conditions indicators are being reported at this time.

Response Indicators:

- Implementation of public education efforts and outreach including the issuing of fish advisories.

In early 1994, DSR released a report entitled " A Preliminary Assessment of Total Mercury Concentrations in Fish from Rivers, Lakes and Reservoirs in New Jersey", by Dr. Richard Horwitz, Academy of Natural Sciences Philadelphia, that identified mercury levels in selected freshwater fish species collected from around the state. Mercury concentrations in specimens of largemouth bass and chain pickerel were elevated above a risk-based criteria developed for food consumption. On July 10, 1994, the NJDEP/DOHSS issued public health advisories to limit consumption of these species statewide and at specific water bodies that exhibited the elevated concentrations. The advisories are directed toward the general population and those high risk groups identified. Most affected are those segments of the population that are exposed through consumption of recreationally caught freshwater fish.

The NJDEP/DFGW provides a detailed listing of those waterways and fish species that currently are under the state's fish consumption advisories though the DFGW information publication "New Jersey Fish and Wildlife Digest". Each quarter, over 350,000 of these brochures are issued to all fishing license outlets, vendors and agents throughout the State. Each year, the DFGW places notification signs at all state waterways listed under the freshwater mercury advisory. Signs are maintained and replaced by DFGW at each waterway to inform anglers of the potential health hazards.

In 1995, the NJDEP/DOHSS generated a pamphlet titled, "A Guide To Health Advisories for Eating Fish and Crabs Caught in New Jersey Waters". Distribution of the pamphlet included all county health offices and department public information centers.

In 1997, the NJDEP/DOHSS released a pamphlet titled, "A Woman's Guide to Eating Fish and Seafood". This pamphlet is directed toward woman that are pregnant, planning to be pregnant or have young children. It outlines the current state issued fish consumption advisories and shows how to reduce exposure to contaminants in recreationally caught fish. Copies of this document are available to the general public through NJDEP and DOHSS and direct distribution included all county health officers and community health centers.

DSR has recently completed a survey on consumption patterns of anglers in the Newark Bay Complex. There are basically three types of fishermen here: traditional fishermen, cultural fishermen and subsistence fishermen. This information will help the State in targeting public education activities and in learning about consumption patterns among vulnerable populations, i.e., pregnant women.

- Research projects:

1. Mercury concentrations in fish, surface water, sediments and aquatic vegetation from selected water bodies in New Jersey

A pilot project to develop a multi-media profile of three freshwater lakes and the collection of precipitation samples was performed by DSR and reported in 1995 (the precipitation component is discussed in the precipitation section). The lakes profile included collection of surface water, sediment, soil, aquatic vegetation, and fish at each of three lakes, representing the northern, central and southern regions of the state. Surface water quality in one of the three lakes has been recommended for additional study due to elevated mercury levels observed, which may have been related to a local discharge. The data range observed for mercury in sediments was 57 to 431 ppb, which is within the range of values reported in other areas of the U.S. with no known local anthropogenic sources.

In 1994, in response to the findings from the 1994-DSR/ANSP mercury in fish survey, NJDEP/DOHSS issued a public health notice to prohibit the consumption of fish from 15 waterbodies throughout the state due to elevated mercury concentrations. As a follow-up to this policy, DSR designed a project to develop a mercury profile for each of the 15 waterbodies listed. The project is expected to be reported in 1997 and the data generated through this project will provide NJDEP with additional information to better understand the cycling of mercury through various media, and fish trophic levels and will be used in the development of fish advisories as needed.

DSR/ANSP is conducting ongoing research into the identification of mercury concentrations in fish from throughout the state. This project is expected to be completed in 1997. It will incorporate several of the Toxics in Biota Committee's recommendations into a comprehensive assessment of mercury contamination in freshwater systems in New Jersey. Building upon the initial investigation, this project will develop a database on additional waterbodies within geographic strata that demonstrated high or variable bioaccumulation rates or where there was previously low sampling intensity. The data gathered will generate a detailed revision of the stratification system, an analysis of mercury from waterbodies not previously tested, ancillary parameter water analysis and a determination of the mercury in fish species and locations utilized primarily by substance anglers in urban areas of New Jersey.

2. Fish consumption patterns by New Jersey anglers

To better understand fish consumption patterns of New Jersyans and the potential implications on public policy regarding fish consumption advisories and surface water criteria, NJDEP commissioned the New Jersey Marine Sciences Consortium and Eagleton Institute to undertake a statewide survey of fish consumption by household. The objective of this project was to obtain pertinent information essential to yield consumption estimates for risk assessments and incorporation into the development of surface water quality criteria. Through 1000 individual household telephone interviews, direct contact with fishermen's organizations as to where they fished, frequency of fishing and which species sought, and the analyses of wholesale and retail sales and market landings data this project was able to accurately assess the fish and shellfish consumption habits of New Jersey residents. The survey was used to determine a variety of activities including, household fish consumption patterns, a profile of fish consumption in New Jersey, categorical profile of fish dishes (freshwater, saltwater), profiles of methods of fish preparation, amount (ounces) of fish consumed by New Jerseyans, fish consumption per meal, per demographic group and per week in New Jersey, consumption of native New Jersey fish species, and a profile of New Jersey anglers fish consumption habits and fishing activity.

Milestone: Identify sources of mercury to air from points source emissions.

Cause Indicators:

- Status and trends of mercury loadings emitted to air from New Jersey point sources (i.e., incinerators)

As part of the Task Force on Mercury Emissions Standard Setting, an inventory of mercury air emissions from stationary sources was prepared. This inventory is summarized in Volume III of the final report on Municipal Solid Waste Incineration (1993). An effort is now underway to update and improve that inventory using actual stack test data. Most of this stack test data is being collected as part of the implementation of NJAC 7:27-27: Control and Prohibition of Mercury Emissions.

Conditions Indicators:

No conditions indicators for this milestone are being reported at this time.

Response Indicators:

No response indicators for this milestone are being reported at this time.

Milestone: Determine the extent of mercury contamination of New Jersey aquifers by the year 2005.

Cause Indicators:

- Loads of mercury-containing agricultural chemicals applied on land.

Mercury-based pesticides were used extensively on agricultural land, turf/sod, and golf courses in

New Jersey from the turn of the century through the 1990's (agricultural use was banned in the 1970's but golf course and turf use is still allowed today). It is known that portions of the Kirkwood-Cohansey aquifer system in southern New Jersey contains elevated levels of mercury. One potential source of the mercury in the aquifer is the past and present use of these metal-based pesticides. DSR has recently completed a report describing a methodology to estimate amounts of mercury applied to New Jersey land due to the use of this metal in pesticides. The report concludes that between 1910 and 1970, a wide range of amounts of mercury as an active ingredient in pesticides were applied annually on approximately 200,000 acres of cropland and golf courses (e.g., from approximately 10,000 lbs. in the 1940's-1950's when use of these pesticides was predominant to approximately 1,000 lbs, in the 1970's when the use of synthetic organic pesticides replaced mercury pesticides).

Conditions Indicators:

- Percent of private wells in susceptible aquifers tested for mercury with mercury concentrations above the MCL.

NJDEP has records of over 2,000 private well testing results for mercury in water. Of these, almost 300 (15% of those sampled) show mercury concentrations above the maximum contaminant level (MCL) of 2 ppb. The issue of mercury in ground water, from a human health perspective, seems restricted to private wells since mercury is seldom detected above the MCL in community water system samples (only one public water system sample showed an exceedance of the MCL of over 3000 reported samples). See the Drinking Water Self-Assessment for more a detailed description of mercury levels in public water systems.

- Mercury levels in ambient ground water.

A study conducted by DSR, with Skidaway Institute of Oceanography, concluded that the natural, background levels of mercury in New Jersey ground water is 0.001 to 0.04 ppb. Mercury levels above approximately 0.04 ppb would therefore be considered to be anthropogenically impacted.

Response Indicators:

- Number of water source changes and/or treatment units installed due to mercury contamination.

From 1993 to 1995, three mercury violations have been reported for public water systems. The BSDW, which is responsible for collecting monitoring and compliance information on public water systems, has not assessed this indicator, so it cannot be reported at this time.

- Research projects:

1) Distribution of mercury in ground water, soils and sediments of the Kirkwood-Cohansey aquifer system in the New Jersey Coastal Plain, Phase I and Phase II.

PHASE I: Data on mercury concentrations in water from potable wells in the southern part of New

Jersey were collected from state and county records. These results were incorporated into a database and evaluated in order to discern the spatial and temporal distribution of mercury in ground water. Areas where at least one well sample yielded water containing mercury above the maximum contaminant level of 2 ug/L were classified as "contaminated sites". These sites were evaluated for similarities. Such parameters as land use history, proximity to industrial sites, cemeteries, hazardous and municipal landfills, household inputs such as exterior paint and septic leachate, and atmospheric deposition were investigated as potential sources of mercury to ground water. In order to verify the data that were previously collected and to gather additional information, a sampling effort for ground water and soil was conducted at some of the contaminated sites. Six hypotheses regarding the origin of the mercury being found in ground water are offered, the first two of which have been dismissed as reasonable possibilities. They are: 1) sampling error; 2) pump materials; 3) household inputs; 4) point sources; 5) atmospheric deposition; and 6) land-applied mercurial pesticides. A second phase of this study is being conducted to further eliminate some of the hypotheses and to determine possible mechanisms for mobilizing mercury from soils to ground water.

PHASE II: More detailed correlations between nitrate and other constituents associated with agricultural chemicals were completed on the mercury data set. Positive relationships between mercury and nitrate and chloride were found in agricultural areas in the state and it is shown that levels of these constituents are higher in agricultural areas than in undeveloped, pristine ground waters.

Milestone: Assess point and nonpoint source loadings of mercury to surface waters and sediments

No cause or conditions indicators are being reported at this time.

Response Indicators:

- Continue to revise and develop mercury surface water criterion for mercury (responding to comments).

Milestone: Assess soil mercury levels

No indicators for this milestone are being reported at this time.

IV. AIR QUALITY/RADIATION SELF-ASSESSMENT

GLOSSARY

ADR	Alternative Dispute Resolution
CAAA	Clean Air Act Amendments
CEHA	County Environmental Health Act
CEMS	Continuous Emissions Monitoring System
CO	Carbon Monoxide
LEV	Low Emission Vehicle
MARAMA	Mid-Atlantic Regional Air Management Association
MOU	Memorandum of Understanding
NAAQS	National Ambient Air Quality Standards
NESCAUM	Northeast States for Coordinated Air Use Management
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NJAC	New Jersey Administrative Code
NO_x	Oxides of Nitrogen
NO_2	Nitrogen Dioxide
O_3	Ozone
OTC	Ozone Transport Commission
OTR	Ozone Transport Region
PM_{10}	Inhalable Particulate Matter
PPA	Performance Partnership Agreement
PSI	Pollutant Standards Index
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
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds

1. Background

The air resource in New Jersey is affected by many naturally occurring and manmade pollutants, and air quality in the state varies significantly depending on location, time and weather conditions. While there are no clear or fixed boundaries over which air quality can be described, geographic air sheds have been defined, primarily for the purpose of developing strategies to control air pollution. New Jersey is part of four major air sheds, each of which is associated with a metropolitan area (New York, Philadelphia, Atlantic City and Allentown - Bethlehem). Within each air shed, air quality is affected both by local emissions and by pollution which is transported into the area by the prevailing winds. Transported pollution has a serious impact on New Jersey's air quality just as pollution from New Jersey affects areas downwind of it. There are many multi-state efforts to control this pollution and these will be described in more detail later. Within New Jersey itself, there are a wide variety of air pollution sources. These can generally be categorized as mobile sources (such as cars and trucks), stationary 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 about 500 major source facilities operating in New Jersey, including over 200 chemical and allied products manufacturing plants with products ranging from pharmaceuticals to agricultural fertilizers to solvents, cleaners and paints. There are about 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 four major petroleum refinery regions -- two along the Delaware River in Camden and Gloucester Counties and the other two adjacent to Newark Bay and the Arthur Kill. There are 30 major petroleum facilities in New Jersey transporting and distributing 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 at the end of this section).

In addition to focusing on pollutants in the four major air sheds, the NJDEP is also concerned with the quality of indoor air for New Jersey residents. Indoor air may also be affected by a variety of sources, from homeowner-used products to industrial machinery to infiltration of outdoor pollution. Two sources of particular concern are pesticides and radon.

Pesticides, which is the generic term for all products intended to alleviate pest problems (insecticides, herbicides, fungicides), may be used in diverse settings such as residential homes and office buildings. The air inside any treated building thus becomes a potential source of exposure for those people using the building. Possible air contaminants from these products include the pesticide active ingredient, as well as any inert ingredients used in the formulation (e.g., volatile organic compounds).

Radon is a colorless, odorless, and tasteless radioactive gas that is a naturally occurring decay product of uranium-238. The diluting effect of the atmosphere results in a relatively low outdoor radon concentration. However, in confined homes and buildings, radon can become concentrated to unhealthy levels. Radiological and geological data, as well as indoor radon test data, indicate that the radon problem in New Jersey is substantial and widespread. Approximately 500 lung cancer deaths per year in New Jersey are estimated to be attributable to radon exposure.

2. Description of Air Quality/Radiation Programs

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 in sections 2.1., 2.2. and 2.3. However, not all aspects of the air pollution problem are regulated by NJDEP's Air Program. With respect to indoor air pollution, for example, the application of pesticides is regulated by a separate part of the agency, as is any type of radiological air pollution.

Since air pollutants can be transported across jurisdictional lines, a regional approach to solving air pollution problems is often necessary. NJDEP works cooperatively with other states to address these problems through participation in groups such as the Ozone Transport Commission (OTC) and the Ozone Transport Assessment Group (OTAG).

Cross-media issues such as acid rain may be addressed by the air program, while others such as mercury in fish may be jointly managed by several parts of NJDEP. There are also other agencies that assist NJDEP in carrying out the goal to preserve, sustain, protect and enhance air quality. Local agencies assist with enforcement and monitoring activities; the Clean Air Council advises the Commissioner on air pollution related issues; the Department of Health and Senior Service 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. As described in the 1996 Performance Partnership Agreement (March 1996), the Region 2 Office of EPA also plays an important role in the overall air quality program.

2.1. Air Quality Permitting

The responsibility for reviewing new and modified stationary sources of air pollution 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 selected 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.

2.2. Air Quality Enforcement

The responsibility of air pollution enforcement lies within the Air and Environmental Quality Compliance and Enforcement (AEQE) program. The primary objective of the air pollution enforcement program is to ensure 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 that the required emission standards are met to improve air quality.

2.3. 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 develops strategies 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 drafting and managing the adoption of amendments to the State’s Air Pollution Control Code and preparation of revisions to the State Implementation Plan (SIP).

2.4. Local Government Programs

There are 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 facilities such as office buildings, apartment houses, commercial facilities with small boilers, and similar small point sources, and report alleged violators to NJDEP.

2.5. Environmental Radiation

The Radon Program in NJDEP has three primary responsibilities related to indoor air exposure to radon. They are: 1) increasing public awareness of the radon problem; 2) increasing the radon testing rate; and 3) increasing installation of radon mitigation systems when indoor radon levels warrant such action. The Department will also be assuring that radionuclide air emissions remain low.

2.6. Pesticide Control

The use of indoor pesticides, is regulated by the NJDEP's Pesticide Control Program (PCP). Pesticides may be used in diverse settings such as residential homes and office buildings. The air inside any treated building thus becomes a potential source of exposure for those people using the building. Possible air contaminants from these products include the pesticide active ingredient, as well as any inert ingredients used in the formulation (i.e., volatile organic compounds). The PCP was set up to regulate the use of all pesticides, including those used in indoor settings, in order to minimize the risk of exposure for people residing in the State.

2.7. Release Prevention

Within the Release Prevention Program there are activities which directly or indirectly result in the reduction of overall releases of pollutants to the air. Under the authority of the Toxic Catastrophe Prevention Act (TCPA), this program identifies companies which handle extraordinarily hazardous substances and ensures that procedures are in place to prevent the occurrence of accidental chemical releases. In addition, as part of the Community Right-To-Know (CRTK) program, facility-wide releases to air from both stack and fugitive emissions are reported to NJDEP and made available to the public. Public scrutiny of these data are believed to be partially responsible for the reduction of these emissions in New Jersey.

3. Stakeholder Involvement

Efforts have been made to initiate the discussion of the air quality aspects of NEPPS with interested parties outside the Department. These included the NEPPS Stakeholders meeting on April 30, 1996, an Air Quality focus group on August 9, 1996, and two presentations to the NJ Clean Air Council. The focus of these discussions was on the details of the Self Assessment and PPA, rather than on the key environmental issues, which were generally accepted.

In the air quality breakout group during the NEPPS Stakeholders' meeting on April 30, 1996 (see "Outreach and Public Participation to Date" section for expanded workshop description), many suggestions were made for improving the statement of goals and subgoals for the air quality section, and many new or improved environmental indicators were offered. These suggestions, which were considered in the preparation of the FY97/98 Performance Partnership Agreement (PPA), will help NJDEP and EPA Region 2 to continue to fine-tune the goals and upgrade the list of environmental indicators.

Some specific comments are addressed in a preliminary way in this Self-Assessment. The comments received regarding interpretation of vehicle miles traveled (VMT) as a pressure (cause) indicator have been helpful in compiling the narrative for this indicator.

One state (condition) indicator which was favored by the participants in the breakout group is the number of people exposed to ambient air concentrations above the national standard. Although there was no commitment in the PPA to report this indicator as yet, it is included in this Self-Assessment in response to the Stakeholders' recommendations, and as a first step toward the development of human health-based indicators.

4. Key Environmental Issues

4.1. Designated Nonattainment Areas

Since the passage of the federal Clean Air Act in 1970, 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, particulate matter and lead NAAQS, there are still areas where New Jersey has not attained the NAAQS for the other criteria pollutants: CO, O_3 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 achieving the standard must be made before the designation can be changed. Monitoring data alone are usually not sufficient, as these tend to represent only a portion of the area. Specific air quality designations, by pollutant, are discussed in Section 8.

4.2. Exposure to Toxic Air Contaminants and other Potentially Harmful Agents

Although NAAQS have been set for six pollutants, there are many more for which there are no specific air quality standards. These additional toxics are handled by NJDEP in a variety of ways. Three categories of these pollutants are described below: toxics, indoor radon, and indoor exposure to pesticides.

4.2.1. Air Toxics

Air toxics is a broad class of compounds, loosely defined as any air pollutant with known adverse health effects. It includes carcinogens, mutagens, and other biologically active compounds. Since there are so many toxic air contaminants, it has not proven feasible to set ambient standards for all of them. The air toxics program has traditionally been based on applying the best control technology so as to minimize emissions of these substances. But there is concern that even with the best controls, emissions may still pose unacceptable risks to the public. Evaluating the magnitude of that risk and minimizing it is a major challenge for the program.

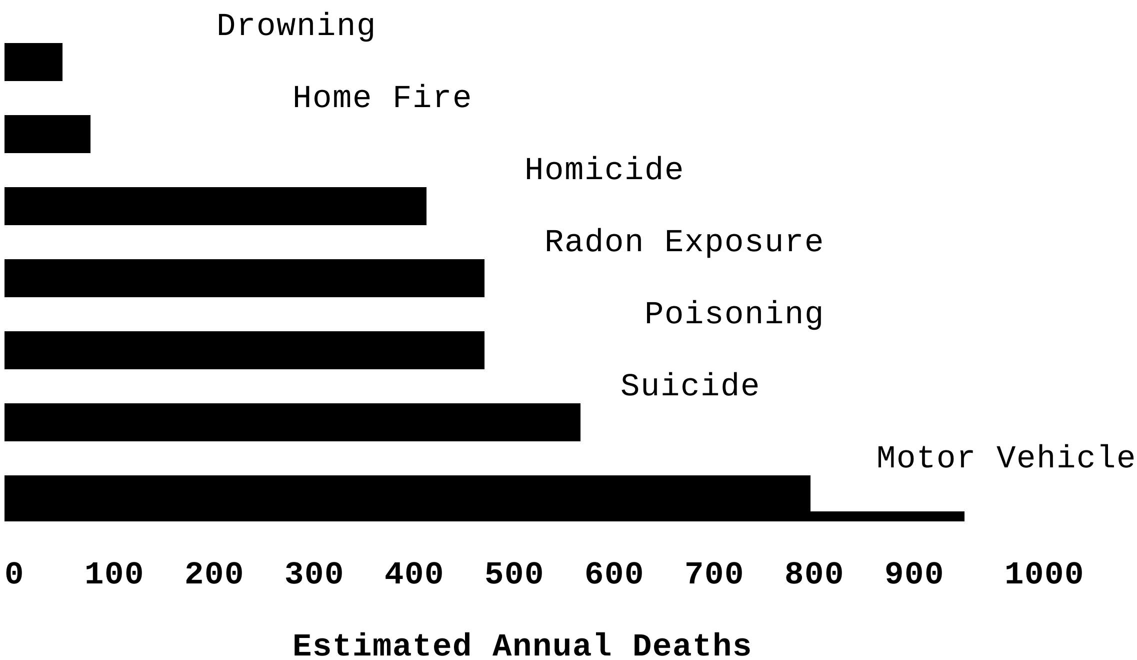
4.2.2. Radon in Indoor Air

Because of the predominant geology in New Jersey, naturally occurring radon is widespread and found at elevated levels in many parts of the state. Because it is widespread and carries a relatively high risk for developing lung cancer even at fairly low concentrations, radon poses one of the highest levels of health risks for environmental exposure in New Jersey. Although there are uncertainties in the calculation of radon's cancer potency and in the patterns of human exposure, it has been estimated that exposure to radon in indoor air may be responsible for 500 lung cancer deaths each year in New Jersey.

When compared to other risks encountered in daily life, the estimated risk from radon is significant. For New Jersey, in any year, estimates have indicated that one is more likely to die from radon exposure than from drowning, home fires or homicide. Comparative risks are presented in Figure AQ-4.1.

FIGURE AQ-4.1

Comparative Risks



Sources:
Statewide Scientific Study of Radon - CDM, 1989
Center for Health Statistics - NJDOHSS

4.2.3. Pesticides Use

Properly applied pesticides can have many beneficial effects. However, pesticides can be harmful if used improperly. The goal of NJDEP is to ensure that those who choose to apply pesticides do so in a safe and proper manner.

4.3. Quality of Life

Air pollution control has always had the protection of public health as its first priority, but pollution can also affect the quality of life and have significant economic consequences. The public generally considers unacceptable any pollution levels that impair visibility, cause objectionable odors, damage materials and property, or harm crops or other plants. Especially when pollution can be seen or smelled it is likely to be objectionable regardless of whether or not it poses a health risk. Responding to public concerns and complaints about such problems has always been a major program function.

4.4. Air Deposition

Air pollution affects us in many ways, not just through inhaling pollutants directly. Often pollution will settle out on or be absorbed by plants, land, or water bodies. Acidic deposition in particular has received a lot of program attention over the years. When lakes become too acidic they can lose their ability to support fish and other life forms thus degrading an important natural and economic resource. Emission sources contributing to deposition in one area can be several hundred miles away, so this is a national and international issue. In recent years mercury and nitrogen oxide emissions have also receive state and national attention related to long range transport and deposition.

5. Program Strengths

5.1. Maintaining Air Quality (Routine Activities)

As discussed in section 2, there are many programs in NJDEP working either directly or indirectly to maintain, improve and assess 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
*Implementation of strict mercury emission standards for municipal incinerators
*Certification of radon mitigation and measurement activities
*Education of pesticide applicators
*Standards for the volatile content of architectural coatings and of consumer and commercial products
*Implementation of the operating permit program (for major facilities), including the collection of emission fees

5.2. State Implementation Plan for Ozone

Over the past four years, New Jersey has revised its State Implementation Plan (SIP) for ozone in response to the requirements of the Clean Air Act Amendments of 1990. In March 1995, the EPA developed a two phased approach to attain the ozone health standard. In Phase I, the State is required to meet all the Pre-November 1994 mandated measures in the Clean Air Act as well as the Rate of Progress requirements through 1999 (a 24% reduction from 1990 levels), adopt the regional requirements set forth by the OTC and commit to achieve the emission reductions necessary to attain the ozone health standard and address ozone transport. Phase II is a consultative process to address ozone transport throughout the eastern United States.

New Jersey has submitted SIP revisions for all the Pre-November 1994 mandated measures, the Rate of Progress planning requirements through 1996 and for the OTC Low Emission Vehicle program. The NJDEP is working on completing the remaining requirements. The status of these actions is presented in Section 8.1.3. The Phase II consultative process is underway, as described in the OTC Agreements (below) and in Section 6.2. of Program Limitations.

5.2.1. OTC Agreements

The Ozone Transport Commission (OTC) 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 member states of the OTC have 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 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 includes Northern VA, DC, DE, NJ, CT, RI, MA, and parts of NY, PA, and NH. Outer Zone covers portions of NY and PA. The Northern Zone (ME, VT, and parts of NH and NE NY) is exempt. 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 required the States to submit their LEV SIP amendment by February 15, 1996. New Jersey met this requirement.

5.2.2. Promoting Cleaner Fuels

NJDEP 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.

In addition, NJDEP has developed a program to increase the use of alternative fuel vehicles in New Jersey fleets, known as the New Jersey Clean Fleets Program. As part of this program, NJDEP has convened a public/private workgroup to develop and implement an action plan, which will be submitted to EPA as a SIP revision following a public hearing.

5.3. Diesel Emission Testing

In June 1995, Governor Whitman signed legislation establishing a new enhanced emissions testing program for heavy duty diesel trucks and buses. A six month pilot demonstration program, which served as a trial of roadside testing techniques, is now complete. Using information from the pilot program NJDEP will establish emission standards for diesel trucks and buses, while the Department of Transportation's 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.

5.4. CO Redesignation

NJDEP has requested and the EPA granted the State's request to redesignate to clean air status Camden County and nine 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 that these areas continue to meet the health standards.

5.5. 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% of the facilities requested to participate in the program. For reporting year 1995, over 65% of the Emission Statements were returned to NJDEP electronically. This effort has been successful in reducing the cost and 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.

5.6. Air Toxics

NJDEP, under the authority of the Air Pollution Control Act, primarily uses a state-of-the-art technology approach to minimize the emission of toxic air contaminants. Additionally, for potential new 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 new or modified sources of 56 air toxics are routinely screened each year for potentially high cancer risk. In this way, risk assessment is used as a tool to ascertain whether the remaining risk after control warrants further control.

5.6.1. 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 (MSW) 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 from MSW incinerators into the air by 1996 be reduced by nearly 91% from 1990 baseline levels. By the year 2000, emissions would be cut by over 96% from 1990 levels.

The resulting new standards, adopted September 1994, are designed to alleviate 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 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 collection of additional information for other sources of mercury emissions, such as incineration of hospital waste and sewage sludge, and the burning of coal in power plants. Additional information on NJDEP's mercury activities can be found in the Cross-Cutting Issues/Programs section of this document.

5.6.2. Reducing Exposure to Accidental Releases

The Toxic Catastrophe Prevention Act (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 at 957 facilities, most of them potable water and wastewater treatment facilities. In mid-1995, 40,400 tons of EHSs were in inventory at 179 facilities. The relatively low level of release potential 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 New Jersey citizens.

A 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% 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.

5.6.3. Inspections of High Risk Point Sources

Special air toxics inspections were conducted by NJDEP's Enforcement staff in FY93, based on information reported in EPA'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 plants 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: 1) more accurate record keeping and reporting; 2) process changes; and 3) additional controls.

5.7. Pollution Prevention

NJDEP is developing a facility-wide permit program. This program, being tested 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 500 major facilities will also use a facility-wide permit format.

5.8. 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 NJDEP information. Internet access to this data is available at www.state.nj.us/dep/airmon/index.htm. The monitoring program has also recently expanded its efforts to measure ozone precursors and now has three sites 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 successful public/private partnerships.

5.9. Emission Trading

NJDEP 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 other 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 currently has established two emission trading programs: the emission offset trading program and the open market emission trading program. The offset trading program has been in existence since 1979 and serves major new stationary sources and existing stationary sources that are undergoing major modifications. The offset trading program is served by an emissions bank managed by NJDEP.

The open market emissions trading program is a new program established in 1996; mobile, area, and off-road source, as well as both large and small stationary sources, may participate in this trading program. A privately-operated registry is being established to support the open market program. Businesses, brokers, environmentalists, and academics are currently working with NJDEP in an Emissions Trading Workgroup, under the auspices of the Air Reengineering Task Force, to develop enhancements of the open market program.

NJDEP is also participating in regional efforts, sponsored by OTC, NESCAUM and MARAMA, to develop a NOx Budget Program, pursuant to the 1994 MOU discussed in 5.2.1. above. The program would be a cap-and-allowance trading program, similar to the federal acid rain trading program. The cooperative regional efforts have resulted in a model rule that states will be using to guide their state NOx Budget rulemakings. The Acid Rain Program at EPA is undertaking the development of an emissions and allowance tracking system to support this program.

5.10. Compliance and Enforcement Program

There are about 15,000 facilities in New Jersey (with over 53,000 stacks) that are subject to regulation pursuant to the Air Pollution Control Act. There are 536 major facilities (as defined by the CAAA) and about 4857 non-major facilities, including about 400 of which are synthetic minor sources. All inspections and other field activity is performed by professional staff located in one of four regional field offices. The Northern regional office is responsible for regulated facilities in Hunterdon, Morris, Passaic, Somerset, Sussex and Warren counties. The Metro office is responsible for facilities in Bergen, Essex, Hudson and Union counties. The Central office is responsible for facilities located in Burlington, Mercer, Middlesex, Monmouth and Ocean counties. The Southern office is responsible for facilities in Atlantic, Camden, Cape May, Cumberland, Gloucester and Salem counties.

In FY97, NJDEP will be merging the Northern and Metro field offices into a single office that will be known as the Northern office. In addition, the NJDEP has delegated its authority to monitor compliance with the Air Pollution Control Act to 18 certified local health agencies pursuant to the County Environmental Health Act (CEHA). These 18 county or regional agencies are responsible for inspecting the remaining 9600 minor facilities, including about 4979 gasoline stations, 1524 dry cleaners, 957 auto body shops/paint spray booths, and 2146 other minor or "B" sources. The Office of Local Environmental Management, which is in the Office of Enforcement Coordination and located at the NJDEP Headquarters in Trenton, oversees the substantial work performed by certified local health agencies.

The Air Compliance and Enforcement program monitors and assures compliance with the air pollution regulations codified at NJAC 7:27-1.1 et seq., including Subchapter 8 governing permit conditions, Subchapter 16 for VOC compliance, and Subchapter 19 for NOx compliance. Permits issued pursuant to Subchapter 8 require compliance with applicable federal requirements for NSPS, NESHAPS, PSD, and MACT, and state regulations for particulates, sulfur, CO, VOC RACT, NOx RACT, certain toxics including mercury, and State of the Art control technology. These permit conditions include emission limits, emission and process monitoring and testing requirements, and record keeping and reporting requirements.

NJDEP monitors compliance with these requirements through the performance of periodic compliance inspections, the review of quarterly excess emission reports (EERs), the observation of stack tests performed by regulated entities, and the installation of continuous emission monitors (CEMs). In FY96, NJDEP performed 1037 inspections of 471 major and 566 non-major facilities. Each inspection ordinarily includes a review of the most significant emission sources and other priority process, control or monitoring equipment, but usually does not include each piece of equipment subject to regulation within the facility, especially for larger facilities. In FY96, NJDEP reviewed 814 quarterly EERs for over 300 facilities with certified CEMs. NJDEP also observed the performance of 133 stack tests for 99 major and 34 non-major facilities; performed 81 follow up inspections to verify compliance with the terms of an Order or Consent Agreement; and conducted 640 field investigations in response to citizen complaints of air pollution, usually involving sources of odors alleged to violate the nuisance-type standard for odors set forth in the Air Pollution Control Act. In addition, the 18 certified local health agencies performed 2484 routine compliance inspections of minor sources in FY96, and 3813 complaint investigations, including 2200 complaints referred by NJDEP.

In addition, to help the owners and operators of small municipal solid waste (MSW) incinerators comply with the recently adopted mercury emissions control rule, NJDEP initiated an outreach program to remind owners and/or operators of MSW incinerators at apartment buildings, institutions and commercial facilities of the regulatory deadlines. In September 1995, NJDEP mailed letters to approximately 109 owners and/or operators of small MSW incinerators on record with the department. The letter provided information about the regulatory deadlines and what actions were necessary to comply. The first regulatory deadline fell on January 2, 1996. The requirement was to submit a protocol to NJDEP for stack testing that was to be conducted on a quarterly basis. The letter further advised owners and/or operators who planned to shutdown their MSW incinerators to do so by January 1, 1996 to avoid violation. The outreach provided a detailed summary of the rule requirements and a copy of the mercury rule. A contact person from each regional office was provided for inquiries and response. The outreach effort served to increase awareness of the regulatory obligations imposed by the mercury rule.

In FY96, the Air Quality Compliance and Enforcement program issued 1772 Notices of Violation (NOVs) for violations discovered through inspections and other compliance monitoring methods, and 215 administrative orders and penalty assessments for violations that warranted formal enforcement actions.

5.11. Air Operating Permit Program

After several years of negotiations and three rule proposals, the final portion of the operating permit rule was adopted on August 10, 1995. This followed the enactment of revisions of the New Jersey Air Pollution Control Act on August 2, 1995, which included authority for 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.

5.12. Radon

5.12.1. Radon Test Reporting

In 1991, mandatory reporting of radon testing and mitigation was required by N.J.A.C. 7:28-27.1 et seq. From 1991 through 1995, 183,812 houses have been tested for radon in New Jersey, an average of 36,762 per year. When the period before mandatory reporting is considered, based on the voluntary reporting that was instituted between 1985 and 1991, at least another 206,192 homes have been tested for radon. The total of 390,004 represents approximately 20% of the homes in New Jersey. Testing is most closely tied to the real estate market as most tests are conducted as part of the sale of a home.

5.12.2. Radon Mitigation Installations

The reporting of radon mitigation installations was also made mandatory in 1991. From 1991 to 1995, 10,535 homes were mitigated for radon, an average of 2,107 per year. When added to the 1,647 reported being mitigated from 1985 and 1991 during the voluntary program, a total of 12,182 homes have been mitigated. The 2,107 homes mitigated each year translates into preventing over 100 estimated future lung cancer cases.

5.12.3. Radon Hazard Subcode

The Radon Hazard Subcode requires that all homes built in Tier 1 communities (those with high potential for radon gas occurrence) be constructed with radon resistant features such as a polyethylene barrier placed under the concrete slab in the basement, crushed stone under the slab, and a polyethylene pipe placed into the zone matrix under the slab which extends approximately two feet into the basement. These features will make a radon mitigation system easier to install and more effective, should subsequent tests indicate elevated radon levels in the home.

5.12.4. Radon Outreach

The outreach program includes a toll-free information line staffed by professionals that was created to answer questions from the public concerning radon issues. In addition to having specific questions answered over the telephone, information packets containing basic information on radon, testing for radon, and methods to reduce levels in homes are also available.

The outreach effort has also encompassed a variety of public information approaches including: press releases, television and radio public service announcements, seminars for local officials, paid advertisements in magazines, newspaper and magazine articles, development of a "model" house exhibit to demonstrate entry points and mitigation techniques, slide show presentations, posters, brochures and information cards.

To assist teachers in educating students on radon issues and risk in general, a curriculum entitled "Radon Alert" was created and distributed to all New Jersey public schools in 1992. Radon Program staff make presentations to many organizations, companies and other interested parties to get the radon message out.

More recently, an initiative to develop a partnership between the NJDEP and local communities was started and, to date, approximately 75 New Jersey communities have elected to participate. The program will include seminars and workshops for local health, government officials and volunteers interested in assisting local radon outreach efforts.

Also, because most radon tests are conducted in conjunction with the sale of a house, the radon program has worked extensively with the real estate industry in educating agents on the radon issue and providing guidance documents that can be used by the parties involved in the transaction. To support this effort, a Real Estate Task Force consisting of representatives from the real estate industry, mortgage lenders, real estate attorneys, EPA and NJDEP has been established and meets to discuss current issues and potential initiatives.

To lend more credibility to the radon message, cooperative outreach efforts with the American Lung Association, Cancer Society and other medical organizations have been undertaken. Including radon in discussions of lung disease and the backing of prominent professionals in the field is expected to increase the radon testing rate by those skeptical of the risks from radon exposure.

To further the reach of the radon outreach effort, the Radon Program has proposed the development of a web page on the Internet. By including general radon information as well as New Jersey specific issues and initiatives, not only will the Radon program be able to get the radon message out to more people, it will also be able to communicate what initiatives it is pursuing which in turn might be of help to other state and local agencies.

5.12.5. Radon Certification Program

Radon testing and mitigation is currently a voluntary action taken by home buyers and sellers. Because of the need to ensure that radon testers and mitigators provide quality services to the public so that public confidence in these services remains high, the radon program, as authorized by N.J.A.C. 7:28-27.1 et seq., has established certification criteria for those companies and individuals who provide radon services. Prior to certification, an individual must complete the requisite education and experience requirements that are established for each type of classification: Radon Mitigation Technician, Radon Mitigation Specialist, Radon Measurement Technician, Radon Measurement Specialist. In addition, radon mitigation and measurement companies must also become certified, as well as laboratories performing the radon test analyses. Should a pattern of poor performance or fraudulent actions become apparent, the individual and/or company may have their certifications revoked.

The certification program also enables the Radon Program to collect valuable data for use in establishing the radon tier areas of the state, determine if certified companies are performing up to standard, and identify any trends in radon occurrence or problems. The development of a radon tier map, which classifies portions of the state as high, medium or low potential based on measurement results, is an integral part of the Radon Hazard Subcode established by the Department of Community Affairs with the guidance of the Radon Program. This code requires that all new construction within Tier 1 communities, those with the highest potential for elevated radon, encompass radon resistant techniques to reduce the amount of radon entering the structure and, if indoor radon levels are high, enhance the effectiveness of mitigation systems installed at a later date.

5.12.6. Technical Activities

The Radon Program also has undertaken numerous projects designed to: investigate and develop new risk assessment techniques; investigate the effectiveness of mitigation systems; identify and employ tamper-resistant measurement techniques; identify radon cluster areas; assist those seeking to become certified by providing tutoring on technical issues; and assist in solving problems at difficult-to-mitigate structures.

5.13. Pesticide Applications

5.13.1. Pesticide Control Regulations

The Pesticide Control Regulations (NJAC 7:30-1 et seq.) were promulgated to define the conditions under which pesticides could be applied in the State. These regulations govern all aspects of pesticide use in the State, and were developed to protect both human and environmental health. Any person who chooses to apply pesticides in New Jersey must follow all pertinent regulations or face civil penalties. The regulations pertain to all types of pesticide applications, including those which might impact indoor air quality.

One of the primary strengths of the regulations is the provision which mandates Certification and Registration of Pesticide Applicators. All persons who wish to apply pesticides occupationally in New Jersey must first prove competency by undergoing training and certification. Once this is completed, applicators must then register with the PCP annually and maintain certification competency throughout the duration of their licensing.

A large percentage of pesticide applications performed in New Jersey are for the purpose of controlling household and structural pests. These treatments often require indoor applications of pesticides, resulting in the potential for contamination of the indoor air and adverse impacts. Having a regulatory mandate which legally requires and demands applicator competency strengthens the Program's ability to protect air quality.

5.13.2. Education and Outreach

The PCP has a strong and varied component of educational forums, as well as a professional position dedicated to educating both the regulated and non-regulated communities. Educational and outreach forums focus not only on adherence to the regulations but also on the potential impact of pesticides on human and environmental health. Information is provided for stakeholders on a variety of topics related to protecting indoor air quality, from alternatives to traditional pesticide methods to procedures for minimizing exposure.

5.13.3. Pesticide Use Surveys

Licensed pesticide applicators are required to maintain records of their pesticide use and make these records available to the PCP upon request. The PCP uses this requirement to perform various "use surveys", which give a detailed account of the types, amounts, and locations for pesticide use statewide. These surveys are a cost-effective means to gauge pesticide use patterns for the State. Use surveys are periodically sent to pesticide applicators who treat indoor settings and this information can be used to determine environmental loading.

5.13.4. Monitoring Research

To increase the knowledge concerning pesticide issues related to indoor air quality the PCP conducts research projects involving sample monitoring and analysis. The PCP has a small staff dedicated for the purpose of conducting this scientific research. With this component the PCP can respond to newly identified problem areas, as well as continue ongoing research into pesticide impacts. Several projects have already led to recommendations of regulatory changes for the protection of human and environmental health.

5.13.5. Analytical Methodology Development

There are hundreds of pesticide active ingredients in use in the State and more are introduced every year. In order to detect pesticides in environmental samples, analytical methodologies must be developed for each ingredient. The PCP has access to an analytical method (ion trap/multi-residue) which scans for many different pesticide actives, from many different chemical classes, at one time. This is an accurate, efficient, and cost-effective means to determine the types and extent of contamination in environmental samples.

6. Program Limitations

6.1. Motor Vehicle Emissions

As indicated in Figure AQ-1.1(found at the end of this section), 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 turnover 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 require 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 NJDEP's 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.

6.2. 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 nonattainment. Preliminary results from the EPA modeling analysis 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 10% 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 will submit a report of its recommendations and findings to EPA. The OTAG effort is intended to meet Phase II of the EPA's two phase ozone attainment policy.

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 NOx RACT technology becomes the baseline indicator for all states to measure further progress.

6.3. 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 and particulate matter the current standards may not be protective for a significant fraction of the population. The probable 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, then 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 presented 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.

Particulate Matter: Epidemiologic data suggest increased mortality associated with daily particulate levels less than the current EPA NAAQS for Inhalable Particulate (PM-10). Other data suggest increased morbidity as measured by hospital admissions for asthma and other respiratory and cardiovascular symptoms as well as adverse effects on measures of respiratory competence (e.g., forced expiratory volume, peak respiratory flow) associated with increases in ambient particulates of as little as 10 $\mu g/m^3$ (AWMA, 1995). These studies also suggest that smaller particles (less than 2.5 microns in diameter) are more important in producing adverse health effects. 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 may not attain a new standard.

6.4. 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 New Jersey does not measure may be just as important, or in some cases, more important in assessing environmental conditions and defining how New Jersey protects health and the environment.

It is known that the monitoring 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 (less than 2.5 microns) 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 New Jersey'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 New Jersey 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 daily air quality ratings on the six pollutants that are measured may be misleading. In fact, many air pollutants that NJDEP 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 NJDEP to assess the effectiveness of the 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 can use the information generated.

6.5. Environmental Indicators for Evaluating the Effectiveness of Air Quality Programs

As NJDEP moves from measuring its success by simple activity counts to measuring improvement in the environment, new ways of evaluating the effectiveness of various aspects of the Air Quality Program must be developed. Some possible indicators have been proposed in the PPA and will be evaluated for feasibility as the tools for measuring them become available. Some of these potential indicators include: percent of pollution sources complying with ozone control regulations, or carbon monoxide regulations; number of sources with potential to cause lead standard exceedances that are identified in the permit process per number of sources evaluated; and average pounds of NOx emissions per million BTU of heat produced. Several possible indicators related to the Enforcement activities of the Air Quality Program are described below.

6.5.1. Enforcement Indicators

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 whether enforcement activities are indeed 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. 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 monitored by a Continuous Emissions Monitoring System (CEMS), 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 Excess Emissions 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 five

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.

6.6. 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 less polluting car, keeping a car running clean, and alternatives to commuting in single-passenger cars. In the past these efforts met with limited success because of their voluntary nature and the lack of incentives to facilitate participation. In the future, incentive-based programs may prove to be more successful.

6.7. 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 air emissions 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 an electronic 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.

6.7.1. Air Pollution Enforcement Database System (APEDS)

Data in the APEDS system are mainly generated from information submitted by facilities during the permit application process (including allowable emissions), 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 NJDEP issues a permit to construct, the appropriate input worksheets are completed and sent in batches to a key punching section for data entry.

6.7.2. 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 New Jersey 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 ten 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.

6.7.3. Emissions Statements

Facilities which emit air pollutants above certain thresholds must report their annual emissions to the NJDEP within six months after the end of the year. The covered pollutants are VOC, NOx, CO, SO_2, TSP, PM10 and lead. These data are 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.

6.8. 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.

6.8.1. IRIS

Continued access to EPA'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.

6.9. Radon Testing

One limitation of the Radon Program is that testing and mitigation are voluntary. According to the recent Conference of Radiation Control Directors Radon Risk Communication and Results Study, New Jersey's radon testing rate of approximately 20% overall and 40% in high risk areas are double and triple the respective rates nationally. Although these rates are relatively high, it will still take many years to test all of the housing stock in the state unless the testing rate is significantly increased. The fact that radon testing and mitigation are both voluntary is an impediment to increasing the testing rate.

Currently there is no provision in the Radiation Protection Act, specifically N.J.S.A. 26:2D-70 et seq., requiring that persons test their homes or buildings for radon. Local municipalities have promulgated local ordinances requiring radon testing and/or mitigation at the time of a real estate transaction, but none of these initiatives has been approved by the Commission on Radiation Protection as required by the Radiation Protection Act, thus none have become law. The impetus for testing in the state now is often the contractual requirement by the potential buyer of the property. This has resulted in approximately 80% of the annual tests being conducted as part of a real estate transaction.

Because the majority of homes being sold are tested for radon due to buyer demand and because the vast majority of homes tested each year are part of a real estate sale, the impact of legislation requiring radon testing during sales on the overall testing rate in the state is not certain. In addition, attempts to increase the radon testing rate by legislating testing in all homes and other buildings would likely be met with great resistance on the part of the public. Issues such as the ability to pay, the capability of the radon testing industry to respond to an immediate, large-scale test demand, and the perception by the public that such a requirement constitutes government interference in what would be considered a personal choice matter, all work against making radon testing mandatory.

Currently, there appears to be a belief by those who live in slab-on grade houses that radon is not a problem. Data suggest that first floor radon (living area) levels in these types of structures are as likely to be elevated as those with basement construction. The radon program needs to evaluate this situation by determining the number of such structures in the state and their indoor radon levels and explore outreach methods that will best educate the inhabitants of these structures. The Radon Program has instituted a new radon test form to be submitted monthly by testers and mitigators to assist in determining the number of slab-on-grade homes being tested and mitigated. Risk analysis suggests that by bringing the testing and mitigation levels of these structures up to those for dwellings with basements, an additional 210 lives could be saved for each year of the program.

Tampering with radon tests, particularly those involving real estate transactions, appears to be a problem. Statistical data suggest that radon tests taken during a real estate transaction are on average lower than those run under non-real estate conditions. Currently the Radon Program is conducting a survey to determine just how large a discrepancy exists. In addition, methods for deterring test tampering are being explored and a guidance document for home buyers is envisioned which would help them identify improperly placed and run radon tests. These initiatives could save an additional 43 lives annually if fully implemented.

Data suggest that urban areas are not being tested for radon at the same rate as non-urban areas of New Jersey. This is of concern because many urban areas are located in Tier 1 and 2 areas, which increases the potential that elevated levels of radon exists in urban buildings. The reasons for a lack of testing in these areas are many: many dwellings are publicly owned or are owned by a non-resident landlord, many urban citizens do not have the money to test, there is a belief that multi-family dwellings are not prone to radon problems, and perhaps the word is simply not getting to these urban residents. To begin to understand this issue better, the Radon Program has proposed a project that will include testing an urban, multi-family dwelling to determine if a radon problem exists, and if so, mitigate the building. Lessons learned from this project may be used to test and mitigate similar buildings in other areas of New Jersey.

6.10. Lack of Federal Pesticides Exposure Standards

One of the primary limitations in addressing concerns about indoor air quality and pesticide use is the fact that there are no Federal standards or guidelines setting limits on the amount of pesticides that can be used or acceptable air levels following legal treatment. The Pesticide Control Regulations are designed solely to ensure that those who choose to apply pesticides do so in a safe and proper manner.

6.10.1. Ingredient Disclosure

As is the case with all pesticide products, those used in indoor settings do not have to reveal the absolute constituency of their ingredients. Many of these materials are known as "inert ingredients", and are often composed of volatile organic compounds (VOC's). VOC's may be associated with human health impacts, thereby substantiating the need for disclosure, especially for products used in indoor settings. Having the ability to identify all ingredients in any particular product would greatly benefit the PCP by allowing for proper evaluation of all potential health risks.

6.10.2. Research Limitations

There are several areas of concern regarding the use of indoor pesticides for which limited information is available. Examples of these include synergistic and/or additive effects of different active ingredients, indoor air levels of compounds after various pesticide applications,

and reaction between applied ingredients and surrounding atmosphere. PCP resources to investigate these and other issues are severely limited.

6.11. 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.

6.12. 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 program's activities however, since 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. 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.

6.13. Urban Toxics

New Jersey is a densely populated state with concentrations of residents in several urban areas, including the Paterson/Clifton area, the Jersey City/Elizabeth/Newark area, the New Brunswick area, the Trenton area, and the Camden area. Density of population is associated with concentrations of air emissions. This is a by-product of the activities of modern daily living, including use of consumer products, dry cleaning services, motor vehicles and trucks, architectural coatings, home furnaces and space heaters, and small appliances and household power tools such as lawn mowers and snow blowers. A strategy for improving the air quality in the State's urban centers is needed to ensure a healthful environment for living, working and playing.

6.14. Viability of Emissions Trading

For most people in the regulated community, New Jersey's newly promulgated open market emissions trading represents an unfamiliar way of doing business. It represents a cultural change in the way NJDEP and the regulated community interrelate. Emissions trading offers the promise of providing a more cost-effective method for achieving compliance with air quality standards, but this promise may be unrealized if potential participants decline to participate because they encounter too many unknowns. Outreach is needed to provide information as to how to function in this new arena.

The area of emissions quantification is one in which information dissemination is particularly important. The open market emissions trading program invites participation from mobile, area, and off-road sources, as well as both large and small stationary sources. This broad array of potential participants creates the challenge of finding uniform and fair standards for emission quantification which can be applied to this diversity of sources. Dissemination of guidance on quantification and appropriate quantification protocols is critical.

7. EPA Responsibilities

- Region 2 will serve as New Jersey's advocate within EPA and will see that issues of importance to the state are raised in the appropriate forum.

EPA Response: This is an on going function in Region 2. Examples where over the past year the Region has advocated New Jersey's concerns, issues and needs on three critical Clean Air Act required programs are: oxygenated fuels, enhanced motor vehicle inspection and maintenance (I/M) programs, and NOx RACT regulation.

The Region worked closely with Headquarters in order to find a way to allow the State to end the oxygenated fuel program in southern New Jersey and to allow the State to reduce the fuel sales season from seven months to four months in the northern part of the State. With regard to the State's I/M program, the Region continued its efforts to work with Headquarters and other Regions in order to ensure that New Jersey has the flexibility to implement an enhanced I/M program which best meets the needs of the State. Our efforts resulted in New Jersey submitting a plan for a program which upgrades vehicle testing methods and allows for private test-and-repair stations to continue to fully participate in the program. With regard to the NOx RACT regulation, which contains deviations from national policy, the Region has been working with the national VOC and NOx workgroups to give full approval to New Jersey’s regulations.

- EPA will provide training and assistance to state personnel to enable them to input AIRS enforcement, emissions and air quality data, and work with NJDEP to develop an electronic interface between state databases and AIRS.

EPA Response: Region 2 arranged for a hands-on workshop in July 1996 which covered the new AIRS Facility Emission Inventory Sub-System Batch Update Process software. Region 2 has also arranged and managed a work assignment to upload point source data into AIRS. Most of the point source data has been successfully uploaded into the system (VOC, NOx, and CO data).

- EPA will participate in the Ozone Transport Commission (OTC) and Ozone Transport Assessment Group (OTAG) to ensure that the region's concern with transport of ozone and ozone precursors into our region is adequately taken into consideration and that the state is not unfairly burdened.

EPA Response: The Region actively represents New Jersey's interests on one OTC committee and two OTAG groups. Specifically, the positions the region holds are:

-William Baker co-chairs the OTAG Implementation Strategies and Issues Workgroup,

-Robert Kelly serves on the OTAG Regional and Urban Scale Modeling Workgroup,

-Under the Clean Air Act, Jeanne Fox is a member of the OTC, and

-Rudy Kapichak serves on the OTC Mobile Source Committee.

- EPA will ensure that New Jersey receives guidance, policy, ACTs and CTGs as soon as they are available. EPA will be available to answer and resolve any questions on such documents.

EPA Response: This is an on-going function in Region 2. For example, Region 2 has recently transmitted guidance documents for such topics as: Municipal Waste Combustors and Municipal Solid Waste landfills shortly after the guidance became available.

- EPA will work with New Jersey to develop the necessary SIP revisions and state regulations which will enable New Jersey to attain the ozone and carbon monoxide standards. The goal will be to have SIPs and regulations which will be fully approvable.

EPA Response: Region 2 worked closely with New Jersey on two major SIP revisions in the past year. The first, involved the redesignation of a number of areas to attainment of the carbon monoxide air quality standard. This allowed the State to end the oxygenated fuel program in southern New Jersey since the State demonstrated that oxygenated fuels were not necessary for attainment or maintenance of the air quality standard. The second, was the State's enhanced motor vehicle inspection program. Our close work allowed the State to take advantage of the maximum amount of flexibility allowed and enabled New Jersey to submit a plan for a program which upgrades vehicle testing methods and allows for private test-and-repair stations to continue to fully participate in the program.

Region 2 continues to work with New Jersey on its carbon monoxide and ozone SIPs, reviewing drafts of the SIPs; providing assistance on meeting guidance and Clean Air Act requirements; and providing technical assistance in the preparation of projection emission inventories, including resolving the issues associated with applying rule effectiveness to select point sources with high control efficiency.

- EPA will review SIP submittals within 60 days of receipt and advise New Jersey of any administrative deficiencies. EPA will propose action on complete SIP revisions within six months of being determined complete. EPA will take final action within three months of the close of the comment period on the proposal. Whenever possible, EPA will process SIP revisions as direct finals.

EPA Response: New Jersey has submitted four SIP submittals this past year. EPA has found that the four submittals were administratively complete. Two of the four SIP submittals have experienced some delay due to national consistency issues, which EPA is resolving. In addition, New Jersey has submitted about 29 single source SIP revisions for NOx RACT within the past year. Of the 29 submittals, 27 have been determined to be complete.

8. Indicators Progress Report

In the New Jersey Environmental Performance Partnership Agreement - 1996, NJDEP described what steps it would take during state FY96 to achieve its program goals. Specific milestones or objectives were developed for each subgoal and a variety of state, pressure and response indicators were considered for each objective. These are summarized in the Table AQ-8.1 at the end of this section. Indicators for radon and pesticides do not appear in this table because these programs were not part of the FY96 pilot Agreement. NJDEP agreed to submit data on the indicators which are shown in bold and capital letters in that table. The following is a report on those indicators grouped by specific objective. Development of some of the indicators that are not in bold is also described in this section. In the following discussion, the indicators labeled as state indicators in Table AQ-8.1 are described as condition indicators, and the pressure indicators are described as cause indicators.

8.1. Attain the Air Quality Standards for Ozone

The entire state has been designated as nonattainment for the ozone NAAQS. The Clean Air Act Amendments (CAAA) 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-8.1 (found at the end of this section).

8.1.1. Condition Indicators

In calendar year 1996, there were a total of eight exceedances of the ozone standard. These exceedances occurred on six different days. (That is, there were six days on which ozone exceeded the standard at one or more monitor locations in the state.) This compares to 14 days in 1995. While this is a substantial decrease, much of it can be attributed to the cooler, wetter weather experienced in the summer of 1996. The trend in ozone levels has been downward over time and significant progress has been made towards attaining the standard, although much still needs to be done. The Figure AQ-8.2 above shows the number of days the ozone standard was exceeded since 1980.

8.1.2. Cause Indicators

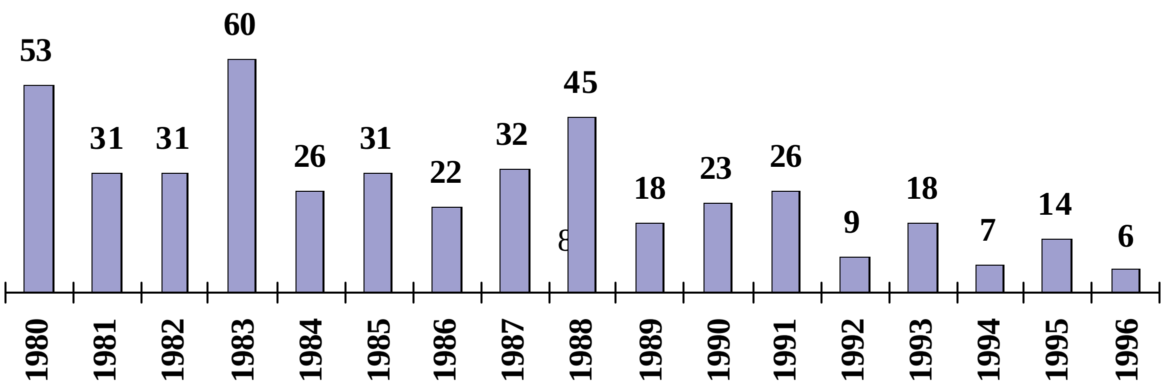
Results from the base year 1990 inventory and the preliminary 1993 inventory show a reduction in the emission of the air contaminants that lead to ozone formation in the atmosphere. The table below compares the actual emission estimates from the 1990 and 1993 Emission Inventory for NOx and Volatile Organic Compounds, the ozone precursors. The numbers shown below in Table AQ-8.2 are the preliminary estimates and are subject to quality assurance and change as more accurate data are acquired.

Table AQ-8.2: Estimated Emissions In New Jersey (Tons per ozone season day)

Category	VOC-1990	VOC-1993[FN]	NOx-1990	NOx 1993[FN]
Major Point	354	167	818	724
Minor Point	247	242	56	54
Area Sources	170	172	12	12
Highway	425	353	492	449
Off-Highway	195	197	196	198

Figure AQ-8.1

Days Ozone Exceeded the Health Standard in New Jersey 1980-1996



Total	**1391**	**1131**	**1573**	**1437**

FN - Preliminary estimates

8.1.3. Response Indicators

Table AQ-8.3 below summarizes the status of the major SIP components required to be submitted prior to November 1994. In addition, the NJDEP is working on developing the 1999 - 24% Rate of Progress Plan and control measures needed to attain the health standard. These measures are summarized in Table AQ-8.4. On July 3, 1996, the EPA started a sanction clock in New Jersey for the State's failure to submit the 1999 - 24% Rate of Progress Plan and for failing to submit an enforceable commitment to adopt all measures necessary to attain the health standard and to address transport. These items are required under the USEPA's Phase I Ozone Attainment Policy. The NJDEP expects to address these deficiencies in the SIP later in FY97.

Table AQ-8.3: Pre-November 1994 Clean Air Act Requirements for New Jersey

SIP Element	Status
1990 Base Year Emission Inventory	Approved (60 Fed. Reg. 51351, Oct. 2, 1995). The NJDEP will be updating the inventory to include the latest information available.
Reasonably Available Control Technology (RACT) rules for VOC and NOx sources	VOC: Approved (59 Fed. Reg. 49208, Sept. 27, 1994) NOx: Approved Final Rule (62 Fed. Reg. 3804, Jan. 27 1997 - effective date Feb. 27, 1997)
New Source Review Rule - 7/25/97 61 Fed. Reg. 38591 - Limited approval pending further EPA guidance	Partially complete (59 Fed. Reg. 56019, Nov. 10, 1994). Future modifications are expected to address completeness issues and anticipated future federal regulation changes.
Enhanced Inspection and Maintenance	July 1995 submittal complete March 1996 submittal - Final Approval (April 28, 1997)
Emission Statement Rule	Approved (59 Fed. Reg. 39688, Aug. 4, 1994)
Employer Trip Reduction Program	Proposed Approval (59 Fed. Reg. 62646, Dec. 6, 1994) - States will proposed substitute - by Phase I Ozone SIP

Phase I Ozone SIP	Proposed Condition Interim Approval on April 30, 1997

Table AQ-8.4: Regional and State Control Measures

Control Measure	Status
Regulation of the content of consumer products	November 6, 1995 (27 NJR 4291(a))
Implementation of the OTC Low Emission Vehicle Program	December 18, 1995 (27 NJR 5016(a))
Implementation of the OTC NOx MOU for major stationary sources	Working with the affected facilities and OTC member states to develop a regionally consistent rule and appropriate allocation mechanism.

8.2. Attain and Maintain the Carbon Monoxide Standards

Four counties and three municipalities in the northeastern portion of the state are designated as not attaining the carbon monoxide NAAQS. Figure AQ-8.3 (found at the end of this section) shows the location of these nonattainment areas. The Clean Air Act required all moderate carbon monoxide nonattainment areas to meet the health standard by December 31, 1995. Monitoring data in this area indicate that the NAAQS are currently being met. In order to request redesignation two years of "clean" data are needed. The state has requested a one-year extension to the attainment date. The NJDEP is awaiting the EPA's response to this request.

8.2.1. Condition Indicators

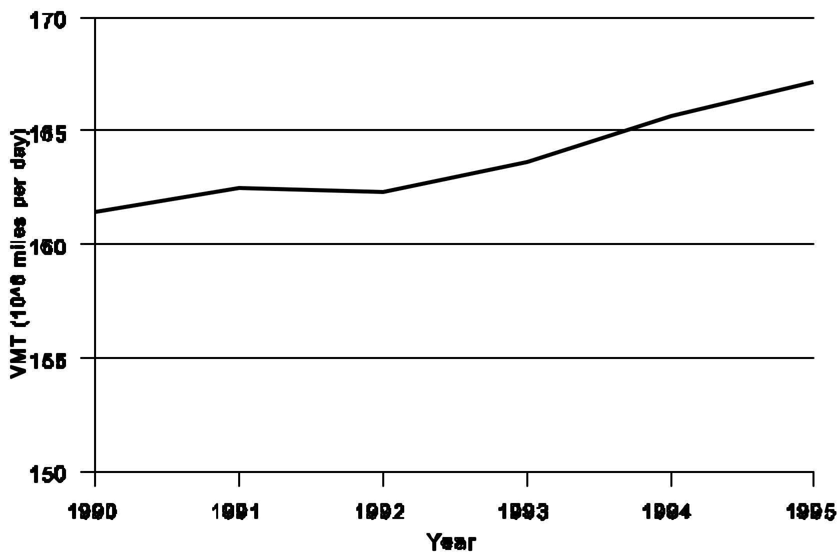
In calendar year 1996, there were no exceedances of the carbon monoxide standard. In recent years exceedances of the CO standard have been infrequent and confined to just a few sites in northeastern New Jersey.

8.2.2. Cause Indicators

One indirect indicator of vehicle emissions is miles of vehicle travel throughout the State. The NJDOT computes estimates of the vehicle miles of travel (VMT). These estimates are computed using the Highway Performance Monitoring System (HPMS) methodology. The HPMS methodology utilizes actual traffic counts in accordance with the Federal Highway Administration's (FHWA) Traffic Monitoring Guide.

From 1990 to 1995 the VMT grew 5.7 million miles per day or 3.5%. This corresponds to a 0.7% per year growth rate. The VMT growth is summarized in Figure AQ-8.4. (Note that the 1995 VMT estimate has been submitted to the FHWA, but has not yet been approved and should be regarded as a preliminary estimate.)

Figure AQ-8.4: Estimate of Vehicle Use in New Jersey



8.2.3. Response Indicators

The recent enactment of the National Highway System Designation Act of 1995 (NHS Act) provided New Jersey with the opportunity to reexamine the design of its enhanced I/M program. NJ took advantage of this opportunity and proposed amendments and new rules to both NJDEP and the Department of Transportation, Division of Motor Vehicles' (DMV) enhanced I/M regulations on May 6, 1996 and to the State Implementation Plan (SIP) for enhanced I/M on March 27, 1996. Both agencies have now adopted their respective rule changes.

A Request for Proposal (RFP) for the contractual services to implement and run the centralized portion of the enhanced I/M program was released on February 28, 1997. Under the latest schedule, the contract could be awarded in May 1997 with the eight-month demonstration phase beginning in June 1997. Full implementation would begin in February 1998.

As a component of the enhanced inspection program, New Jersey is currently working on an Emission Technician Education Plan (ETEP), which will insure that technicians are properly trained in effectively repairing vehicles which fail the enhanced emission test. This plan was submitted to the EPA in April 1996 as a component of the enhanced I/M SIP. Training and certification of qualified technicians should begin during the summer of 1997.

8.3. Maintain Current Attainment Status for Particulate Matter

Although EPA switched from a Total Suspended Particulate (TSP) NAAQS to an inhalable particulate (PM10) NAAQS several years ago, several municipalities in New Jersey were still designated nonattainment with respect to the TSP standard at the start FY96. NJDEP petitioned EPA to have these designations removed and Region 2 did so with a direct final rule published in the Federal Register on January 30, 1996. The entire state is in attainment of the PM10 standard.

8.3.1. Condition Indicators

In calendar year 1996, there was one exceedance of the standard for particulate matter (PM-10) due to demolition activities near one of the monitoring sites. No reporting of cause or response indicators are required this year.

8.4. Maintain Current Attainment Status for Lead (Pb).

The phase out of lead in gasoline has been extremely successful in reducing and keeping levels of lead below the health standards. The entire state is currently in attainment of the ambient standard for lead.

8.4.1. Condition Indicators

In calendar year 1996, there were no exceedances of the standard for lead. No reporting of cause or response indicators are required this year.

8.5. Maintain Current Attainment Status for NO2.

The entire state is currently in attainment of the air quality standards for nitrogen dioxide.

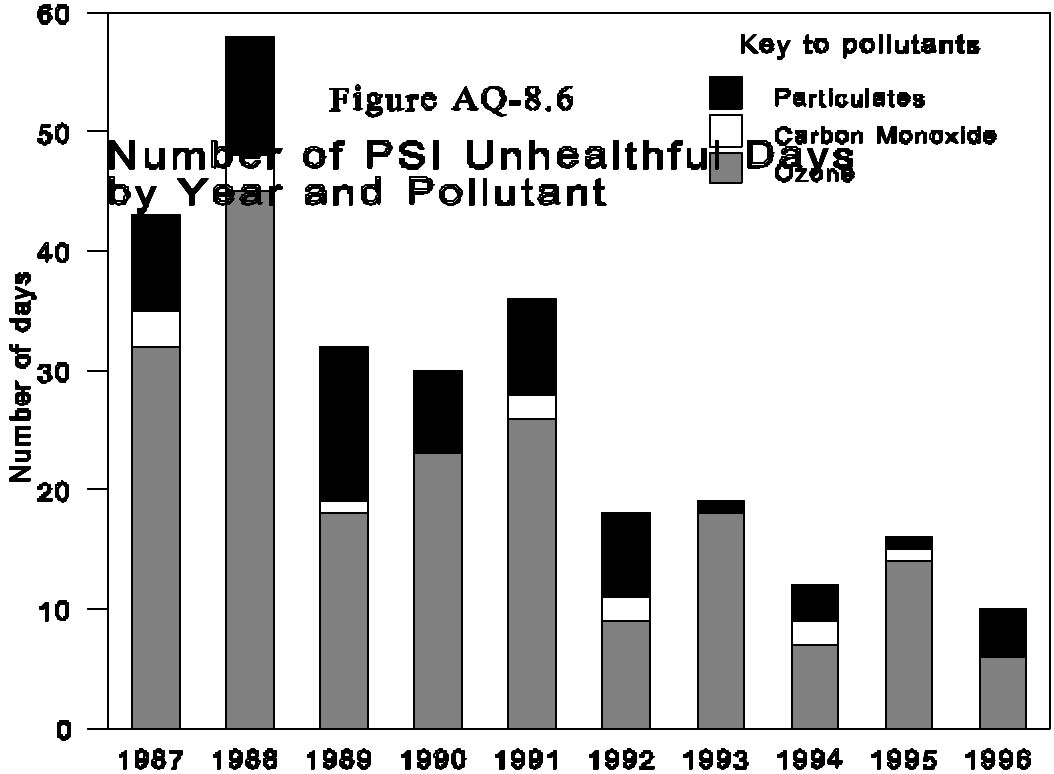
8.5.1. Condition Indicators

In calendar year 1996, there were no exceedances of the standard for NO2. The standard for nitrogen dioxide has not been exceeded in New Jersey since 1976. No reporting of cause or response indicators are required this year.

8.6. Attain SO2 Standard Statewide

As part of the air quality impact review when the Warren County Municipal Solid 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-8.5, found at the end of this section).

8.6.1. Condition Indicators



In calendar year 1996, there were no monitored exceedances of the standard for SO2. The standard for sulfur dioxide has not been exceeded in New Jersey since 1974. No reporting of cause or response indicators are required this year.

8.7. Alert the Public to Unhealthful Air Quality Conditions

NJDEP maintains a year-round watch on air quality and notifies the public whenever conditions become unhealthful. Air quality ratings are developed daily, based on a national system know as the Pollutant Standards Index (PSI). The PSI is determined from the NJDEP network of continuous air monitoring sites where levels of CO, NO_2, O_3, SO_2 and particulates are measured around the clock and compared to federal health standards.

8.7.1. Condition Indicators

In calendar year 1996, there were a total of 10 days on which air quality was rated as unhealthful according to the PSI. On six days the unhealthful ratings were due to high levels of ozone. The remaining unhealthful rating was caused by high particulate concentrations. The Figure AQ-8.6 above shows the general downward trend in unhealthful days since 1983.

8.8. Reduce Hazardous Air Pollutants (HAPS) emitted by major sources by implementing the national Air Toxics program (Title III of the CAAA)

On November 15, 1995, NJDEP sent a letter to EPA Region 2 requesting delegation of the air toxics requirements in Title III of the Clean Air Act Amendments (CAAA) as they apply to major sources (i.e., those that will be required to obtain Operating Permits). Delegation of authority to implement this portion of Title III was granted on June 17, 1996 in conjunction with interim approval of the New Jersey Operating Permit program.

The delegation request covered 14 source categories. The regional office will inform NJDEP of the promulgation of each future Maximum Achievable Control Technology (MACT) standard and the Department will then determine how best to implement each new rule. In FY96, workshops were offered by NJDEP for sources affected by the Petroleum Refinery MACT standard (September 7, 1995) and the Degreasing and Surface Cleaners MACT standard (March 6, 1996). Workshops on Title III in general were offered on September 7, 1995 and March 6, 1996 for the regulated public and on November 1, 1995 for NJDEP and EPA staff.

Although there was no commitment to report any pressure or state indicators in the 1996 PPA for this milestone, NJDEP routinely compiles the results of the reports received in the New Jersey Release and Pollution Prevention Report and the federal Toxic Chemical Release Inventory forms. The information for Survey Year 1994 was presented in The Community Right to Know Annual Report which was issued in December 1996.

8.9. Reduce toxic emissions from motor vehicles

Limited ambient air monitoring data are available from two sites in New Jersey which may provide insight into the magnitude of public exposure to air toxics emitted by motor vehicles. One site is located in the City of Camden and is part of the national Urban Air Toxics Monitoring Program (UATMP). The other is located at Rider University in Mercer County and is part of the Photochemical Assessment Monitoring Station (PAMS) network. The Environmental Indicators Appendix contains additional discussion regarding data collected by the PAMS network.

Measurements of concentrations of organic compounds identified either as toxic or as important in the formation of ground level ozone are made at the Camden and Rider sites. Of the organics measured, there are only three that are measured at both locations, are on the list of Hazardous Air Pollutants (HAPS), and have been associated with motor vehicle emissions. These are benzene, toluene, and xylene. Benzene concentrations at Rider averaged 1.31 parts per billion carbon (ppbc) in 1995 compared to historic average concentrations of 8.1 ppbc at Camden and 8.8 ppbc nationally. Similarly, toluene and xylene levels at Rider averaged 3.95 ppbc and 1.95 ppbc respectively. This compares to 15.8 ppbc and 10.0 ppbc at Camden and 36.4 ppbc and 13.2 ppbc nationwide. Some of the differences may be due to procedural differences between the PAMS and UATMP networks. In the summer of 1997 Camden will become both a PAMS and a UATMP site which will allow these potential differences to be evaluated. A second PAMS site was added this year in New Brunswick and data from this site will be reported in the next Self-Assessment.

In 1995, New Jersey, along with other areas of the country designated severe or extreme ozone nonattainment areas, required the use of reformulated gasoline (RFG). RFG contains 30-40% less benzene than conventional gasoline. While there were no ambient measurements of benzene made in New Jersey prior to 1995, concentrations in other areas using RFG dropped an average of 38%.

8.10. Identify and correct mercury problems related to air emissions

As part of the Task Force on Mercury Emissions Standard Setting, an inventory of mercury air emissions from stationary sources was prepared. This inventory is summarized in Volume III of the final report on Municipal Solid Waste Incineration (1993). An effort is now underway to update and improve that inventory using actual stack test data. Most of this stack test data is being collected as part of the implementation of NJAC 7:27-27: Control and Prohibition of Mercury Emissions.

8.11. Identify hot spots of exposure to air toxics and reduce emissions which lead to those exposures

Ambient air concentrations of several heavy metals and benzo(a)pyrene have been measured for many years at several sites in the State. These data are reported in more detail in the Environmental Indicators Appendix but are summarized here. Much of the data for metals is at or below the detection limit. This is especially true for arsenic and cadmium, but is also a common occurrence with chromium, nickel, and vanadium, where many sites have fewer than 50% of their samples with detectable levels of these metals. Barium, a possible marker for mobile source emissions, is found at highest concentrations at the Fort Lee site, which is near the toll booths for the George Washington Bridge. Vanadium, a marker for oil combustion, shows a significant decline in concentrations since 1990. Several metals - copper, iron, manganese, nickel and zinc - are somewhat higher at urban sites than at the suburban and rural sites.

Levels of BaP, a product of fuel combustion, range from 0.354 nanograms per cubic meter (ng/m3) at Ringwood State Park to 2.28 ng/m3 in Fort Lee (near the toll booths for the George Washington Bridge). Intermediate concentrations are found at other urban sites, and at the Phillipsburg site which is located near a foundry.

8.12. Protect visibility in the Brigantine National Wildlife Refuge and selected urban areas

There are no condition reporting requirements for this milestone. Visibility data are being collected by the EPA in the Brigantine National Wildlife Refuge.

8.13. Reduce nuisance complaints (primarily odors and soiling)

There are no condition reporting requirements for this milestone. A system for tracking such complaints is being developed.

8.14. Reduce regional acid deposition by implementing the federal acid rain program

Title IV of the Clean Air Act Amendments of 1990 establishes a federal program to reduce emissions of sulfur dioxide and nitrogen oxides which are precursors to acid rain. For 13 years, NJDEP has been measuring acidic loading and ionic burden of air deposition at three sites in the state. These data are reported in the Environmental Indicators Appendix. It is of note that average levels of sulfate declined and pH increased at all three sites in 1995 - the first full year of implementation of the Phase I provisions for sulfur dioxide emission control under Title IV. As the federal acid rain program takes effect it is expected that acid deposition in New Jersey, as represented by these data, will continue to decrease.

9. References

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ntire state into attainment for all criteria air pollutants by 2007 and maintain air quality in areas already meeting health standards.

	Fund source	Pressure Indicators (emissions, etc.)	Data Avail.	State Indicators (Air concentrations, deposition, etc.)	Data Avail.	Response Indicators (Activities, outcomes)
andards for	F/S	**1. BASE YEAR EMISSION INVENTORY FOR VOC AND NOx [1]** **2. PROJECTED EMISSIONS FOR VOC AND NOx AFTER SIP IMPLEMENTATION** 3. Ambient precursor levels **4. VEHICLE MILES TRAVELED** 5. Average precursor emission per vehicle [3] 6. Stack test data for precursors[7]	Y Y Y Y F Y	1. Ambient ozone levels at 15 sites[1] **# OF EXCEEDANCES[1]** # of people exposed and duration[1] 2. Emergency room admissions for asthma attacks 3. Crop and ecosystem injury[1]	Y Y Y F N	**1. PROGRESS ON COMPLETION OI ATTAINMENT PLAN (SIP)[4]** 2. Consistency between SIP and transportation plans and projects 3. Number of required rules promulgated 4. Innovative programs (e.g. emissions trading) initiated 5. Status of emission statement program 6. Progress in participating in regional solutions (OTC, OTAG)[4] 7. Permits issued limiting precursor emissions 8. % of pollution sources complying with ozone control regulations 9. Continue implementing PAMS networl and routine ozone monitoring
e CO standards	F/S	1. Mobile source emissions inventory [1] 2. Average CO emission per vehicle [3] 3. Traffic congestion **4. VEHICLE MILES TRAVELED** 5. % of vehicles passing inspection	Y Y N Y Y	1. Ambient CO levels at 16 sites[1] **# OF EXCEEDANCES[1]** # of people exposed and duration[1]	Y Y Y	1. Status of motor vehicle control program including # of LEVs and ZEVs in fleet **2. STATUS OF ENHANCED I/M PROGRAM** **3.STATUS OF MECHANICS TRAINING FOR I/M** 4. Status of redesignation request 5. Results of special LIDAR study for measuring CO 6. Limit CO emissions through permitting 7. % of sources complying with CO regulations 8. Continue CO monitoring program
nent status for	F/S	1. TSP and PM_{10} allowable emissions reported in APEDS[1,3] 2. TSP and PM_{10} actual emissions reported in Emissions Statements[1,3]	Y Y	1.TSP concentrations at 12 sites[1] 2. PM-10 concentrations at 25 sites[1] **# OF EXCEEDANCES[1]** # of people exposed and duration[1]	Y Y Y Y	1. Limit particulate emissions through permitting 2. TSP nonattainment designations removed

		3. Fine particulate emission inventory 4. Modeling results[2] 5.Average particulate emissions by vehicle type[3]	N Lim Y	3. Fine particle (PM-2.5) concentrations 4. Composition of particles	N Lim	3. Participate in development of NAAQS for fine particles 4. % of pollution sources complying with PM regulations 5. Average ug PM/m^3 in stack 6. Continue particulate monitoring prograr
nent status for	F/S	1. Pb allowable emissions reported in APEDS[1,3] 2. Pb actual emissions reported in Emissions Statements[1,3] 3. Modeling results[2]	Y Y Lim	1. Pb data at 11 sites[1] **# OF EXCEEDANCES[1]** # of people exposed and duration[1] 2. Accumulation of lead in the environment 3. Blood lead levels	Y Y Y N N	1. # of sources with potential to cause exceedances identified in permit process/# c sources evaluated 2. % of pollutant sources complying with lead regulations 3. Continue lead monitoring program
nent status for	F/S	1. NOx allowable emissions reported in APEDS[1,3] 2. NOx actual emissions reported in Emissions Statements[1,3] 3. Modeling results[2]	Y Y Lim	1. NO2 data at 11 sites[1] **# OF EXCEEDANCES[1]** # of people exposed and duration[1]	Y Y Y	1. Limit NOx emissions through permitting 2. NOx RACT plans reviewed 3. % of sources in compliance with NOx regulations 4. Average lb NOx/mm BTU 5.Continue NOx monitoring program
atewide	F/S	1. SO2 allowable emissions reported in APEDS[1,3] 2. SO2 actual emissions reported in Emissions Statements[1,3] 3. Modeling results[2]	Y Y Lim	1. SO2 data at 16 sites[1] **# OF EXCEEDANCES[1]** # of people exposed and duration[1] 2. SO2 data collected by Penn. Power and Light	Y Y Y Y	1. Comments on the Martins Creek power plant model compliance protocol and mod compliance study 2. Limit SO2 emissions through permittir 3. % of sources complying with SO2 regulations 4. Continue SO2 monitoring program
nful air quality	F/S	1. Pollutant emissions (see above)[1,3] 2. Weather conditions[2] 3. Acute releases	Y Y Y	**1. AIR POLLUTION LEVELS CONVERTED TO POLLUTANT STANDARDS INDEX (PSI)[3]** 2. Health advisories 3 Regional air quality reports distributed by media	Y Y N	1. Timeliness of health advisories 2. Develop a report for television use

Performance Partnership Agreement
Air Pollution Control Program
Environmental Goals/Indicator Summary Table

ːxposure to toxic air contaminants

	Fund. Source	Pressure Indicators (Emissions, etc)	Data Avail.	State Indicators (Air concentrations, deposition,etc.)	Data Avail.	Response Indicators (Activities, outcomes)
Pollutants jor sources by onal Air Toxics e CAAA)[4]	Emis-sion fees	1. Actual emissions from the toxic release inventory (TRI) and from the Release and Pollution Prevention Report (RPPR) [1,3] 2. Allowable emissions data from APEDS [2]	Y Y	Ambient air concentrations for some HAPS at 1 TAMS site	Y	**1. NUMBER OF MACT STANDARDS DELEGATED** **2. NUMBER OF MACT WORKSHOPS FOR AFFECTED PARTIES & DEP STAFF** 3. % of sources complying with MACT standards
ıs from motor	S	1. Mobile source inventory speciated for air toxics	N	**1. AMBIENT AIR CONCENTRATIONS OF BENZENE, ETC, AT 2 PAMS SITES** 2. Ambient air concentrations of other air toxics from mobile sources	Y N	1. Implement heavy duty diesel I/M program 2. Number of HDV inspected 3. Evaluate air toxics benefit of federal mobile source program for motor fuel
rcury problems ;	S	1.Mercury emission inventory for stationary sources (1990)	Y	1. Mercury levels in ambient air 2. Wet and dry deposition of mercury	Lim Y	1. # of air sources with potential to contribute to fish contamination/ # of sources evaluated 2. Mercury emission reduction resulting from implementation of NJAC 7:27-27
osure to air sions which	S	1. Emissions data from APEDS [2] 2. TRI and RPPR data [1,3] 3. Data from Emissions Statements 4. Operating Permits 5. Mobile source emissions	Y Y F F N	**1.METALS CONCENTRATION DATA AT 9 SITES** **2. BaP CONCENTRATION DATA AT 6 SITES** 3. Hg deposition data 4. Ambient air concentrations of benzene, etc. at 2 PAMS sites 5. Mercury levels in fish 6. Ambient air concentrations for HAPS 7. Environmental sampling around municipal waste combustors 8. Metals deposited in water bodies	Y Y Lim Y Lim N Lim N	1.Pilot GIS mapping project combining TRI and toxicity data with air monitoring data

apital letters will be reported to EPA

Data Availability

State Funding — Y = Yes Lim = Limited F = Evaluate Feasibility in FY96

ː — N = Not currently available

				9. Data collected by entities outside DEP	N	

Performance Partnership Agreement
Air Pollution Control Program
Environmental Goals/Indicator Summary Table

ne adverse affects of air pollution on the quality of life in New Jersey

	Fund. Source	Pressure Indicators (Emissions, etc)	Data Avail.	State Indicators (Air concentrations, deposition, etc.)	Data Avail.	Response Indicators (Activities, outcomes)
onal Wildlife	F/S	1. Allowable emissions reported in APEDS[1,3] 2. Actual emissions reported in Emissions Statements[1,3] 3. Modeling results [2] 4. Emissions data from other states	Y Y Lim Lim	1. Visibility monitoring (Visual Range)[3] 2. Observational data	Lim Lim	1. PSD permit applications reviewed and coordinated with federal land manager 2. Regional haze plan developed
laints oiling)	F/S	1. Complaints received 2. Inventory of odorous and corrosive substances	N Y	1. Soiling index	N	1. Number of complaints received/resolved

apital letters will be reported to EPA

State Funding
e

Data Availability
Y = Yes Lim = Limited F = Evaluate Feasibility in FY96
N = Not currently available

Performance Partnership Agreement
Air Pollution Control Program
Environmental Goals/Indicator Summary Table

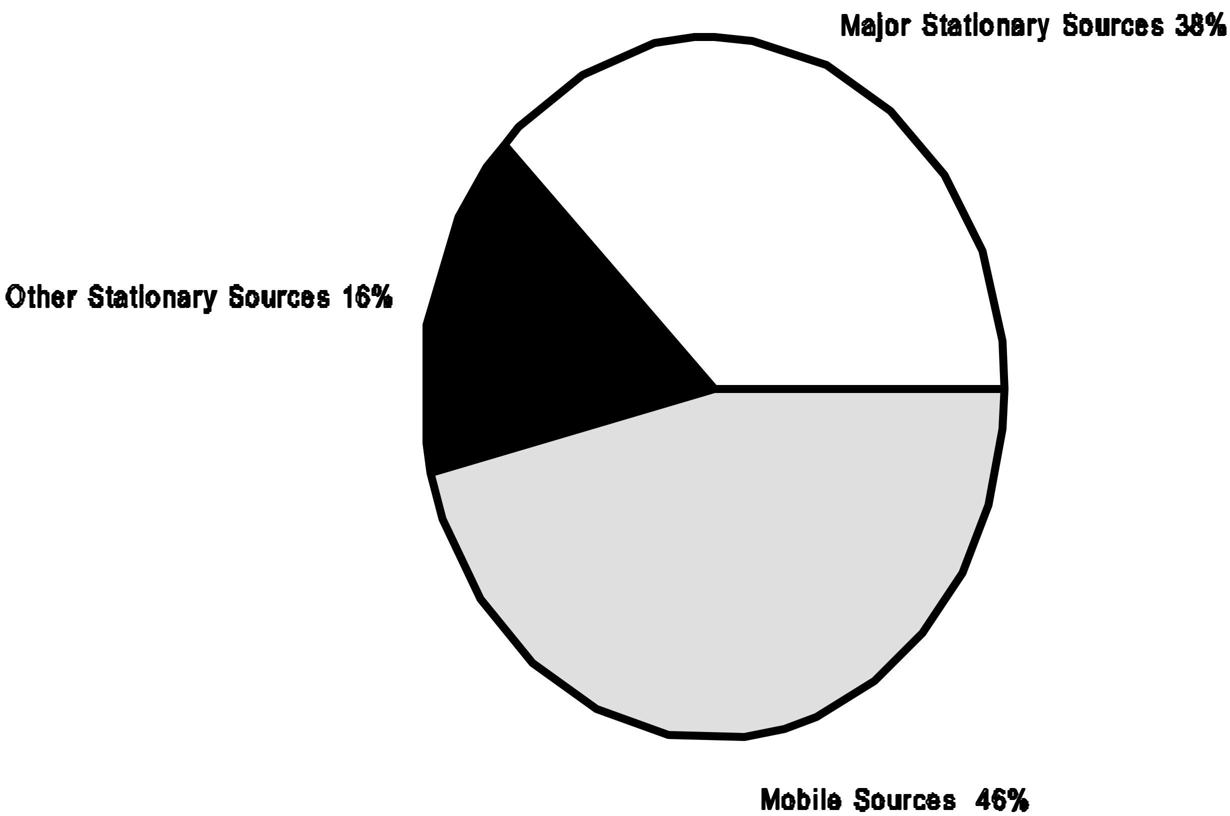
els of acid deposition

	Fund source	Pressure Indicators (emissions, etc.)	Data Avail.	State Indicators (Air concentrations, deposition, etc.)	Data Avail.	Response Indicators (Activities, outcomes)
eposition by al acid rain	F/S	1. Actual NJ emissions of SO2 and NOx as reported by CEMS 2. AIRS inventory data from upwind states	Y F	**ACIDIC LOADING AND IONIC BURDEN IN DEPOSITION DATA COLLECTED AT 3 SITES**	Y	1. Phase II permits issued 2. Review CEMs plans submitted by Phas II utilities 3. Observe CEMs performance for Phase II utilities 4. Review certification applications for Phase I and Phase II utilities[4] 5. CEMs audits

apital letters will be reported to EPA

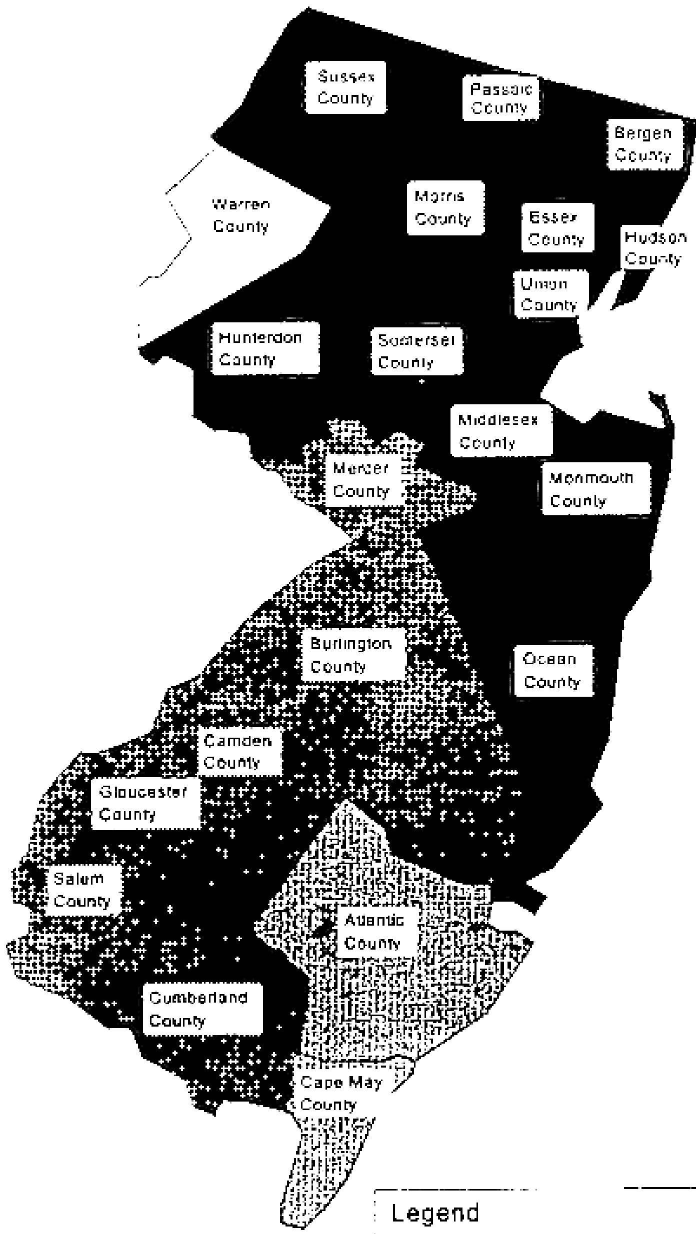
Data Availability
State Funding Y = Yes Lim = Limited F = Evaluate Feasibility in FY96
e N = Not currently available

1990 New Jersey Emission Inventory of VOC and NOx



AQ–Figure 8.1

Ozone Non-Attainment Areas* in New Jersey



Legend

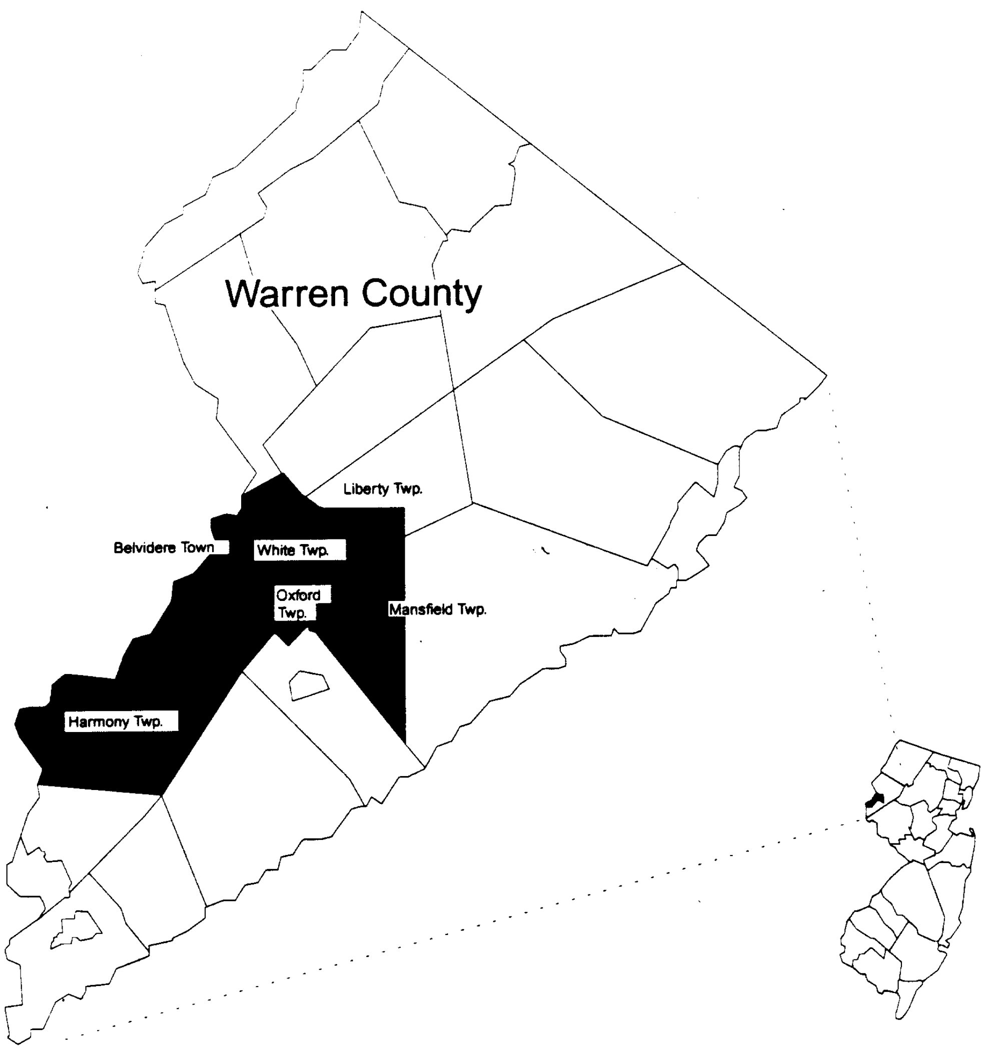
Designation	Design Value	Attainment Date
Marginal	.121 - .137 ppm	Nov. 15, 1993
Moderate	.138 - .159 ppm	Nov. 15, 1996
Severe 1	.180 - .190 ppm	Nov. 15, 2005
Severe 2	.191 - .279 ppm	Nov. 15, 2007

*Nonattainment of the National Primary (Health) Standard

Figure AQ - 8.3

AQ-Figure 8.5

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

V. WATER RESOURCES SELF-ASSESSMENT

GLOSSARY

AMNET	Ambient Biological Monitoring Network
BMP	Best Management Practices
BOD	Biochemical Oxygen Demand
CAFRA	Coastal Area Facility Review Act
CBOD	Chemical/ Biochemical Oxygen Demand
CFR	Code of Federal Regulations
CSO	Combined Sewer Overflow
CWEA	Clean Water Enforcement Act
DLA	Delegated Local Agency
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
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
GPD	Gallons per day
IPP	Industrial Pretreatment Program
MGD	Million gallons per day
MPN	Most probable number
N.J.A.C.	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NJPDES	New Jersey Pollutant Discharge Elimination System
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source (pollution)
OEP	Office of Environmental Planning
OQA	Office of Quality Assurance
PCBs	Polychlorinated Biphenyls
PCS	Permit Compliance System (EPA database)
PPB	Parts per billion
PPM	Parts per million
QAMP	Quality Assurance Management Plan
QAPP	Quality Assurance Project Plan
SIU	Significant Indirect User
SNC	Significant Non-compliance
SPPP	Stormwater Pollution Prevention Plan
SRF	State Revolving Fund

SRP	Site Remediation Program
STP	Sewage Treatment Plant
SU	Standard units (pH)
SWQS	Surface Water Quality Standards
TMDL	Total Maximum Daily Load
UIC	Underground Injection Control
USGS	United States Geological Survey
WCE	Water Compliance and Enforcement
WPCA	Water Pollution Control Act
WQBELs	Water Quality-Based Effluent Limitations

Water Resources Self-Assessment Part 1: Freshwater Watersheds

1. Background

1.1. Description of Surface Water Resources

A watershed is the geographic region within which water (including ground water), sediments and dissolved materials travel to a particular waterbody. There are 96 watersheds in New Jersey, that include a variety of freshwater aquatic habitats including cool trout waters in the north and acidic Pinelands streams in the south. Freshwater wetlands provide habitat for numerous aquatic and terrestrial species. Many of New Jersey's watersheds include both freshwater and tidal waters, that flow into estuaries and then to the ocean. This section of the Self-Assessment focuses on freshwater portions of watersheds and is organized around inter-related factors which affect watershed function: ***physical*** (habitat), ***chemical*** (water quality) and ***biological*** (indigenous flora and fauna). 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 Water Regions	Upper Delaware, Lower Delaware, Passaic/ Hackensack, Atlantic Coastal, and Raritan
River Miles	6,450[1]
Border River Miles	310[1]
No. of Freshwater Lakes and Ponds	1200[1,2]
No. of Public Lakes/Reservoirs/Ponds	380 [1,2]
Area of Public Lakes/Reservoirs/Ponds	38 sq. miles[1,2]
Area of Estuaries/Bays (open waters)	420 sq. miles
Ocean Coast Shoreline	120 miles
Area of Freshwater Wetlands	1,033 sq. miles[1]
Area of Coastal/Tidal Wetlands	380 sq. miles[1]

[1] Approximate figure
[2] Lakes/reservoirs/ponds include natural and manmade impoundments

Most watersheds also encompass a variety of land uses. Generally, rivers originate in undeveloped, rural or agricultural areas and flow through suburban, urban and industrial areas. Human uses of water include drinking water supply, industrial process and cooling water, irrigation, recreation, and effluent disposal. Aquatic life uses include feeding and spawning grounds, and habitat.

1.2. Point and Nonpoint Sources of Pollution

Water pollution sources are classified as point and nonpoint sources. Point sources emanate from a pipe and include industrial and municipal wastewater treatment plant effluents, cooling water discharges, industrial stormwater and combined sewer overflows (CSOs). New Jersey's freshwater and marine waterways receive approximately 15 billion gallons per day of treated wastewater from 810 industrial (NJDEP, 1995) and 308 municipal point source discharge permits and 20 CSO permits. There are no direct industrial discharges to ocean waters. The significant and widely distributed industrial base includes manufacturing, refining and chemical production. Approximately 90% of New Jersey's industries that discharge their wastewater to municipal wastewater treatment plants are regulated by the local agency (approximately 1,160), and approximately 90 other industries that discharge to treatment plants are regulated by NJDEP. In addition, industrial facilities which discharge stormwater to stormwater conveyance facilities are required to be permitted; at present, there are over 2,000 industrial facilities in the State permitted for stormwater discharges.

Combined sewers collect and transport stormwater and sewage to sewage treatment plants through a single collection system. In wet weather, the conveyance systems often become overloaded, resulting in stormwater and untreated sewage being discharged via CSO pipes. In New Jersey, there are approximately 300 CSO discharge points associated with 30 municipalities and other entities. CSOs are concentrated in three areas: tidal portions of the Delaware River, in Camden, Gloucester and Trenton cities; tidal portions of the Raritan River in New Brunswick; and throughout the New York-New Jersey Harbor complex, including the marine and estuarine waters of the Hudson River, Passaic River, Hackensack River, Elizabeth River, Kill Van Kull, Arthur Kill, Rahway River, Newark Bay and non-tidal portions of the Passaic River. There are no known CSOs discharging directly to the Atlantic Ocean in New Jersey. Further, there are no longer anticipated dry weather discharges at CSO points in New Jersey. Dry weather discharges that are the subject of enforcement actions still occur at other locations within conveyance systems and/or at treatment facilities. CSOs are discussed in detail in the Marine Water section of this Self-Assessment.

Nonpoint sources of pollution emanate from diffuse sources that are often dispersed and difficult to control. Nonpoint sources of pollution include municipal stormwater, runoff from construction, urban, suburban and agricultural lands, waste disposal and contaminated sites, air deposition to lakes and land, infiltration of contaminated ground water, hydrologic and habitat modification, and marinas located in lakes and coastal waters. New Jersey includes municipal stormwater as a type of nonpoint source pollution even though it is discharged from a pipe because the sources of municipal stormwater contaminants are highly diffuse and difficult to control. Contamination of municipal stormwater with oil, grease, petroleum hydrocarbons, metals, nutrients, pesticides, pathogens, suspended solids, litter, animal wastes and other pollutants has been documented in scientific literature. Fecal coliform and other contamination from municipal stormwater discharges have lead to swimming beach and shellfish harvesting area closures in New Jersey's estuaries and ocean waters. However, the relationship between NPS pollution and water and habitat quality is not well quantified in many areas.

1.3. Comprehensive Watershed Management/Development of State Plan

The complexity of land and water uses, and types and sources of pollution in a relatively small geographic area makes identification of the sources of pollution and management of water resource problems particularly challenging in New Jersey. In order to respond to this challenge, NJDEP has been developing a comprehensive watershed management strategy that addresses all of the elements of an aquatic ecosystem. This strategy will include both regulatory and non-regulatory approaches to resource protection to address activities occurring within the watershed that impact or may impact the water resource in an integrated manner. The comprehensive watershed management approach is intended to move beyond the site-specific and single medium approaches to a holistic approach that encompasses regulatory efforts, pollution prevention, source reduction and stakeholder involvement on a watershed basis. Watershed management will be implemented in New Jersey by coordinating existing NJDEP programs and will include stakeholder involvement in watershed management activities.

The development of a watershed management strategy involves mapping watersheds, collecting and assessing data on trends and current conditions, setting goals, developing and implementing regulatory and non-regulatory management strategies and evaluating the effectiveness of those management strategies. These phases are shown graphically on Figure FW-1 (found at the end of this section). For management purposes, NJDEP grouped New Jersey's 96 hydrologic watersheds into 20 watershed management areas; the watershed management areas were grouped into five water regions. A draft map of New Jersey's 20 watershed management areas and five water regions is provided in Figure FW-2 (found at the end of this section). The development of a watershed management strategy and progress on the Whippany Watershed Management Pilot Project is discussed in more detail in the Freshwater Watersheds "Program Strengths and Limitations" sections of this document.

In recognition of the fact that land development in New Jersey was scattered, with less than optimal regulation or an overall plan, New Jersey undertook a program in 1986 to plan land development through the year 2010. The purpose of the Interim State Development and Redevelopment Plan (IPLAN), prepared by the Office of State Planning under the Department of Treasury, was to: 1) accommodate projected development; 2) provide a sound state fiscal and economic base; 3) preserve and protect fragile land and habitat and develop mechanisms to limit loss of agricultural land; 4) maintain acceptable air and water quality; and 5) limit infrastructure development by encouragement of growth in existing cities and towns (i.e., population concentration). Focus on the preservation of farmland, fragile lands and habitats though the existing development rights program, enhancing and encouraging development in cities and towns, focusing on limiting auto travel and controlling nonpoint sources of pollution will help fulfill the goals of IPLAN program and are expected to have a positive impact on New Jersey's water resources.

1.4. Surface Water Quality Standards (SWQS)

The Surface Water Quality Standards (N.J.A.C. 7:9B) establish the antidegradation policies, designated uses and criteria used to protect and enhance the State's surface water quality. Designated uses reflect intended uses of the State's surface waters and may or may not reflect current uses. Wherever achievable, the designated uses reflect the goals of the Federal Clean Water Act. Designated uses of New Jersey's waters can 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, and Category Two Waters.

The specific designated uses are reflected in the categorical designation of the waterbody. 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. Also, FW1 waters are not to be subject to any new wastewater discharges. 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 water quality. Category Two waters are protected from changes which would cause water quality to be lowered below the promulgated criteria plus a reserve.

Narrative and numerical criteria reflect the maximum levels of pollutants allowable to achieve attainment of designated uses. Narrative and numerical criteria have been developed for conventional and microbiological parameters (i.e., dissolved and total nutrients, dissolved oxygen, pH, fecal coliform, etc.), and toxic metals and organics, including many priority pollutants. The criteria were designed to protect human health and aquatic life.

1.5. Data Sources and Quality for Identification of Key Issues

NJDEP’s freshwater ambient monitoring programs are designed to provide status and trends information on a statewide basis. Monitoring of water quality with respect to chemical parameters provides information on status relative to the Surface Water Quality Standards (SWQS) and water quality trends. Microbiological monitoring is used to assess potential human health concerns for recreation. NJDEP also conducts biological monitoring using benthic macroinvertebrates. Benthic macroinvertebrates are stationary, bottom-dwelling organisms that are exposed to chemical pollutants in water and sediment, and their populations are also affected by habitat quality and hydrology. Both chemical and biological data are needed for comprehensive water quality assessments because each type of data has strengths and limitations. Chemical water quality can change often and significantly. However, the suite of chemical parameters monitored in water is incomplete, and the effect of exposure to various levels of chemicals on biota is uncertain. Biological data provide an integrated indicator of water, sediment and habitat quality, but identification of causes of impairments requires chemical and habitat data.

Ambient Stream Monitoring Network

The Ambient Stream Monitoring Network, operated cooperatively by NJDEP and the United States Geological Survey (USGS), consists of 79 fixed stations monitored for 80 chemical and microbiological parameters. (Station locations are shown on Figure FW-3). Conventional and microbiological parameters are monitored five times per year. Metals are monitored in water twice per year. These parameters are a subset of parameters regulated in the SWQS. Complementary flow data are also collected to allow calculation pollutant loads. Metals, chlorinated pesticides, polychlorinated biphenyls (PCBs) and phosphorus are monitored in sediments once every three years. Most stations are located at midstream and downstream portions of freshwater streams. Data have been compared to SWQS and analyzed to assess water quality trends.

Each of these 79 stations represents approximately five stream miles; thus, approximately 525 miles (or 8.1% of New Jersey's stream miles) are monitored. Extrapolation to the rest of the State is not scientifically valid because the network is a non-random fixed station design, and there are biases in current station locations. Further, the sources of pollution are not understood at each station.

Using Ambient Stream Monitoring Network data, the Division of Science and Research (DSR) and a consultant recently conducted an analysis of trends for 20 years (1974-1994) and status with respect to numerical Surface Water Quality criteria for five 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".

Ambient Biological Network

The Ambient Biological Network consists of 771 stations, at which the populations and diversity of benthic macroinvertebrates are monitored. This network is used to screen stream reaches for follow-up chemical monitoring and assess potential impacts to aquatic life in first order streams (headwaters) and some second, third and fourth order portions of freshwater streams. First order streams have no tributaries, second order streams have first order tributaries. The data are used to screen waters for aquatic life designated use impairments. Monitored waters are classified as unimpaired, moderately impaired and severely impaired, based upon the criteria included in the EPA protocol. (Plafkin, 1989)

Other Data Sources

Additional data sources include research projects and special studies conducted by water management programs and DSR. The Division of Water Quality (DWQ) maintains a database of permitted facility information including permit tracking, effluent limitations, monitoring requirements, compliance schedules and effluent Discharge Monitoring Report (DMR) data. Sludge quality, quantity and management information is also maintained within DWQ's database. The Water Compliance and Enforcement database contains enforcement actions information. The GIS database contains significant information useful for water management including: watershed boundaries, monitoring and permitted facility locations, land use, etc. The Site Remediation Program (SRP) often requires surface water, ground water and sediment monitoring near contaminated sites. SRP maintains data on locations of sites, remediation status. However, the utility of chemical concentration data is limited because SRP's chemical data are not computerized.

Data Quality

Since 1981, NJDEP's Office of Quality Assurance (OQA) has implemented laboratory certification regulations to enable laboratories and NJDEP to improve the quality of environmental data gathered on ambient water quality and permitted discharges. NJDEP evaluates compliance with these regulations through on-site audits and proficiency testing, and enforcement actions are taken against deficient laboratories as needed. The program has grown from 130 laboratories at it's inception, to over 900 laboratories in 1996. All ambient water quality, effluent and compliance monitoring samples collected by or for NJDEP must be analyzed at a certified laboratory.

The department-wide Quality Assurance Management Plan (QAMP) specifies development of Quality Assurance Project Plans (QAPPs) which establish project or program quality assurance goals, techniques and methods before each NJDEP monitoring program is undertaken. Since the 1980's, the use of QAPPs has expanded from the Ambient Stream Monitoring Program to include ambient studies required for some municipal and industrial permit actions, industrial stormwater, ground water, industrial pretreatment, and enforcement monitoring.

2. Description of Freshwater Resources Programs

NJDEP's regulatory programs (i.e., standards, permitting and enforcement), financing programs and most planning functions are conducted on a statewide basis. It was not possible, or useful, to separate these statewide programs into freshwater and marine water functions. Monitoring programs focus on a particular type of resource (i.e., separate monitoring networks for streams, lakes, bays, etc.). The Freshwater Watersheds section of this Self-Assessment includes statewide activities and freshwater monitoring. Appropriate cross-references are included in the Marine Water Resources section.

2.1. Policy and Planning

Office of Environmental Planning

The Office of Environmental Planning (OEP) is responsible for planning functions for several environmental media and programs within NJDEP, including watershed management, water supply, water quality management planning (i.e., the continuing planning process required by the Federal Clean Water Act, including updates of Areawide Water Quality Management Plans and the Statewide Water Quality Management Plan), stormwater/NPS management, and surface and ground water quality standard setting. OEP is the lead office for development and implementation of the Framework for Statewide Watershed Management and with Whippany River Watershed Pilot Project. Additionally, OEP administers Federal and State funds for demonstration and implementation projects, including outreach and education activities, for nonpoint source management, wellhead and aquifer protection, water supply and coastal zone management, assesses data from water quality monitoring programs, produces the State Water Quality Inventory Report (305(b) report) and the list of impaired waterbodies (303(d) list).

Division of Science and Research

The Division of Science and Research (DSR) 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 most of the data gathered by NJDEP on toxics in biota consumed by humans. DSR provides technical support for standard setting and other activities. In addition, DSR coordinates many activities related to development and implementation of the NEPPS Self-Assessment, Performance Partnership Agreement, Performance Partnership Grant and development of environmental indicators.

Water Monitoring Management

Water Monitoring Management (WMM) manages a number of statewide or watershed-specific monitoring programs to collect data on water quality in rivers, lakes, ground water, sediments and marine waters. Chemical, bacteriological and biological monitoring provide the basis for water quality assessments and provide data for regulatory and classification purposes. WMM conducts chemical and bacteriological monitoring of fresh surface water and ground water and chemical and toxic monitoring of sediments. WMM also performs compliance monitoring, manages the Clean Lakes Program and provides training for volunteer monitoring groups. WMM programs and networks are specific to each type of water resource (i.e., separate programs for freshwater, marine water and ground water) and are described in relevant sections of the Water Resources Self-Assessment

Pesticide Control Program

The Pesticide Control Program (PCP) is responsible for enforcing State and Federal pesticide regulations to prevent pesticide contamination and to reduce adverse environmental and ecological effects resulting from legal and illegal use of pesticides on a statewide basis. The Pesticide Control Program manages the Aquatic Pesticide Permit Program and the Mosquito/Fly Control Permit Program for the State. Treatment records for the type and amount of pesticides that are applied to the aquatic environment are reviewed, permitted, tracked and monitored. In addition, PCP also conducts pesticide training, outreach and education activities, collects and evaluates pesticide use and impact data, and conducts residue monitoring projects.

Office of Quality Assurance

The Office of Quality Assurance (OQA) is responsible for developing and administering the annual Quality Assurance Management Plan (QAMP) and for overseeing all the quality assurance activities associated with NJDEP's environmental programs. The OQA acts as the liaison between NJDEP and the EPA on all quality assurance issues and analytical data collection techniques. Additionally, OQA administers NJDEP's laboratory certification program, responsible for certifying laboratories performing analysis of drinking water, wastewater, radon in air and water, and operates a certified contract laboratory program (CLP) for use by NJDEP programs.

2.2. Environmental Regulation

Division of Water Quality

The Division of Water Quality (DWQ) issues permits for discharges to ground and surface waters of treated sewage, industrial wastewater and land-based dredged materials disposal activities, manages the industrial pretreatment program for discharges of industrial wastes to sewage treatment plants, manages combined sewer overflows (CSOs), assures adequate design of treatment works and conveyance systems, administers sewer bans, issues permits for sludge management, landfill leachate discharges, reviews and approves water quality model submittals, regulates industrial stormwater and, through Soil Conservation Districts, manages stormwater construction sites. These activities are administered under the National Pollutant Discharge Elimination System (NPDES) delegation, granted NJDEP in April 1982 from EPA (i.e., the NJPDES program). Limited technical assistance to system operators is also provided by staff of DWQ. In addition, DWQ administers the Standards for the Construction of Individual Subsurface Sewage Disposal Systems pursuant to the Realty Improvement Act.

The Municipal Wastewater Assistance (MWA) program facilitates the upgrade of treatment works, combined sewer overflows and conveyance facilities, as well as a new component for stormwater/nonpoint source management projects, through various Federal and State sources of funds. The financing programs include the State Revolving Fund (SRF), on-going activities to complete projects under the construction grants program, and administration of State-only wastewater financing programs including funds available through a $190 million 1985 Wastewater Bond Act and $50 million under a 1992 Bond Act, a grant/loan program for the Pinelands area of the State (through a $30 million 1985 Pinelands Bond Act), as well as planning and design grants and construction projects through the Sewage Infrastructure Improvement Act/1989 Stormwater Management and CSO Abatement Bond Act.

Water Supply Element

The Water Supply Element is responsible for programs that assure adequate and safe supplies of drinking water, permitting water diversions and conducts water supply feasibility studies. Additional information on this program is provided in the Drinking Water section of this Self-Assessment document.

Land Use Regulation

The Land Use Regulation program administers the programs associated with the Waterfront Development Act, the Wetlands Act of 1970, the Coastal Area Facilities Review Act (CAFRA), the Flood Hazard Area Control Act, the Freshwater Wetlands Protection Act and the Riparian Lands Management Program, and conducts review and approval activities under the applicable permit programs. See the Land and Natural Resources section of this Self-Assessment document for a complete description of this program.

2.3. Enforcement

Water Compliance and Enforcement Element

The Water Compliance and Enforcement Element (WCE) conducts inspections, samples the discharges from and provides compliance assistance at NJPDES permitted facilities. The element tracks compliance with monitoring, reporting, effluent limitations , compliance schedules and other permit requirements. In instances of noncompliance, notices of violations and/or enforcement directives are issued. As needed and required pursuant to law, formal enforcement actions with or without penalties are also initiated through the issuance of either administrative documents or judicial actions in Superior Court. Investigations of unauthorized discharges/activities and response to numerous water resource related complaints are also conducted.

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.) See the Land and Natural Resources section of this Self-Assessment document for a complete description of this program.

Office of Alternative Dispute Resolution

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

2.4. Natural and Historic Resources

Division of Fish, Game and Wildlife

The Division of Fish, Game and Wildlife (FGW) 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. See the Land and Natural Resources section of this Self-Assessment document for a complete description of this program.

Division of Parks and Forestry

The Division of Parks and Forestry (P&F) 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. New Jersey's Green Acres Program conducts efforts to provide, preserve and enhance open space. The Green Acres Program provides planning assistance and low-interest loans and grants to municipalities and counties for open space acquisition and recreational development projects. The program also furnishes matching grants to nonprofit organizations for open space and conservation land acquisition. The program serves as NJDEP’s land acquisition agent in purchasing land for state parks, forests, and wildlife management areas, funded through passage of Public Bond Acts. See the Land and Natural Resources section of this Self-Assessment document for a complete description of Parks and Forestry programs.

2.5. Site Remediation

The Site Remediation Program (SRP) is responsible for cleanup or oversight of cleanup at contaminated sites. Responsibilities include site management to remediate contamination of surface and ground waters and sediments. See the Site Remediation section of this Self-Assessment document for a complete description of this program.

2.6. Pollution Prevention

In addition to the Pollution Prevention Program described earlier in this Self-Assessment, pollution prevention efforts are an inherent component of many activities performed by NJDEP in conjunction with regulation of water resources because they address pollution before it happens. Planning, permitting, financing, and compliance assistance activities each have pollution prevention aspects which are highlighted below. Additional information is included in the program strengths and limitations sections that follow.

Through proactive planning, current and future water resources management needs can be assessed and provided for in an environmentally sound manner. Watershed management is a planning approach to facilitate assessment of existing data, identify data gaps, establish priorities and facilitate implementation of appropriate watershed management activities. The Wellhead Protection and Critical Areas programs, designed to prevent ground water degradation and depletion, are discussed in the ground water and drinking water sections of this Self-Assessment. In addition, establishment and implementation of surface water and ground water quality standards, regional stormwater and nonpoint source management activities may also be considered pollution prevention activities. Outreach, education, and training are fundamental pollution prevention components of watershed management, nonpoint source management, and pesticides program.

Permit limits are established to protect the uses of the receiving water bodies in order to ensure that existing and future residential, commercial and industrial activities do not result in irreversible degradation of the environment. Permitting activities within this context include regulation of surface and ground water discharges (including combined sewer overflows, industrial stormwater permits, sewer connection permits, sewer bans, sludge management, industrial pretreatment and technical assistance programs). A major component of industrial stormwater management permits is the development and implementation of Stormwater Pollution Prevention Plans. Facility-wide permits are designed to promote pollution prevention by limiting the transfer of pollutants across media in addition to streamlining the permitting process. Facility-wide permits are discussed in more detail in the Pollution Prevention Section of the Cross-Cutting Issues/Programs portion of this Self-Assessment document.

Pollution prevention benefits also occur through the State's financing program via construction of wastewater management facilities, associated infrastructure and stormwater/NPS management projects (the newest component of the low-interest loan financing program). As a result of the construction of needed facilities and projects, both point and nonpoint source pollution problems can be addressed in a cost effective manner to address existing and long term (20 year) needs.

Compliance and technical assistance activities are also proactive pollution prevention mechanisms. Through these efforts, enforcement and DWQ staff can provide assistance to municipalities in meeting permit requirements.

3. Stakeholder Involvement

The NEPPS stakeholder workshop "Management for Environmental Results in New Jersey: Implementing the National Environmental Performance Partnership System" (April 30, 1996) was a significant effort to solicit public involvement in the NEPPS process. In addition, a Water Resources Focus Group session was held on August 6, 1996 to discuss specific water resources issues in greater detail. Input received at these Stakeholder sessions guided NJDEP in the preparation of this Self-Assessment document, the FY96 Performance Partnership Agreement (PPA), as well as future documents under the NEPPS process. Of particular note, NJDEP agreed that water supply, stormwater management, nonpoint source pollution and watershed management issues warranted further consideration, and additional detail is included in this Self-Assessment. Additional workshops and focus group sessions will be held to continue this outreach effort.

In order to enhance public awareness regarding the NEPPS process and the unique nature of this joint EPA-NJDEP partnership, several articles have been published in the <u>New Jersey Discharger</u>. This Division of Water Quality publication conveys information about New Jersey's water quality programs and is widely distributed to the regulated community, environmental and industrial groups and the public. NJDEP intends to continue to publish NEPPS articles in the New Jersey Discharger.

Currently, the FY96 Self-Assessment and FY96 and FY97/98 Performance Partnership Agreement documents are available through the NJDEP's Electronic Bulletin Board. Internet access is also available for the FY97/98 Performance Partnership Agreement and is being explored to further facilitate stakeholder discussion of future Self-Assessments and Performance Partnership Agreements.

4. Key Environmental Issues

The proposed goal for New Jersey's surface waters is:

"Our surface waters (tidal and non-tidal) will support human and ecosystem health and applicable uses such as recreation, fishing, drinking water supply, agriculture and industry."

This goal statement has been revised based on input from stakeholders and the NEPPS Water Resources Workgroup. The goal is intended to reflect human and ecological uses of surface water resources identified in the Federal Clean Water Act and the State's Surface Water Quality Standards.

The key water resources issues relate to the goal statement, were identified from a water resources (not program) perspective, and are important on a statewide or regional basis. Data are available to support the identification of each key issue. Suspected problems for which sufficient data have not been gathered are identified as data gaps in the program limitations section. The key water resources issues may be modified based on additional data and data assessments and are not currently prioritized within the water media or across other media. Indicators related to many of these key water issues are reported in the Environmental Indicators Appendix to this Self-Assessment. Additional indicators will be reported in future Self-Assessments. Additional data and data assessments are needed to quantitatively identify specific sources of pollution at monitored locations and to explore links between causes of problems, ambient conditions and the effectiveness of societal responses.

Status assessment of chemical and microbiological water quality included comparison of applicable numerical Surface Water Quality Standard Criteria. Although an assessment relative to these numerical criteria is a useful means of identifying water quality issues, it isn't necessarily definitive. A valid consideration is whether the essentially statewide criteria (by classification) are appropriate for each watershed.

Outstanding Natural 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. Also, FW1 waters are not subject to any new wastewater discharges. Exceedences of SWQS and increasing concentrations of some parameters in Pinelands, FW-1 Category 1 and Trout Production waters have been documented despite point source controls. The sources of contamination will vary by subwatershed, and the relative contributions of point and nonpoint sources of pollution will also be variable.

4.1. Nutrient Enrichment in Water

Nutrients such as nitrogen and phosphorus are present in all surface water bodies. In stable ecosystems, the nutrients inputs are balanced by the needs of aquatic biota. However, excessive nutrient inputs can cause eutrophication of waterbodies. Eutrophic waters tend to exhibit high concentrations of nutrients which cause periodic algal blooms. As the blooms die off, dissolved oxygen is lowered, potentially killing fish and other aquatic species. Excessive concentrations of nutrients, suspended solids and algae also periodically affect drinking water supply designated use and drinking water treatment costs.

Of the 380 public lakes (24,000 acres) in New Jersey, 116 (10,462 acres) have been evaluated for trophic status. Of these, 113 lakes (10,351 acres) are considered to be eutrophic. The natural eutrophication process in New Jersey lakes is being accelerated by inputs of nutrients and suspended solids from fertilizers, air deposition, stormwater and discharges from sewage treatment plants and septic systems. 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, aquatic pesticide application, dredging to remove sediments and oxygen demanding bottom materials). Some New Jersey rivers also experience periodic algal blooms.

4.1.1. Dissolved Oxygen in Water

Dissolved oxygen (DO) is essential to aquatic life, and the criteria has been set at 7 parts per million (ppm) in trout production waters, 5 ppm in trout maintenance waters and 4 ppm in non-trout waters. In-stream DO may be affected by loads of nutrients and other oxygen-demanding substances from both point and nonpoint sources. Exceedences of the DO criteria were observed at least once at only five out of 79 stations between 1990 and 1994; increasing (improving) concentration trends were observed at 14 stations and decreasing (declining) concentration trends were observed at 13 stations. However, the current monitoring design may underestimate exceedences and trends because data are collected between 10 am and 3 pm, when diurnal dissolved oxygen concentrations are highest. Diurnal data are needed to comprehensively assess DO.

4.1.2. Phosphorus in Water and Sediments

Phosphorus has been identified as the limiting nutrient in most freshwaters in New Jersey and therefore control of phosphorus is needed to protect drinking water supplies and prevent or reduce eutrophication. The phosphorus criteria is set at 0.1 ppm to protect drinking water supplies from potential coagulation problems during treatment and to prevent or reduce eutrophication of surface waters. Above impoundments, the criterion may be set lower to protect lakes and reservoirs. Within impoundments (lake or reservoir) the criterion is 0.05 ppm. The criterion may be set higher than 0.1 ppm if phosphorus is not a limiting nutrient.

NJDEP and USGS currently conduct monitoring above and below impoundments, but not within them. Using a criterion value of 0.1 ppm at all stations, exceedences of the criteria occurred in 34 % of all samples and were observed at least once at 73 stations out of 79 stations between 1990 and 1994. Levels of phosphorus are decreasing at 37 stations, increasing at eight stations, and unchanged at 44 stations.

Phosphorus is present in sewage treatment plant and septic system effluents and runoff from lawns and agriculture. Phosphorus compounds are also used to reduce drinking water corrosivity by some purveyors, potentially increasing phosphorus concentrations in sewage treatment plant effluent. Phosphorus in sediments may contribute to water concentrations, and nationally, phosphorus concentrations in sediment appear to be rising. Average phosphorus concentrations in freshwater sediments (70 stations) ranged from 20 ppm to 2900 ppm. Disturbance of contaminated sediments can resuspend the contaminants in the water column. This is problematic primarily in industrialized areas that are periodically dredged.

4.1.3. Nitrogen in Water

Control of nitrate concentrations in freshwaters is important to protect surface supplies of drinking water and ecologically important waters. The nitrate criteria is set at 10 mg/l in most freshwaters, because above this concentration, babies are at risk for methhemoglobinanemia (blue baby syndrome). In the Pinelands, the nitrate criteria is set at 2 ppm to protect the ecology of this area. Although exceedences of the nitrate criteria occurred at only one of 79 monitored stations between

1990 and 1994, concentrations are rising at 46 stations. Nitrate increases may be attributed to upgrades of sewage treatment plants (which reduced effluent levels of ammonia by converting the nitrogen to nitrate) and nonpoint sources (stormwater, runoff, air deposition, contaminated ground water, etc.). Additional data are needed to identify and manage sources and to track this emerging issue.

4.1.4. Suspended Solids in Water

Excessive concentrations and loads of suspended solids may fill in lakes, rivers and estuaries and transport some contaminants (e.g., nutrients and metals) to waterbodies. The suspended solids criteria is set at 25 ppm in trout production and maintenance waters and 40 ppm in non-trout waters to protect aquatic life and habitat quality. Exceedences of the suspended solids criteria occurred in 4% of samples and were observed at least once at 23 stations between 1990-94. There are insufficient data to assess trends. Excessive suspended solids may originate from both point and nonpoint sources.

4.2. Pathogens in Water

Pathogens include bacteria, protozoans, and viruses that are a potential health threat to humans. Both human and animal wastes may contain pathogens that present human health risks. Pathogens that threaten human health may be present in treated sewage effluent, nonpoint source runoff contaminated by domestic and wild animals, stormwater and contaminated sediments. Pathogens may also originate from septic system effluent, combined sewer overflows (CSOs) and sewage infrastructure failure.

It is time-consuming and difficult to test for most human pathogens, and for others, not technically possible. Therefore, fecal coliform bacteria are used as an indicator of fecal contamination of water. Fecal coliform bacteria are an imperfect indicator. Due to greater survival or resistance to disinfection or differences in spatial transport, human pathogens may be present in the absence of fecal coliform bacteria. Conversely, because not all human pathogens are derived from fecal contamination, human pathogens may be present in the absence of fecal coliforms. However, in most situations, fecal coliform data provide a reasonable basis for evaluating whether the extent of fecal contamination in ambient waters is improving or declining.

To meet the fecal coliform criteria in the Surface Water Quality Standards, the geometric mean of five or more samples per month should be less than or equal to 200 most probable number (MPN) per 100 milliliters and no more than 10% of all samples collected during the 30 day period should exceed 400 MPN per 100 milliliters. The criterion is based partially on geometric mean because ambient fecal coliform concentrations can be highly variable. This criterion is useful to assess microbial water quality over an extended period of time. However, because the standards is a long- term (30 day) average, its utility as an indicator of immediate potential human health risks associated with recreational uses is limited. For bathing beach assessments, the New Jersey Department of Health and Senior Services requires weekly samples be compared to the 200 MPN per 100 ml criterion. If this value is exceeded, a second sample is collected and tested 24 hours later. If the second sample also exceeds 200 MPN per 100 ml, the bathing beach is closed and reopened only after subsequent tests are below the criterion.

Based on the Clean Water Act, New Jersey has designated swimming use in all surface waters. However, swimming occurs at lake and ocean beaches, and generally not in rivers. Lake bathing beach samples are collected by county or local health departments, and the data are currently not available to NJDEP. Ocean and bay bathing beach data are collected by county and local health departments and reported by NJDEP's Cooperative Coastal Monitoring Program, which is discussed in the Marine Resources section of this Self-Assessment. Therefore, the following data assessment focuses on fecal coliform in rivers and streams as per the swimmable designated use at specific sampling locations, and does not include an assessment of swimmability at lake, bay and ocean bathing beaches.

Fecal coliform results for the Ambient Stream Monitoring Network are summarized on Table FW-1. Exceedences of the fecal coliform criteria in single samples collected during summer periods occurred in 65% of samples and were observed at least once at 75 out of 79 river stations. This assessment is based single samples collected during the summer (approximately two samples per year) between 1974 and 1994. Due to the highly variable levels, trends were detected at only 19 stations; 14 were increasing, five were decreasing.

The recreational designated use assessment conducted for the biennial Statewide Water Quality Inventory Report (305b report) also utilizes fecal coliform results for the Ambient Stream Monitoring Network. The results of the recreational designated use assessment reported in the 1994 Statewide Water Quality Inventory Report are presented in Table FW-2 (found at the end of this section). This assessment is based on the geometric mean of annual data from the past 5 years and also includes an assessment of threats of further degradation to the waterbody. The results of this assessment indicate that 77% of the 525 monitored stream miles do not support recreational designated use and that all monitored waters are threatened with further degradation.

4.3. Toxics in the Aquatic Environment

Toxic contamination in the aquatic environment is a concern from both a human and ecological health perspective. Human routes of exposure include direct contact from recreation, consumption of contaminated fish and shellfish, and potential impairments of drinking water supplies. Ecological health issues include impaired reproductive capability, which is of particular concern for threatened and endangered species. There are numerous sources of toxics in the aquatic environment including industrial and municipal point sources, industrial and municipal stormwater, CSOs, contaminated sediments, ground water and air. Some toxic contaminants cycle through the aquatic environment from water to sediment, to plants and animals.

4.3.1. Toxics in Water

Mercury

The mercury criteria is 0.144 ppb to protect human health. Concentrations of mercury in excess of the criteria occurred in 6% of samples and were observed at least once at 16 out of 79 stations between 1990-94. Since studies conducted on a national basis indicate potential contamination of metals samples, additional sampling, using clean-methods techniques, is needed to confirm these data. Insufficient data were available for trend analysis. Spatial analysis is needed to compare water column, sediment and fish tissue concentrations of mercury. 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.

Lead

The lead criteria is 0.5 ppb to protect human health. Concentrations of lead in excess of the criteria occurred in 10% of samples and were observed at least once at 16 out of 79 stations between 1990-94. As stated above, due to potential contamination problems, additional investigation is needed to confirm these data. 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.

4.3.2. Toxics in Sediment

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. Transfer through the food web of toxic pollutants from sediments to biota (i.e., bioaccumulation) has resulted in elevated levels of PCBs, DDT's and mercury in New Jersey fish. Ingestion of organisms with high levels of contaminants poses a risk to humans and other wildlife.

An evaluation of sediment concentrations for 1990-94 was conducted using data collected at 70 Ambient Stream Monitoring Network stations. Data from 1990-94 were averaged for each station because sediment data are highly variable. During this period, the range of average mercury concentrations was 0.0025 ppm to 1 ppm; average DDT concentrations ranged from 0.2 ppb to 343 ppb; average PCB concentrations ranged from 0.5 ppb to 800 ppb. Additional evaluation of these results is needed to assess the potential effects of these concentrations on fish tissue and water quality. Currently, evaluation of sediment concentrations is limited by the lack of sediment quality standards.

4.3.3. Toxics in Fish Tissue

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. Municipal and industrial discharges, landfills, hazardous waste sites, contaminated groundwater inputs, air deposition (fossil fuel fired power plants, waste incinerators, etc.), agricultural inputs and other sources of NPS pollution are potential sources of fish tissue contamination.

NJDEP has found high 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.

Mercury contamination in fish tissue is a national problem. New Jersey is one of 32 other states that has enacted fish consumption advisories in response to mercury contamination. NJDEP recently issued statewide consumption advisories on pickerel and large mouth bass due to mercury contamination. Numerous freshwater bodies also have advisories that are more stringent than the statewide advisories. Consumption advisories target "at risk" segments of the population: pregnant women, women planning pregnancy within a year, nursing mothers, and children under five years old. Drinking water supplied from affected waters has been tested and shown to be safe because the mercury resides primarily in sediments and aquatic life.

4.4. pH Balance

Exceedences of the pH criteria occurred in 16% of samples and were observed at least once at 55 out of 79 stations between 1990 and 1994; 39 stations had increasing trends (i.e., becoming more basic), and one decreasing trend (i.e., becoming more acidic). Since the criteria for most waters 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.

4.5. Habitat Alteration and Wetlands Losses

Habitat alteration occurs when land use changes: rural to agricultural, then to residential, industrial and commercial uses. Historically, urban industrial centers in the northeast and southwest were developed. Currently, extensive and rapid suburban development is suspected of causing water quality degradation in formerly high quality streams, although the extent of habitat alteration and water quality degradation have not been documented. Land development can negatively affect water resources by increasing the extent of impervious surfaces, which can lead to stormwater contamination, altered hydrology (e.g., drying of wetlands, flooding, etc.), streambank erosion, temperature fluctuations (caused by removal of riparian vegetation and thermal discharges) and eutrophication. Table FW-4 (found at the end of this section) summarizes the effects of urban runoff on water quality and aquatic habitat.

The ecological value of wetlands has been well established in scientific literature. It is estimated that approximately half of the nation's wetlands have been lost since colonial times as land was prepared for agriculture by ditching and draining wetlands. Later, residential, industrial and commercial development included destruction of wetlands and the channelization, relocation or elimination of natural stream corridors. In New Jersey, the State lost 200,000 wetland acres (averaging 10,000 acres per year), which represents approximately 20% of its freshwater and estuarine wetlands between 1953 and 1973. The rate of destruction slowed somewhat so that by 1988, losses were estimated at a minimum of 500 acres per year. See the Land and Natural Resources section of this Self-Assessment document for further discussion of wetlands.

4.6. Aquatic Life Designated Use Impairments

Aquatic life designated uses include habitat, reproduction, adequate food supply. These uses are incumbent upon adequate water, sediment and habitat quality. Benthic macroinvertebrate population data are used to screen waters for attainment of aquatic life designated uses because these organisms can be classified by pollution tolerance, and are relatively stationary residents whose populations are reflective of the cumulative effects of all aspects of their ecosystem. Although benthic data do not constitute a comprehensive assessment of aquatic life designated uses, they are indicative of aquatic life designated use attainment. A more comprehensive assessment of aquatic life designated uses should include habitat assessment, freshwater fisheries and endangered and nongame species.

Benthic macroinvertebrate population data are collected at 771 stations, assessing approximately 3,855 miles (60%) of the State's river miles. Based on this screening, aquatic life designated uses are attained but threatened in 1,349 miles (35% of assessed miles), moderately impaired in 2,005 miles (52%) and is severely impaired in 463 miles (12%). Results are summarized in Table FW-3 and shown spatially on Figure FW-4 (both are found at the end of this section). These data form the basis of the aquatic life milestone. 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.

4.7. Water Resources Management Issues

For the purposes of this Self-Assessment, water resources management issues include the quantity aspects of water uses, relationships between quality and quantity and the ecological aspects of addressing water quantity. This section of the Self-Assessment document focuses on surface water resource management issues. Information related to ground water resources management is provided in the Ground Water Resources section of this Self-Assessment document. Information specific to potable water supplies is provided in the Drinking Water section of this Self-Assessment document.

New Jersey receives in excess of 44 inches of precipitation on average, providing water for human consumption, industrial, agricultural and recreational purposes as well as aquatic and terrestrial biota. Approximately 72% of the annual water withdrawals for all uses are from surface water sources, and 51% of New Jersey's population is served by surface water supplies. Currently, NJDEP estimates that drinking water use is 1,168 MGD (88%), industrial use is 175 MGD (11.7%) and agricultural use is 154 MGD (10.3%) industrial use. Cooling water demands are not included in these estimates because they typically return water to its source.

An analysis of existing supplies and future demand was completed in 1996 for the Water Supply Master Plan. On a statewide basis, New Jersey currently has adequate water supplies (surface and ground water) to meet current needs: total safe yield is 1,750 MGD (850 MGD surface water + 900 MGD ground water); the demand in 1990 was 1,500 MGD. However, by 2040 the demand is projected to rise to 1790 MGD, a potential water deficit. These estimates and projections must be interpreted with caution. Limitations include potential inaccuracies in ground water availability estimates, difficulty in accounting for the relationship between surface and ground water, existing constraints on ground water resources such as development and contamination, the method of water supply development and use can reduce safe yields below the optimum yield, statewide statistics may mask significant regional and local deficits.

In order to address regional and local water resource issues, NJDEP divided the state into 23 water planning areas. These areas generally coincide with the 20 watershed management areas and will be refined to address this consideration in the next Water Supply Master Plan. Planning areas are considered individually and in combination since water may be transferred between planning areas and water use in one area may affect availability in another area. The Water Supply Master Plan estimates deficits of 198 MGD in eight planning areas and surpluses of 454.6 MGD in 15 planning areas. By 2040, 350.6 MGD in nine planning areas and surpluses of 320.7 MGD in 14 planning areas.

More than half of the water used in the State (over 700 MGD) is used only once, (i.e., depletive use) through ocean and estuarine discharges of treated wastewater. Although regionalization of sewage treatment plants led to improvements in water quality as discharges were relocated from streams to waterbodies with larger assimilation capacity, net water availability has been lost.

The impact of these and other water resource management decisions on ecosystems has not been well documented. The complex inter-relationship between surface and ground water quality and quantity and biota is an important consideration. To begin addressing these issues, NJDEP requires new withdrawals to be preceded by extensive environmental assessments and monitoring whenever withdrawal rates are thought to be large enough to impair aquatic ecosystems and their dependant species. This policy may be expanded to include assessments of base flow impacts for proposed substantial ground water withdrawals from shallow aquifers.

Mechanisms to address current and future deficits focuses on management of water resource issues on a watershed management area and water region basis. Specific measures include designation of critical areas for aquifers that limit water withdrawals, implementing source water protection and water conservation programs, including addressing "unaccounted for" water losses in purveyor systems

(10-30% per planning area), water supply management programs including conjunctive use of several surface and ground water supplies, construction of new supplies, and management of depletive uses.

5. Program Strengths

NJDEP's regulatory programs (i.e., standards, permitting and enforcement), financing programs and most planning functions are conducted on a statewide basis. Monitoring programs focus on a particular type of resource (i.e., separate monitoring networks for streams, lakes, bays, etc.). The following assessment of program strengths addresses the full scope of each program.

5.1. Surface Water Quality Standards

Rules that establish Surface Water Quality Criteria for the protection of the designated uses of the State's waters (including aquatic life and human health) have been adopted for a number of conventional (such as BOD, suspended solids, pH) and toxic pollutants. New and revised standards (including policies, implementation procedures and criteria) were proposed on February 5, 1996 to supplement or replace provisions already contained in the SWQS rules (including numerical criteria). Criteria being proposed, as well as those already adopted in the SWQS, are established at effect-protective levels. That is, aquatic life-based criteria are developed so that compliance with the criteria provides protection to most of the aquatic biota from adverse impacts. Human health-based criteria for systemic toxins have been developed to protect human health based on the proposition that there is an exposure threshold for these pollutants, below which there are no systemic effects resulting from exposures. Human health-based criteria for carcinogens were developed to provide protection from one extra case of cancer in one million people from an average lifetime exposure to the pollutant at the criteria level.

The SWQS contain antidegradation provisions intended to protect Outstanding National Resource Waters (FW1 and PL) from any degradation. Additionally, Category 1 (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. However, these existing antidegradation policies were written in broad terms to allow maximum flexibility in their application. Unfortunately, this has lead to varying interpretations for implementation, although guidance has been available through the SWQS program and EPA guidance documents. In order to promote consistency, antidegradation implementation procedures (i.e., guidance necessary to develop the justification to lower water quality, which must be developed in support of proposals to lower water quality) were proposed as part of the regulatory reform package published in the February 5, 1996 New Jersey Register. The proposed implementation procedures were intended to provide a uniform interpretation of how the antidegradation policies are to be applied.

The proposed revisions to the SWQS (including the antidegradation policies) were not adopted due to the significant level of public interest and input. Instead, NJDEP will initiate interactive discussions with interested parties to try to develop a mutually satisfactory proposal for revision of the SWQS for subsequent proposal. Until new antidegredation policies are developed, NJDEP will continue to use the existing policies. NJDEP still intends to ultimately have any necessary antidegradation analyses performed as part of the development of water quality management plans, instead of through individual permit actions. However, it may be necessary to address antidegradation concerns through individual permit actions where the permit action timeline does not allow for performing the needed antidegradation analyses as part of the development of a water quality management plan.

NJDEP believes that the most effective manner to address the significant policy issues raised by interested party reviewers on the February 1996 SWQS proposal would be to conduct additional public participation and to reflect these discussions within a reproposal document. Accordingly, NJDEP is proceeding with a readoption proposal which will make a number of changes to the rule for consistency with the NJPDES rules and eliminate the possible expiration of the SWQS rule in April 1998. (NJDEP filed for adoption of NJPDES rules in February 1997. Additional information is provided in Section 5.7 of this section). An interactive rule making process between NJDEP and interested parties will be initiated concurrently with the SWQS readoption process to develop substantive revisions (including revisions to antidegradation policies) to be the subject of a subsequent rulemaking proposal. Based on currently available information, this proposal would be published in the Fall of 1998, with adoption expected during the Summer of 1999.

5.2. Monitoring, Research and Databases Inform Decision-making

Ambient monitoring data are utilized within NJDEP to develop priority lists of impaired waters (i.e., 303 (d) list) requiring additional management actions. Ambient data also form the basis for designated use and trends assessments reported in the State Water Quality Inventory Report (i.e., 305(b) report). Private consultants, industry, municipal governments and other agencies also use these data for site-specific analyses.

In 1991, Water Monitoring Management re-established a statewide biological monitoring network which uses the EPA Rapid Bioassessment Protocol II for stream benthic macroinvertebrates. This network is presently comprised of 771 stations and is anticipated to include 1,000 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 all five of the State's water regions including the upper and lower Delaware River, the Passaic, Hackensack, Wallkill and Raritan River Basins, and the Atlantic Coastal Basin. These assessments are providing information on the biological health of the State's waterways to agency managers and are available upon request to municipal and county land planning agencies. Using these data, local officials have the opportunity to strengthen zoning ordinances and land use plans to protect water uses and quality within their jurisdictions. Few local agencies have requested this information to date.

Approximately 10 public lakes are monitored each year for nutrients, dissolved oxygen and clarity to determine trophic status and develop plans for lake remediation projects. This program also conducts monitoring for toxics in finfish in approximately 10 lakes per year in priority watersheds. Additionally, when State and/or EPA Clean Lakes funds are available, several public lakes are awarded funding to conduct either a Phase I Diagnostic Feasibility Study or a Phase II Implementation Project.

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 sediments. Research has been conducted to evaluate potential alternate indicators of pathogenic contamination to complement fecal coliform data. Research is currently being conducted by USGS to assess the relative loadings of point and nonpoint sources at monitoring stations in the Ambient Stream Monitoring Network, as well as trends assessment for the period between 1987 through 1995.

The DWQ database includes loadings information from discharge monitoring reports as well as detailed NJPDES permit information which includes permit tracking, monitoring requirements, compliance schedules and permit limitations . This database is used to assess permit compliance, set fees and report selected cause indicators related to NJPDES discharges.

5.3. Documented Water Quality Improvements

5.3.1. Improvements in Specific Waterbodies

The NJDEP permitting, enforcement and financing programs have worked together to reduce the impacts of point source pollution throughout the State, with dramatic results apparent in several watersheds. In general, NJDEP and the regulated community appear successful in significantly reducing point source discharges of the reduced forms of nutrients (e.g., ammonia) thereby reducing in-stream oxygen demand and effluent toxicity. Some success stories are described below.

Delaware River

The 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 loads have been dramatically reduced as a result of wastewater treatment plant upgrades. Dissolved oxygen levels have increased from 0 ppm near Camden to healthy levels and the number of species of fish has increased from 16 in 1959 to over 40 today.

In 1988, the Delaware River Basin Commission cited dry weather CSO flows in Camden County for contributing 3.2 million pounds per year biochemical oxygen demand (BOD) and 3.7 million pounds per year of suspended solids, equating to 25% of the wastewater load generated in the Camden-Gloucester counties' sewer service area. Since that time, the Camden County Municipal Utilities Authority (MUA) has secured over $750 million through the construction grant and State Revolving Fund loan programs for planning, design, and construction of upgraded wastewater treatment and CSO facilities. Construction of these facilities is nearing completion.

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 regionalization of sewage treatment within the past eight years. Although water quality is still poor in the Cooper River, dissolved oxygen has increased, and concentrations total phosphorus, total organic carbon, suspended solids and potentially lead and mercury have decreased since 1988 due largely to the extensive municipal discharge regionalization as discussed above that resulted in the elimination of most of the discharges to the Cooper River.

Whippany River

With the upgrade of four municipal treatment plants along the Whippany River, water quality has improved with respect to dissolved oxygen, total phosphorus, total organic carbon, suspended solids and potentially lead and mercury and benthic index 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. As a result, for the first time in 25 years the long-term goal of improving water quality in the Navesink has been realized. It has improved to the point that unrestricted shellfish harvesting in a large portion of the Navesink is now permitted.

5.3.2. Water Quality Trends at Monitoring Stations

Based on trends assessment for 1974-1994 using data generated in the 79 station Ambient Stream Monitoring Network, described earlier, levels of un-ionized ammonia are decreasing at 42 stations but increasing at nine stations; levels of total Kjeldahl nitrogen are decreasing at 73 stations and increasing at only one station; levels of total phosphorus are decreasing at 37 stations but increasing at eight stations. Although 14 stations showed increasing dissolved oxygen levels, 13 stations showed decreasing levels. Exceedences of criteria for un-ionized ammonia and dissolved oxygen occurred at only five out of 79 stations.

5.4. Reduction in Point Source Loadings

5.4.1. Upgrades and Regionalization of Municipal Sewage Treatment Plants

Over the past 25 years, permitting, enforcement and funding programs have been instrumental in reducing point source loads of BOD from approximately 160,000 kg/day in 1985 to 75,000 kg/d in 1990. Instream decreases in un-ionized ammonia and total Kjeldahl nitrogen are also attributed to improvements in wastewater treatment. In the early 1970's there were approximately 100 primary sewage treatment plants in the State, which were designed to remove only 60% of the solids and 35% of the oxygen depleting pollutants, (e.g., ammonia). These plants have been upgraded to regionalized to secondary treatment which is designed to remove 85% of the solids and oxygen depleting pollutants in wastewater. Over $4.5 billion was spent in New Jersey to upgrade all treatment plants to secondary treatment, financed largely by the construction grants program under the Federal Clean Water Act.

New Jersey's State Revolving Fund (SRF), which replaced the construction grants program, has been making construction loan awards since 1987. This program, in combination with State sources of funds (through a number of bond acts and Legislative appropriations), has also been an extremely effective tool to finance water quality improvements. The SRF is a joint program administered by the Municipal Wastewater Assistance Program in DWQ and the New Jersey Wastewater Treatment Trust (Trust), an independent financing agency. Under the program, NJDEP provides zero interest loans (through funds available under Federal capitalization grants pursuant to the Clean Water Act) for 50% of eligible project costs. The Trust provides market rate loans through funds generated by the sale of revenue bonds which are secured by a portion of the required 20% State match) for the remaining eligible costs. To date, the SRF includes over $500 million in Federal capitalization grants as well as $100 million in State match funds. Over $1.2 billion has been awarded to municipalities and authorities in the State since 1987 for construction of wastewater treatment and conveyance facilities. Only the New York State surpasses New Jersey in total SRF dollars lent, according to a survey released by the Council of Infrastructure Financing Authorities. Implementation of water quality-based effluent limitations, stormwater/NPS and watershed management projects will be facilitated through the availability of State financing. These loan obligations, as well as shorter construction periods than occurred under the construction grants program, are indirect indicators of environmental benefits. Infrastructure investment is reported as a response indicator.

5.4.2. Reduced Loads of Toxics to Municipal Sewage Treatment Plants

In New Jersey, 60% of industries discharge waste to sewage treatment plants. Unless properly regulated (i.e., pretreatment of the industrial waste), this industrial wastewater may upset the biological processes of the treatment plant, degrade effluent and sludge quality and may also create hazardous conditions in the collection system. Through the industrial pretreatment program, loads of industrial pollutants have been significantly reduced, preventing pollution that may otherwise have reached surface water bodies via municipal treatment plant discharges.

In April 1982, EPA granted NJDEP delegation of the industrial pretreatment program (IPP) to assume the primary responsibility for implementing and enforcing the National Pretreatment Program. NJDEP identified municipal sewage treatment plants which would need to develop an approvable pretreatment program in the Statewide Pretreatment Management Plan (SPMP). NJDEP evaluated and approved industrial pretreatment programs developed by local agencies. These industrial pretreatment programs authorize "delegated local agencies," (DLAs), to implement and enforce the industrial pretreatment program for industrial facilities discharging wastewater to their treatment plant(s). As of January 1996, NJDEP had delegated IPP authority to 24 local agencies, which have subsequently issued permits to 1,160 industrial facilities. In areas of the State not serviced by a DLA, NJDEP is the control authority that is responsible for permit issuance and enforcement of indirect industrial discharges. Upon receiving IPP delegation, NJDEP began issuing sanitary sewer discharge permits to significant indirect users (SIUs), as defined under N.J.A.C. 7:14A-1.9. As of January 1996, the NJDEP has issued 91 SIU permits.

5.4.3. Improvement in Sewage Sludge Quality

The industrial pretreatment program has also facilitated improvements in sewage sludge quality, as shown in Table FW-5 (found at the end of this section). Currently, 92% of the municipal sewage sludge in New Jersey meets the minimum requirements, and 69% meets the "high quality" requirements for land application under the Federal sludge regulations (40 CFR Part 503). To meet these requirements, sludge must be generally low in pollutants, rich in nutrients and organic matter, and highly suitable for recycling. The percentage of sewage sludge generated in New Jersey being utilized for beneficial purposes has increased from 6% in 1983 to almost 40% in 1996. There are 14 farms in New Jersey which are approved to seasonally apply residuals to 2,600 acres and 150 other sites comprising 21,600 acres which are approved for application of sludge-derived products.

Until 1989, just over half of the sewage sludge being generated by six New Jersey municipal treatment plants was disposed in the Atlantic Ocean. Under Federal and State Judicial Consent Decrees, these six facilities agreed to implement plans for beneficial reuse of their residuals. The importance of this is two-fold. First, the materials are being reused in an environmentally beneficial manner as a useful product for farming, landfill cover, land reclamation and other landscaping uses. Secondly, the need for sewage authorities to create quality residuals products will result in improved sewage treatment plant effluent quality.

5.4.4. Improvements in CSO Management

While the majority of the CSOs in the State discharge to marine or estuarine water bodies, a number of CSOs exist that impact the freshwater resources in the State. The efforts of NJDEP's permitting, enforcement, planning and financing programs have resulted in significant progress in addressing this source of pollutants, including the virtual elimination of dry weather overflows at CSO discharge points and development of short and long term CSO control plans. More information regarding NJDEP's CSO management is included in the Marine Water Resources section of this Self-Assessment document.

5.4.5. Industrial Stormwater Management

Contamination of stormwater can occur at industrial facilities if the stormwater comes into contact with some industrial materials or operations. To reduce contamination of industrial stormwater, the Federal Clean Water Act Amendments of 1987 and regulations adopted by EPA require permits for industrial stormwater discharges. The Stormwater Permitting Program emphasizes outreach and education, pollution prevention and source control through the use of Best Management Practices (BMPs) instead of traditional effluent limitations.

In order to implement the program, two general Discharge to Surface Water (DSW) permits were adopted: the Basic Industrial Stormwater General Permit and the Construction General Permit. 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. To reduce soil erosion and runoff, the Construction General Permit regulates construction activities disturbing five or more acres and certain mining activities. This permit emphasizes the implementation of BMPs and is administered by the local Soil Conservation Districts.

Currently, approximately 1,617 facilities have received the Basic Industrial Stormwater General Permit which requires facilities to develop and implement a Stormwater Pollution Prevention Plan (SPPP) for their site, certifying that they have eliminated contact of stormwater with industrial materials and activities. In three years, SPPPs have been prepared by more than 1,300 industrial facilities and 713 have been implemented to date. These 713 facilities have implemented stormwater pollution control practices to eliminate stormwater contamination at these facilities. In addition, 605 more facilities are progressing toward this objective.

In order to address the large number of individual permit applications, the program developed Interim Stormwater Permits for over 80 types of industries which allow them to begin developing Stormwater Pollution Prevention Plans while they are developing specific BMPs for portions of their site. Currently, 262 industrial facilities have received Individual Stormwater Permits. The program also developed two industry-specific general permits for 138 facilities in the Concrete Aggregate and the Scrap Metal Materials industries. These permits establish BMPs that are unique for each industry and were developed with the assistance of representatives from the affected industrial groups.

To date, 2,785 construction sites have received the Construction Activities General Permit.

5.4.6. Maintenance of Treatment Plant Capacity

When sewage treatment plants have inadequate capacity to treat wastewater, discharge of partially treated sewage can occur. When collection system capacity is inadequate, raw wastewater can escape through manhole covers, pumping stations and may backup in homes and businesses. As described below, the Treatment Works Approval (TWA) Program operates in conjunction with the Capacity Assurance Program (CAP) to ensure properly functioning wastewater management facilities. These programs reduce the need for other regulatory processes, such as implementation of sewer bans or enforcement actions. Due to these programs, there have been relatively few episodes of sewage bypasses due to inadequately designed or operated treatment works. Despite New Jersey's dense development and large population, the sewage infrastructure and treatment systems generally meet performance expectations.

The objective of the TWA Program is to prevent surface and ground water degradation due to inadequately designed and/or poorly operated wastewater treatment and conveyance facilities. The design and use of various treatment works such as municipal and industrial treatment plants, large subsurface disposal systems, and certain large collection and conveyance systems is regulated in this program. When committed flows reach 80% of the facility’s capacity, the owner of the plant must complete a plan, which addresses future flows and when appropriate, includes a schedule for plant expansion.

5.4.7. Management of Inadequate Sewer Systems

The objective of the sewer ban program is to provide a mechanism for the State to minimize increases in flows to severely malfunctioning sewage treatment plants from additional connections. Once a ban is imposed, additional connections to these treatment plants are not permitted for new construction until problems at the treatment facility are corrected. This program also encourages developers to coordinate with treatment facility owners and has been effective since developers often act as a catalyst for the necessary system upgrades.

During FY91, 172 of the 357 municipal sewage treatment plants were under a sewer connection ban, impacting 249 municipalities. These bans were imposed either because the affected sewage treatment facilities were not meeting their NJPDES discharge permit, the collection and conveyance systems experienced raw sewage overflows, creating an obvious human health hazard. Due to the combined efforts of NJDEP’s permitting, enforcement and financing programs, local agencies and construction-related industries, many of the sewer conveyance and treatment systems were upgraded in conjunction with the TWA and CAP programs. As of 1996, 110 municipalities had sewer connection bans lifted. Many of the remaining 62 bans are for small facilities such as schools or shopping malls. There are few long term bans that are effective throughout a town still imposed.

5.4.8. Improved Industrial Discharge Regulation Process Implemented

Currently, NJDEP’s Division of Water Quality issues Discharge to Surface Water (DSW) permits to all facilities requiring these permits every five years. Upon renewal, improvements may be made to permit limitations. Therefore, timely issuance of permits is an important component of continued water quality improvements.

The rate of issuance for these permits has increased significantly in the past three years, primarily due to the imposition of technologically achievable permit limitations for industrial discharges. These permit limits address conventional and toxic pollutants, which have been established to be protective of receiving water quality. These limitations are an integral part of NJDEP's Technical Manual, which was completed in April 1993, and establishes predictable requirements for the regulated community. The previous requirement to conduct time-consuming and expensive stream studies has been eliminated. The use of technologically achievable and water quality protective permit limitations allows NJDEP to more expeditiously control the discharge of pollutants to the surface waters of the State through timely issuance of the permit actions.

5.4.9. Technical Assistance to Municipal Sewage Treatment Plants

The Manpower Development and Training program provides on-site technical assistance and training at small (generally less than 1 MGD) municipal sewage treatment plants that are unable to achieve discharge limits. Although assistance can be offered at all levels, the program's intent is to provide suggestions for low cost modifications and/or operational changes to achieve permit limits. Through the use of a 70% Federal matching grant (in the range of $15,000 to $20,000), the program can provide in-depth technical assistance and general consultation. Between 1992 and 1995 assistance was provided to 53 facilities. Assistance is often provided to small communities on a one-to-one basis in a non-adversarial manner which enhances the positive aspects of NJDEP's presence.

5.4.10. NJPDES Permit Compliance Improved

Compliance rates with permit discharge limitations and reporting requirements has significantly improved over the past few years. These improvements reflect NJDEP's continuing efforts to assist permittees with permit and reporting requirements during compliance evaluation inspections, development of a Discharge Monitoring Report instruction manual and conducting seminars to explain permit and Water Pollution Control Act (WPCA) requirements. From calendar year 1992 to 1995 the number of confirmed discharge limitation violations for which an enforcement action was issued decreased by 53% and the number of reporting violations decreased by 72%. The number of serious violations, as defined by the WPCA, also dropped by 54%. The number of significant non-compliers identified in 1995 was 38, which is greatly reduced from the 81 facilities cited in 1992. Permit compliance is reported as a response indicator. Currently, data to document the environmental gains due to increased permit compliance have not been collected.

5.5. Reductions in Nonpoint Source Loadings

5.5.1. Stormwater Runoff Standards Adopted for New Development

Amendments to the CAFRA and Flood Plain Management Rules have been adopted, establishing runoff control requirements intended to address water quality, flooding and erosion impacts. The water quality requirement establishes a goal of removal of 80% of the total suspended solids load in the stormwater emanating from new development. The erosion and flood control standards provide incentives for watershed management and, in an effort to control downstream flooding and erosion, reduce the allowable peak runoff rate to a level below the predevelopment rate. The flood and erosion control standard will be implemented by all municipalities under the authority of the adopted Site Improvement Standards for Stormwater Runoff Control. The water quality standard will also be required to be implemented by all municipalities when draft Stormwater Management Rules are proposed and adopted.

A public notice of opportunity to comment on the draft Stormwater Management Rules was published in the March 3, 1997 New Jersey Register. After comments have been incorporated, NJDEP plans to publish a formal proposal and readopt the existing Stormwater Management Rules (N.J.A.C. 7:8) with significant substantive and technical changes. These changes are intended to consolidate NJDEP stormwater runoff standards in the existing rules for Stream Encroachment, Coastal Zone Management, and Stormwater Management. Under the proposed changes, watershed stormwater management plans would be completed by local and regional agencies on a voluntary basis and adopted by NJDEP as amendments to areawide water quality management plans. The stormwater runoff standards in these plans will be the governing standards. In addition, NJDEP intends to make grants available from the 1989 Stormwater and CSO Bond Fund to counties and groups of municipalities to complete the voluntary watershed planning process.

5.5.2. Stormwater and Nonpoint Source Pollution Best Management Practices

NJDEP has published a Stormwater and Nonpoint Source Pollution Best Management Practices Manual which provides guidance on how to reduce nonpoint source pollution to meet regulatory requirements. Water quality improvements in the Navesink River due to implementation of BMPs have been described previously. BMPs will also be implemented in the Great Swamp basin to mitigate impacts from stormwater runoff as established in the Wastewater Management Plan adopted by Chatham Township. However, in many cases, data are not available to quantify the specific benefits of BMP implementation and stormwater management.

5.5.3. Stormwater/NPS Management in the Great Swamp Watershed

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 volume 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. The effectiveness of nonpoint source controls will be evaluated in the watershed.

5.5.4. Stormwater/NPS Management Project Financing Available

Funding of wastewater projects has historically been eligible under the Wastewater Treatment Financing Program. Under the FY97 Priority System, the NJDEP and the New Jersey Wastewater Treatment Trust expanded the financing program to include stormwater/NPS management projects as well, and a minimum of $10 million has been allocated to be available for such projects. A wide variety of stormwater and NPS management projects are eligible for funding including: rehabilitation of existing stormwater facilities, purchase of stormwater management system maintenance equipment, replacement of storm drains, purchase or replacement equipment to reduce floatables (e.g., street sweepers, leaf removal equipment, netting on CSO outfalls and skimmer boats), rehabilitation of tide gates or pump stations, extension of outfall points, construction of salt domes, feedlot manure management systems, and streambank stabilization/restoration projects.

As stated above, construction of new or expanded stormwater management systems or facilities are eligible under the financing for this program. However, such systems have the potential to significantly affect the hydrology of an area. To ensure that the proposed stormwater management system cost-effectively addresses the water quality needs of the area without exacerbating water quality or hydrology problems downstream of the proposed project, the Priority System specifies that regional planning must be completed prior to the award of financing.

Financing is being sought for several stormwater and nonpoint source management projects in FY97. It is anticipated that the availability of low interest financing will provide many more municipalities with an important incentive to address stormwater management needs. The availability of low interest financing for both point and nonpoint source management projects and the availability of additional ranking points for projects that are consistent with approved watershed plans, will promote implementation of watershed management projects.

5.6. Watershed Management Strategy Development

NJDEP has drafted a watershed management framework document entitled the “Framework for Statewide Watershed Management”, as per the FY96 NEPPS Performance Partnership Agreement. This document has been provided to EPA after internal review at NJDEP. The Framework document will subsequently undergo an extensive public participation process and NJDEP will adopt the final watershed management strategy by FY98. NJDEP established a Watershed Steering Committee to address policy issues and a technical Watershed Characterization and Assessment Team to guide the assessment aspects of the Framework document.

The Watershed Management Framework includes regulatory and non-regulatory approaches to address activities occurring within the watershed that impact or may impact water resources on a regional, rather than site-specific basis. The framework document includes a recommendation to group New Jersey's 96 hydrologic watersheds into 20 watershed management areas and to group watershed management areas into five water regions. Watershed maps, guidance for watershed characterization, setting goals, developing and implementing regulatory and non-regulatory management strategies and evaluating the effectiveness of those management strategies are included in this Framework Document. An implementation schedule is also included. Watershed management will be implemented in New Jersey by coordinating existing NJDEP programs and will include stakeholder involvement in watershed management activities. A draft budget for watershed management implementation is under consideration by senior managers at NJDEP.

A five year pilot project in the Whippany watershed represents NJDEP's first attempt to fully integrate and coordinate many aspects of water resources management into one watershed management project. Through this pilot project, NJDEP intends to develop a comprehensive watershed management process that will guide activities in other watersheds. The Whippany Project is a collaborative effort between NJDEP and the Whippany Watershed Partnership, a 75 member public advisory group representing the regulated community; businesses, environmental and civic groups; residents; Federal, State, regional, county and local government; and academics.

The Whippany Project is in its third of five years and with the assistance of a public advisory group and four working committees, has produced a watershed characterization report; a project strategy and workplan; a preliminary water quality and sediment study; a technical workplan for in-stream and nonpoint source monitoring and modeling; and a series of public outreach events. A watershed assessment including a definition of critical issues and elements for the watershed management plan, a steady-state model and TMDLs for the Whippany River, and a watershed model (including stormwater contributions from specific land uses) will be produced.

Ultimately, the Whippany Project will result in the adoption of a Whippany Watershed Management Plan that identifies and prioritizes the water resource problems within the watershed and strategies to address priority issues. The plan is expected to 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, ground water 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.

NJDEP has begun implementing watershed activities in four high priority areas identified by Commissioner Shinn. These regions include the three National Estuary Programs (Barnegat Bay, NJ/NY Harbor and Delaware Estuary) and the Passaic River Region, which includes the Whippany

Watershed. A scope of work is currently being developed to expand watershed management planning into the Passaic Region.

5.7. Regulatory Reforms

5.7.1. Watershed Based Permitting

The Division of Water Quality completed a comprehensive review of the NJPDES rules (N.J.A.C. 7:14A), policies and procedures. A rule proposal, that included changes to the NJPDES program, was published in the February 5, 1996 New Jersey Register. The new NJPDES rule is intended to provide a watershed based approach to water resource management, including permitting, to better address regional problems and opportunities.

The watershed 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 water quality models. NJDEP will then be able allocate assimilative capacity to all pollution sources in the watershed, facilitating development of 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 a cooperative effort with interested parties, including EPA, the New Jersey Harbor Dischargers group and DRBC, as appropriate. In addition, the allocation process will facilitate the implementation of Best Management Practices (BMPs) for stormwater and nonpoint sources of pollution.

In order to receive widespread public input on the plans for shifting the NJPDES permitting process toward a watershed based program, NJDEP published several informational documents in the New Jersey Register. An interested party review document was published in February 1993 and a summary of the anticipated rule was published in October 1994. After consideration of the public input received, NJDEP published the NJPDES rule revision proposal in the New Jersey Register on February 5, 1996. This was followed by a number of public hearings and meetings to obtain comments on the proposal. NJDEP also worked with a stakeholders group that included representatives of business, industry, sewage authorities, developers, water purveyors and environmental groups to address their comments on major provisions of the proposed rules. NJDEP has addressed the comments received on the rule proposal and filed for its adoption in February 1997. Publication of the final rule in the New Jersey Register occurred on May 5, 1997. Several proposed provisions were not adopted because additional discussion with interested parties was deemed necessary. NJDEP is continuing to evaluate these provisions.

5.7.2. Increased Permit Outputs

The new rules propose implementation of 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; increasing the use of general permits and permits by rule; and using the watershed approach to issue permits for all discharges to a watershed simultaneously.

5.7.3. Other Regulatory Reforms

Industrial pretreatment rules

The Bureau of Pretreatment and Residuals (BPR) proposed amendments to the "Pretreatment Program Requirements for Local Agencies", which were included in the NJPDES rules proposed in the February 5, 1996 New Jersey Register. The proposed rules, which were completed with the assistance from the New Jersey Pretreatment Task Force, incorporate the pretreatment program requirements currently specified under the Federal General Pretreatment Regulations at 40 CFR Part 503; the New Jersey Water Pollution Control Act; and other applicable regulations, statutes, and current policy requirements. BPR has also proposed Significant Indirect User (SIU) rules which were included within the February 5, 1996 NJPDES rule proposal. These rules establish the NJDEP's role and the indirect user's responsibility in ensuring protection of the local agency's treatment works and receiving water quality. This rule will promote efficient operation of the treatment works, protect the local agency's workers' health and safety, and promote beneficial use of the biosolids generated at the treatment plant. NJDEP filed for adoption of the proposed rule in February 1997. Publication of the final rule in the New Jersey Register occurred May 5, 1997.

Sludge rules

Changes have been proposed to the NJPDES rules to adopt Federal standards for the use or disposal of sewage sludge (40 CFR Part 503). These changes support NJDEP's policy encouraging beneficial use of sludge, which will reduce dependence on chemical fertilizers, among other benefits.

As a companion to the sludge rules, NJDEP will also be updating the Statewide Sludge Management Plan (SSMP) for consistency with Federal requirements. Since its initial adoption in 1987, the SSMP has served as a blueprint for management of the sewage sludge and other non-hazardous materials. The SSMP establishes the standards, criteria and objectives by which sewage sludge management plans are evaluated, and also sets forth the permitting requirements for sewage sludge management alternatives. The proposed update to the Statewide Sludge Management Plan will set forth the dates for submittal of District Sludge and Septage Management Plans as required by the Solid Waste Management Act (N.J.S.A. 13:1E-1 et. seq.). NJDEP is also preparing amendments to the Sludge Quality Assurance Regulations to simplify and standardize sludge quality reporting, analysis, and quality control procedures for all sludge generators.

BPR has received 104(b)3 grant monies to resolve the complexities of the many different statutes and regulations which affect residuals management, including reconciling the differences between the existing State program and the new Federal rules at 40 CFR Part 503. Revised rules under the New Jersey Pollutant Discharge Elimination System (NJPDES), N.J.A.C. 7:14A, were proposed on February 5, 1996. NJDEP filed for adoption of the proposed rule in February 1997. Publication of the final rule in the New Jersey Register occurred on May 5, 1997. Additionally, grant funds were requested to revise the Sludge Quality Assurance Regulations at N.J.A.C. 7:14-4, to implement the revised NJPDES rules, to update the Statewide Sludge Management Plan, and to initiate discussions with the EPA on sludge program delegation.

Stormwater permitting regulations

Amendments to the NJPDES rules are proposed as part of the Statewide Stormwater Permitting Program. Amendments are proposed to two NJPDES-Discharge to Surface Water (DSW) general permits: industrial stormwater discharges and 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.

5.8. Control of Aquatic Pesticide Use

The Pesticide Control Program has been successful in tracking pesticide use in the aquatic environment. Through the Pesticide Control Program's review, permitting, inspecting and monitoring efforts, the Aquatic Pesticide Permits and the Mosquito/Fly Control Permit Programs have reduced adverse ecological impacts to the aquatic environment by ensuring legal/proper use of aquatic pesticides.

6. Program Limitations

NJDEP's regulatory programs (i.e., standards, permitting and enforcement), financing programs and most planning functions are conducted on a statewide basis. Monitoring programs focus on a particular type of resource (i.e., separate monitoring networks for streams, lakes, bays, etc.). The following assessment of program limitations addresses the full scope of each program.

6.1. Limitations of Surface Water Quality Standards

6.1.1. Limitations of Classification System Protecting Aquatic Life

The existing freshwater 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 and as a measure of the quality of the water. However, the trout water classification system is biased toward cold water fisheries. Recognition of high quality warm water fisheries is currently not considered. In addition, trout are not always the most sensitive organisms to the spectrum of known water pollutants. The main determining factors in the suitability of a waterway to support trout are habitat, dissolved oxygen levels, total suspended solids, ammonia 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. A water quality classification system (in contrast to the current designated use classification system) may be needed in addition to a use classification system. However, extensive water quality monitoring data would be needed to develop this type of system.

6.1.2. Lack of Sediment Standards

Finfish contamination with PCBs, dioxin and mercury has been documented in New Jersey. Finfish tissue often becomes contaminated through bioaccumulation and biomagnification. Since fish are mobile, exposure to toxics may occur within or outside of New Jersey's waters. Sediment contamination is suspected to be the pollutant source/sink. In the future, sediment standards may provide an approach to ensuring that current regulatory measures prevent additional contamination of sediments. 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.

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 complicated by sediment transport: contamination in some areas reflects contaminant loadings from both within and outside the borders of the State.

6.2. Watershed Management Implementation Needed

Implementation of watershed management is needed to enable NJDEP to address water resources issues, including maintaining high quality waters, enhancing impaired waters, and addressing data gaps in a coordinated, proactive manner. NJDEP is developing a comprehensive watershed management strategy to accomplish this objective. Draft maps of watershed management area boundaries have been developed, a framework document that includes an implementation schedule and budget are under development. Currently, permitting functions are being organized on a watershed basis and an ongoing pilot project is being conducted to develop expertise in watershed planning and management. However, implementation of regulatory reforms, additional monitoring, assessment and internal and stakeholder coordination efforts are needed to facilitate a resource-based approach to watershed management.

Watershed management poses a host of new challenges to NJDEP staff, including development of new methods for assessing and resolving nonpoint source pollution and stormwater runoff, watershed modeling, data assessment and management, and strategy development on a statewide or regional basis. Accessibility to training and scientific literature are important to ensure the successful implementation of watershed management. Limitations of the existing water resources management programs that will be enhanced through a coordinated watershed management approach are described below.

6.2.1. Need to Evaluate Suspected Water Quality Impairments

Waters that are impaired or suspected of impairment by toxics have been identified as shown on Tables FW-6, FW-7 and FW-8 (NJDEP, 1995a). These waters are a subset of those that have been listed on the Water Quality Impaired Waterbodies List (303(d) list) because of potential exceedences of water quality criteria and/or impairment of designated uses. This list has been developed over several years using numerous sources of information including historical point source loadings of toxics, site-specific studies, fish tissue data, exceedences of SWQS as identified via the Ambient Stream Monitoring Network and severe and moderate impairments as identified via benthic macroinvertebrate data. Some of the data used to develop this list may be outdated and, particularly with respect to metals, may be of questionable reliability.

Currently, the Whippany River is included on the 303(d) list. However, based on recent monitoring data conducted as part of the Whippany Watershed Pilot Project, NJDEP determined that the Whippany River is not impaired for metals. Through watershed management, NJDEP needs to evaluate current water quality in the listed waters to evaluate the need for water quality-based effluent limitations (WQBELs). Additionally, a process for using current data to remove waterbodies that are not impaired from the 303(d) needs to be agreed upon with EPA.

6.2.2. Need to Determine Causes of SWQS Exceedences

Evaluation of ambient water quality data has indicated widespread exceedences of fecal coliform and phosphorus, and localized or sporadic exceedences of pH, suspended sediment, lead and mercury. In addition, increasing concentrations of nitrate and chloride may need to be addressed. These pollutants may arise from both point and nonpoint sources of pollution; the specific sources and management measures needed to address these problems have not yet been identified. Point and NPS management needs are discussed below.

6.3. Improvements Needed to Manage Point Sources

6.3.1. Implementation of Watershed Based Permitting

NJDEP has issued permits with water quality-based effluent limitations (WQBELs) for conventional parameters for most municipal permits where WQBELs are needed. Most municipal facilities' permits contain whole effluent toxicity limitations (i.e., requiring bioassay testing of the effluent) rather than establishing limits for specific toxics. Only those municipal systems that have received delegated pretreatment authority (which, as a group, treat the majority of the industrial wastewater discharged in the State) include chemical-specific toxic limits in their NJPDES permits. Industrial facilities are typically regulated using technology-based limits for toxics. Both industrial and municipal permits are issued on a site-specific basis for toxics, so existing permit limitations for toxics do not address multiple discharge interactions. It is anticipated that municipal and industrial discharge monitoring requirements may be modified in the future to promote implementation of watershed management in the State in a cost effective manner.

6.3.2. Unmet Wastewater Facility Needs

Despite the significant accomplishments of the State's Construction Grants, SRF and State-only financing programs, the 1992 National Wastewater Needs Survey indicated that $4.75 billion in wastewater treatment improvements are still needed in New Jersey. A major component is projects to address combined sewer overflows, which are very costly.

In addition, sewage facilities are not being replaced/upgraded as needed, particularly in urban areas with marginally effective sewage infrastructure systems that are approaching or exceeding their maximum useful life. Millions of dollars are spent transporting and treating extraneous flows which enter these systems, in many cases substantially contributing to CSO discharges, rather than eliminating these flows through sewer upgrades. Through watershed management, appropriate watershed-specific decisions with respect to infrastructure improvement priorities can be made to achieve cost effective environmental benefits.

6.4. Improved Management of NPS and Stormwater Needed

Due to extensive existing and new development, nonpoint sources of pollution are suspected to be a significant source of fecal coliform and suspended solids and a component of in-stream loads of nitrates, phosphorus, chloride, metals, oxygen-demanding pollutants, petroleum hydrocarbons and pesticides. Currently, stormwater runoff is largely controlled on a site-specific basis using generic statewide standards. Very little data exist to quantify the extent of implementation and the effectiveness of BMPs used to control nonpoint sources, or to identify sources of NPS/stormwater pollutant loads and their impacts to water bodies. In addition, the problems of flooding and contamination of stormwater and runoff caused by urbanization have not been resolved. The integration of nonpoint source and stormwater issues into watershed management will facilitate appropriate data gathering and more effective control of these pollution sources.

Multi-agency efforts to control NPS and stormwater runoff are coordinated within NJDEP and other State agencies: NJDEP (Stormwater Permitting, Land Use Regulation, and Environmental Planning); Department of Agriculture (soil erosion and sediment control program); Department of

Community Affairs (Site Improvement Standards); and Department of Transportation (highway and road drainage and erosion control). These efforts should continue and could be expanded to include BMPs for Department of Transportation highway projects, and should be integrated with the Standards for Soil Erosion and Sediment Control to remove inconsistencies between erosion, flooding and water quality regulation.

An additional issue that needs to be addressed is the lack of clear implementation and enforcement mechanisms for nonpoint source/stormwater runoff controls. NJDEP intends to propose stormwater management rules to establish criteria for the development and adoption of watershed-based stormwater management plans. NJDEP is considering the use of monies from the Stormwater/CSO Bond Fund, as well as loans through the Municipal Wastewater Assistance Program, as incentives for local agencies to develop and adopt these plans and to implement voluntary stormwater controls. However, voluntary controls and incentives may not be sufficient in critical areas. Municipal stormwater permits are being explored as an implementation mechanism, particularly in urban areas.

Additional work is needed to develop indicators to evaluate the environmental effectiveness of industrial stormwater permitting and NPS management programs, including assessment of the effectiveness of implementation of various BMPs. NJDEP has applied for Federal funding to develop environmental indicators for industrial stormwater and NPS management and is involved in national stormwater indicator development via EPA.

6.5. Comprehensive Assessment of Water Resources Needed

Data assessment is the process of turning raw data into information upon which decisions can be based. Assessment requires analysis of data (i.e., statistics) and interpretation of the analyzed data (e.g., confounding factors). Historical emphasis on site-specific management and reporting activity measures did not emphasize data assessment. Improvements in some monitoring network designs, coordination of monitoring activities and results within NJDEP and with stakeholders is needed to provide a sound technical basis for water resources assessments. Recent advances in geographic data systems will facilitate spatial analysis of data, but improvements in data accuracy are still needed. Staff development opportunities, particularly in statistics and spatial analysis, are needed to facilitate cost-effective in-house data assessment.

To fully implement watershed management, comprehensive water assessments that include relating data on the specific sources and loads to ambient conditions and evaluations of the effectiveness of management measures. Identifying and quantifying these relationships is an integral component of watershed management and the "*cause-condition-response*" indicator model used in NEPPS. Clearly, the development and implementation of watershed management plans, watershed base permits that include NPS load allocations, development of indicators, and the ability to make decisions based on science require appropriate, adequate data that has been assessed.

Limitations related to data collection and assessment are discussed below. NJDEP anticipates that implementation of NEPPS and watershed management will greatly improve data assessments in the near future.

6.5.1. Limitations of Current Ambient Data and Data Assessments

NJDEP and USGS are redesigning the Ambient Stream Monitoring Network and will consider the limitations to the current design that are described below. Statistically-based monitoring designs that cost-effectively address as many of these limitations as possible will be evaluated. The revised network design will provide data to support watershed management, designated use assessments, status relative to SWQS and trends assessments.

The chemical/microbiological monitoring network assesses water quality in approximately 8.1% of stream miles, primarily in downstream ends of watersheds. Because of the biased, non-random monitoring design, the results cannot be generalized to the rest of the State, which hampers development of scientifically credible indicators. The extent of chemical/microbiological monitoring conducted in high quality stream reaches is very limited (FW-1 waters are not monitored) and tidal stream reaches are not monitored. Water quality data are needed to confirm suspected impairments for waters on the Impaired Waterbodies List (303d list) and to evaluate the quality of drinking water supplies.

Dissolved oxygen is essential for aquatic biota. Dissolved oxygen monitoring data are collected during the diurnal DO peak, potentially underestimating exceedences of the DO criteria. Diurnal DO data are needed to improve accuracy of DO exceedence data. There are numerous contaminants (primarily organics) for which numerical criteria are included in SWQS that are not regularly 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.

National studies have indicated widespread metals contamination in ambient stream monitoring data, bringing the reliability of existing data into question. In response, NJDEP is implementing clean-methods sampling techniques for metals. However, these methods are significantly more expensive that traditional monitoring techniques. The costs and benefits of improved data accuracy need to be considered.

Water quality data from other sources, such as the Site Remediation Program, DWQ site-specific studies, intensive surveys, county and local health agencies and stakeholders need to be compiled and assessed. In some cases, data may not be computerized, limiting utility. For example, ambient data collected by the Site Remediation Program and responsible parties are not computerized. Through watershed management, data from other sources can be evaluated and incorporated as appropriate into watershed based assessments.

Continued research by NJDEP and other agencies on pathogens such as *Cryptosporidium* and

Giardia in drinking water supplies is needed to protect human health, especially immunocompromised individuals. Alternate indicators of pathogenic contamination are needed to address the limitations of fecal coliform. National and NJDEP research is being conducted to identify appropriate alternate indicators.

Sediments are currently monitored for banned pesticides and organics which are important to understanding bioaccumulation in aquatic life. However, numerous pesticides, including those currently used to control algae, mosquitoes and flies, and other chemicals that are in use today are not routinely monitored in the network. Sediment criteria are needed to facilitate evaluation of concentration data.

Data on freshwater fisheries and threatened and endangered species, linked as appropriate to benthic macroinvertebrate data, are needed to evaluate the health of aquatic ecosystems. To protect human and ecological health, additional data are needed on the concentrations and effects of contaminants in biota and fish consumption patterns. Trophic transfer, bioaccumulation, bioconcentration, and biomagnification of toxics in freshwater systems are not well understood. Because of the nature of the protocol, benthic macroinvertebrate monitoring focuses on headwaters (i.e., first order streams), second and third order streams (i.e., with first and second order streams as tributaries). Benthic macroinvertebrate data are not available for mainstreams and tidal waters.

Trend assessments are essential to evaluate the environmental effectiveness of management measures and identify emerging issues. Currently, statistical analysis of trends has not been completed for all parameters in the Ambient Stream Monitoring Network and monitoring frequency is insufficient to quantify trends for metals in water and all parameters in sediment.

6.5.2. Limitations of Causal Data Collection and Assessments

NJDEP has just begun developing point source loadings data into indicators. Previously, these data were collected to monitor each point source. Modifications to PCS and improved GIS locations are needed to accurately place each discharge in the appropriate watershed management area. Development of statewide or watershed loadings indicators is limited because point sources may not be regulated for the same set of parameters. In addition, permit compliance monitoring by NJDEP is currently conducted using grab samples rather than the composite methods typically required in the permits. Coordinated monitoring of point sources and ambient water quality through watershed management is expected to address this data gap.

Data to characterize municipal stormwater in terms of frequency, magnitude, duration and parameter profiles are not readily available. Data on the loads of contaminants from industrial stormwater, contaminated ground water, runoff from contaminated sites, landfills, construction sites, agriculture, resource extraction, developed land, and air deposition are not available. (Ground water can provide 50% to 90% of baseflow to streams. Therefore surficial ground water quality can significantly affect water quality.) These data are needed in impaired waterbodies to develop appropriate watershed-based permit limits that incorporate nonpoint source loads. Watershed based monitoring and modeling is expected to provide information to address this data gap.

Data to characterize the extent of habitat alterations and the effects of these alterations on the benthic community are not readily available. Habitat alterations include wetlands losses, riparian corridor disturbance, channelization, erosion, and flooding associated with human land use as well reduced flows, flow fluctuations and flooding due to water supply activities. These data are needed to understand the relationship between habitat and water quality and to select appropriate management measures in waters that have been identified as severely and moderately impaired on the Impaired Waterbodies List (303d List).

6.5.2. Limitations of Response Data Collection and Assessments

Currently, data are not available to quantify the environmental and cost effectiveness of industrial stormwater pollution prevention plans, and municipal stormwater and nonpoint source Best Management Practices. These data are needed to support implementation of appropriate BMPs, other NPS management measures and point and nonpoint source pollution trading through watershed management plans.

Data assessments are needed to evaluate the environmental effectiveness of the current suite of water quality management tools. Links between ambient conditions, the causes of those conditions and the influences on ambient conditions through management actions are needed to cost-effectively implement appropriate management measures. These links will be explored through the development of indicators for NEPPS and the implementation of watershed management.

6.6. 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 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 approved watershed management plans.

6.7. Industrial Pretreatment Program Changes Would Improve Efficiencies

6.7.1. Regulatory Modifications are Needed under Federal IPP

Under the current Federal General Pretreatment regulations, substantial program modification, as defined under 40 CFR Part 403.18(c), requires review and approval by the NJDEP, as well as a public notice of the "substantial" change being proposed. However, some modifications meeting the "substantial" criteria do not significantly alter IPP implementation and/or enforcement, yet still must be acted on following the review/approval/public notice procedures. Many such activities draw very little, if any, public comment during the proposal process, and draw program resources away from other activities. States or DLA's should have more discretion to determine "substantial" changes and thereby be better able to allocate resources.

6.7.2. Increased Flexibility Should be Allowed for Deminimus Categorical Flows

The Industrial Pretreatment Program's delegation agreement requires that the NJDEP, as well as all delegated local agencies (DLAs), issue discharge permits to those facilities which meet the significant industrial user (SIU) definition under 40 CFR Part 403.3(t). Under the SIU definition, any facility which is subject to a Federal categorical standard under 40 CFR Chapter I, Subchapter N, must have a permit to discharge process wastewater to the sanitary sewer. As such, the NJDEP and all DLAs are required to issue a permit to such facilities, regardless of the volume of the process wastewater flow. Some of these facilities have very low flow (e.g., less than 1,000 gallons per day). The permit process, regardless of facility flow, requires significant resources to develop, draft, and finalize. Permits issued to these low-flow facilities often do not result in significant environmental improvements. Limited resources would be more appropriately utilized for projects and/or permits where the potential for environmental improvements and/or protection would be more significant. Exemption from the permit requirements for categorical facilities with deminimus process wastewater flow should be allowed.

6.8. Pending Institution of Sewer Bans may Spur Development

In view of the severe economic and social impacts following the imposition of a sewer connection ban, it is imposed only after a lengthy analysis of non-compliance of the subject facility to ensure that the ban imposition can be justified. During this analysis period, continued connections to the plant are permitted and the cumulative effect of the additional pollutant loadings contribute further to the degradation of the receiving water quality. At times, if a facility owner becomes aware that a ban may be pending, numerous new development projects may be rushed through so as to gain approval before a ban action is taken.

6.9. Integrated Pest Management/BMPs Needed

The Aquatic Pesticide Permit and Mosquito/Fly Control Permit Programs do not incorporate an Integrated Pest Management system or best management practices that are specifically developed for the various aquatic environments. In addition, aquatic pesticide applicator training and outreach activities should be expanded.

7. EPA Roles and Responsibilities

In order to achieve the water quality goals and milestones that are set forth in the NEPPS Agreement, the State and EPA must fully participate as partners. It is expected that the reduced reporting and oversight will allow both agencies to allocate more resources to water quality improvements. NJDEP and EPA Region 2 identified 18 specific areas of assistance in the FY96 PPA. The following provides a description of EPA progress toward the completion of each item.

1. Upgrade PCS: EPA needs to finalize their signature policy to authorize electronic submissions of discharge monitoring reports. EPA Region 2 will advocate this approach at the national level. EPA will pursue needed enhancements to the PCS system to provide the capability to evaluate pollutant loadings, especially the loadings prior to and subsequent to a treatment facility upgrade or other corrective measures.

EPA Progress: EPA will continue to pursue resolution of the Electronic Signature Policy to address concerns raised by the Department of Justice. The DMR Receipt Date (DMRR) enhancement has been completed and the Reportable Non-Compliance (RNC) software problems have been resolved. EPA has also completed testing and implementation of the Effluent Data Statistics (EDS)/Effluent Loadings software/upgrade to PCS in anticipation of the National Watershed Assessment Project (NWAP) initiative. Following initial testing, certain data inconsistencies have been identified which need to be resolved.

2. Develop sediment criteria/guidance: NJDEP's ability to interpret sediment concentration data, and regulate as needed to prevent additional contamination is hindered by the lack of sediment criteria. As part of this Agreement, NJDEP will assess causes of aquatic life and fish consumption designated use impairment using a sediment quality indicator. Currently, sediment quality criteria do not exist (although EPA has developed some draft criteria). EPA Region 2 should support this national effort and provide timely information to NJDEP on this issue.

EPA Progress: This is a long term commitment by the Region to support the development of sediment criteria on a national level. The Region is committed to supporting the long term national sediment criteria development effort. The criteria, however, will be developed by EPA's Office of Research and Development and Headquarters. Region 2 has, and will continue to support at every opportunity, the development of National sediment criteria.

3. Underground Injection Control: EPA will negotiate a new UIC delegation agreement and provide, to the greatest practicable extent, supplemental funding to support county-based surveys of Class V wells, with enforcement and remedial actions as appropriate based on recent correspondence (September 21, 1995) from Commission Shinn to Regional Administrator Fox.

EPA Progress: UIC negotiations are ongoing between EPA and NJDEP. A new delegation agreement should be completed during 1997. EPA and NJDEP are also discussing using CWA section

604(b) pass through funds to support county based surveys of Class V wells.

4. Screening Section 303(d) Listed Water Bodies: Many 303(d)-listed waters are believed to be affected by heavy metals, but national recognition of sampling and laboratory contamination issues make the existing ambient data suspect. EPA will provide ambient monitoring support, working with the NJDEP Water Monitoring Bureau, to sample priority water bodies during low flow periods and assess the actual levels of heavy metals. Given experiences in the Whippany River and NY/NJ Harbor, some of the metals may be de-listed based on new data using clean methods.

EPA Progress: EPA has provided support for monitoring in the Whippany River and in the NY/NJ Harbor. EPA has also reviewed metals monitoring data, (for the New Jersey waters of the NY/NJ Harbor) provided by the New Jersey Harbor Dischargers Group. These data indicated that copper and lead were not water quality limiting; that mercury was water quality limiting in all waters, and that nickel was water quality limiting in the Hackensack and Passaic Rivers. As a result of this data evaluation, EPA is in the process of revising the copper TMDLs and is working with the New Jersey Harbor Dischargers Group towards the development of Phase II TMDLs for nickel. As NJDEP initiates other high priority TMDL monitoring efforts, EPA will provide technical and monitoring support for metal related issues in New Jersey waters.

5. Passaic River Watershed Project: EPA and NJDEP will agree on a level of EPA staff involvement in a Passaic River Basin watershed management project that addresses Harbor contamination issues (e.g., nutrients and sediment), impacts on in stream existing and designated uses (e.g., aquatic life, water supply) and other priority issues. NJDEP is seeking a level of EPA involvement similar to its resource commitments to the Catskill water supply system of New York City, the Lake Champlain project, the Long Island groundwater management initiative and the Niagara Frontier initiative, all of which are in New York State.

EPA Progress: EPA will work with NJDEP on the Passaic River Watershed Project; an EPA coordinator needs to be identified.

6. Non-Tidal Components of National Estuary Program Implementation: EPA will explore, with NJDEP, the involvement of EPA staff in support of implementation efforts for Comprehensive Conservation and Management Plan (CCMP) action steps that affect non-tidal waters. (Tidal water action steps are included in the FY97/98 PPA).

EPA Progress: The NY-NJ Harbor Estuary Program (HEP) and Delaware Estuary Program (DELEP) Comprehensive Conservation and Management Plans (CCMPs) include many EPA commitments, but most are in tidal waters outside the scope of the PPA. Within freshwater watersheds of these Estuary Programs, the most significant EPA commitments are (1) to support watershed management programs in the Whippany River, Barnegat Bay, and Navesink River watersheds; (2) within the Whippany River watershed, EPA provided $150,000 to support development of a sediment control pilot project; EPA will support implementation of sediment control projects, as appropriate, based on the results of this pilot effort.

7. Continue research on alternate pathogenic indicators: There is a need for a better or "alternative indicator" of the human health risk posed by fecal pollution of environmental waters. Because this need is common to all states, it is or should be the responsibility of the federal government to conduct the research or provide the necessary funding to identify an alternative indicator. EPA studies in the 1970's began this process and resulted in guidance recommending the use of enterococci bacteria over total or fecal coliform bacteria for fresh and marine bathing waters in 1986. Enterococci were superior to coliform bacteria in predicting the presence of human gastrointestinal pathogens in environmental bathing waters. However, enterococci are also limited in that they may not reliably predict the presence of some types of microbial pathogens (*e.g.*, parasites) and the numerical limit used to denote safe bathing water is not based on sound science. In addition, only bathing waters were studied. Shellfish harvest waters were not examined.

EPA Progress: This is a long term commitment by the Region to support the development of an alternative indicator species for pathogens on a national level. The Region is committed to supporting this long term national effort.

8. Monitoring Data Needs: The FY96 NEPPS Self-Assessment document for freshwater watersheds articulated numerous limitations of the current ambient monitoring data collection system. (NJDEP, August, 1995). EPA will work cooperatively with NJDEP to explore specific areas of assistance to address these data gaps.

EPA Progress: EPA and NJDEP have met and discussed changes to the ambient monitoring network. NJDEP proposed to reduce the number of fixed-stations used for long term trend monitoring. With the resources saved, NJDEP proposed to monitor water quality on a rotating watershed basis each year. The statistically-based redesigned network will attempt to address as many of the existing data limitations as possible with available funds. With the statistically-based sampling design, NJDEP will be able to make more informed management decisions in each watershed.

9. Improvements to Program Performance Measures: The Freshwater Watersheds work group identified significant issues with the draft Program Performance Measures requested by EPA. EPA and NJDEP will establish ongoing dialogue to improve these measures.

EPA Progress: EPA remains committed to work with NJDEP on improving the identified significant issues.

10. Nonpoint Source Management: EPA will continue to facilitate technical assistance in the State/Federal Interagency Coordinating Committee. EPA will also provide technical assistance to the State and/or sub-grantees in documenting BMP implementation, biological and chemical monitoring.

EPA Progress: EPA has been participating in the New York and New Jersey State/Federal Interagency Coordinating Committee meetings as indicated in the NEPPS Agreement. The States have further requested that EPA assist in NPS field activities in the priority watersheds that are identified in the NEPPS Self-Assessment. During the meetings, participants select the types of projects that will be conducted in the State and share information about NPS BMP implementation project effectiveness.

EPA has reviewed and provided assistance in the draft findings document for the State Coastal NPS Pollution Control Programs required under the Coastal Zone Act Reauthorization Amendments of 1990. EPA Region II has participated in workgroups with NOAA, EPA-HQ and the States. In addition, EPA has reviewed and approved the Section 319 program commitments as included in the FY97/98 PPA.

11. Permit Quality Review: Over the past few years EPA has de-emphasized its' reliance on the routine review of draft state permits as an oversight activity. Instead, EPA focus is shifting to a technical/program assistance role. As part of this shift, EPA intends to continue conducting periodic Permit Quality Reviews (PQR). The purpose of these reviews is to target programmatic and technical assistance. For development of the FY97/98 Agreement, NJDEP and EPA will re-evaluate the scope of these reviews.

EPA Progress: EPA has utilized the resources normally devoted to PQR in FY96 for review, coordination and comment upon the proposed NJPDES regulatory changes and to provide technical assistance to the State in the issuance of the NY/NJ Harbor permits. The regulations will form the basis for the NJPDES program/permits both in the Watershed Approach and in the interim pending watershed permitting. The PQR will resume in FY97. EPA also will explore establishing annual NPDES program meetings between EPA and NJDEP to enhance communication on program issues and projects.

12. SNAP Meetings: EPA and NJDEP have successfully used the Significant Non-compliance Action Plan (SNAP) process to discuss and coordinate NJPDES compliance and enforcement activities for many years. EPA and NJDEP will continue the SNAP process in accordance with existing agreements.

EPA Progress: The SNAP process has continued. The meetings, which focus on State enforcement actions, have fostered a high level of trust and cooperation between EPA and NJDEP.

13. Annual Enforcement Review: EPA will continue to conduct annual NJPDES enforcement reviews to provide technical/ program assistance. The review will be conducted in accordance with the principles included in this Agreement.

EPA Progress: The annual enforcement file review was conducted in Fall 1996.

14. **EPA Inspections:** EPA sampling and inspection resources have been applied in New Jersey in support of the State's compliance monitoring program. In the next two years, EPA will focus certain sampling and inspection resources on targeted geographic initiatives. EPA remains committed to these efforts.

EPA Progress: EPA continues to utilize inspection resources in support of both EPA and NJDEP geographically-targeted initiatives, such as the Whippany River watershed. EPA will provide the State with an opportunity to identify inspection support needs in FY97.

15. **PCS Meetings**: Quarterly PCS meetings have been held between EPA and NJDEP to facilitate proper coordination, planning and state assistance. These meetings will continue and will support the PCS related activities included in this Agreement.

EPA Progress: Quarterly meetings continue with the focus on Electronic Data Interchange implementation and sludge data.

16. **National Program Guidance**: EPA will continue to provide National Program Guidance as it is issued by EPA Headquarters.

EPA Progress: EPA will continue to provide copies of National Program Guidance documents when they are issued (e.g., policy on NPDES permit backlog levels and watershed permitting implementation; memo on whole effluent toxicity testing methodology; memo on oil & grease analytical methodology revision policy on effluent trading in watersheds; and various NPS information including the May 16, 1996 NPS grant guidance.)

17. **Interstate Issues:** EPA will act as the liaison whenever there are any interstate issues.

EPA Progress: EPA will continue to provide support. To date EPA has been working with NJDEP and the New Jersey Harbor Dischargers Group towards the settlement of Phase I TMDLs and the development of Phase II TMDLs for nickel. EPA is on the WQS & Modeling Workgroups for Delaware Bay and other interstate waters.

In an effort to address the dredged material problems in the Port of New York/New Jersey, EPA convened a dredged material management forum. The forum brought together a wide spectrum of groups, concerned with issues associated with the dredging and disposal of sediments, to seek cooperative and implementable solutions. Both NYSDEC and NJDEP are active participants in the forum. The forum is interacting with the U.S. Army Corps of Engineers to develop a management plan for dredged materials in NY/NJ Harbor and to identify responsible parties for implementing the plan. EPA is committed to continuing the forum.

In addition, on July 24, 1996, the Clinton Administration announced a plan to end dumping at the Mud Dump Site and to again begin dredging in the port. EPA is working with the U.S. Army Corps of Engineers and the States of New York and New Jersey to implement this plan.

18. Estuary Program: EPA will continue its active involvement in the NY-NJ Harbor Estuary Program, Delaware Estuary Program and the Barnegat Bay Estuary Program.

EPA Progress: EPA will continue its active participation in the NY/NJ Harbor Estuary Program (HEP), the Delaware Estuary Program (DELEP), and the Barnegat Bay Estuary Program (BEEP). The HEP Comprehensive Conservation and Management Plan (CCMP) was approved by the Governors of New Jersey and New York in February 1997. EPA has proposed the extension of both of these management conferences to oversee the implementation of the actions identified in their respective CCMPs. EPA will continue chairing the HEP Management Committee and will participate in the DELEP Coordinating Conferences.

EPA will also continue its participation in the BBEP. Along with NJDEP, EPA will chair alternate meetings of the Policy Committee, and participate in all Management Committee, Workgroup and Advisory Committee meetings. In conjunction with NJDEP and the BBEP Program Office, we will produce an action plan for Barnegat Bay in 1997 and a CCMP by 1999.

8. Indicators Progress Report

The following water resources goal statement was developed to reflect broad societal values for water resources:

> **Water Resources Goal:** Our waters will support human and ecological health and uses such as recreation, fishing, drinking water supply, agriculture and industry.

Four subgoals which address each of the designated uses of water, supported by milestones (with targets) and objectives (without targets) were developed. Progress toward milestones and objectives is measured using three types of indicators: *cause indicators*, which describe causes of pollution problems; *conditions indicators*, which describe current and/or historical ambient conditions; and *response indicators*, which describe societal responses to problems identified by cause and condition indicators.

Indicators were selected considering the following criteria:

- relates to environmental goal and subgoal;
- relates to milestone or objective;
- relates to environmental pressure, ambient conditions or effects, or societal response;
- readily available, technically sound data;
- collected on a regular basis;

- wide spatial distribution;
- sensitive to changes;
- for reporting trends, length of historical record
- availability of supporting data (e.g., population, meteorology)
- educational value

Additional data analysis and interpretation are needed to link the selected indicators spatially and temporally, allowing evaluation of sources and causes of water quality impairments. These assessments are essential to the successful integration of indicators into NJDEP policy and decision-making. Detailed data analysis will be conducted as part of the watershed characterization process. Since the Performance Partnership Agreement has been in place only since March 1996, it is not possible to assess progress toward milestones.

Subgoal: Protect and enhance aquatic life designated uses.

Milestone: By 2005, 50% of assessed river miles will support healthy sustainable biological communities. (Note: This milestone has been revised from: By 2005, 75% of assessed river miles will support healthy sustainable biological communities. This target was based on benthic macroinvertebrate data from three of five water regions. In these three regions, about 65% of monitored waters supported aquatic life designated uses. A target of 10% improvement over 10 years was set in the milestone. Recently, NJDEP completed benthic sampling in the remaining two regions. Statewide data show that 35% of the states monitored waters have healthy benthic communities, 52% have partially impaired benthic communities and 12% do not support benthic communities. Therefore, NJDEP is revisiting this milestone to develop a reasonable target based on statewide data and watershed management implementation.)

Cause Indicators

Municipal point source loads of BOD/CBOD: Municipal point source BOD/CBOD decreased from 160,000 kg/d to 75,000 kg/d between 1985 and 1990 as a result of the Federal mandate for secondary treatment in 1988. No significant changes to the overall BOD/CBOD loadings have occurred since 1990, although the number of residents in sewered areas has increased.

- *Point source levels of acute whole effluent toxicity*: Compliance with acute whole effluent toxicity limits has increased from 90% to 95% between 1990 and 1994. About 8% of 15 BGD (billion gallons per day) discharged are regulated. Data are not available to document reductions in levels of acute whole effluent toxicity prior to 1990.

- *Point source contributions of nutrients and suspended solids:* Nutrients for this indicator are ammonia and phosphorus. Ammonia was selected because decreases in instream concentrations are attributed to upgrades of sewage treatment plants. Phosphorus was selected because although declining, instream concentrations of phosphorus still exceed the criteria at most monitored locations. It was not possible to calculate total loads of ammonia, phosphorus and suspended solids on a statewide basis because these parameters are included in only a subset of permits. Data to capture the upgrades of sewage treatment plants in the 1980's were also not available.

Ammonia data were reported at 124 discharge points in both 1990 and 1994. Of these 124 facilities, 38 reported increases in loads, 53 reported decreases in loads, and 33 did not report sufficient data to calculate loads.

Phosphorus data were reported at 81 discharge points in both 1990 and 1994. Increased phosphorus loads were reported at five discharge points, decreases were reported at 17 points and 58 facilities did not report sufficient data to calculate loads.

- *In-stream temperature:* This indicator was selected as a surrogate for riparian vegetation removal. Water temperature is also affected by meteorology and thermal discharges. Although data have been assessed for trends in water temperature, the available data were not appropriate for an indicator of riparian vegetation removal. Therefore, water temperature is not reported as an indicator.

- *Land use status*: **place holder**

Conditions Indicators

- *Aquatic life designated use attainment:* Statewide, 35% of waters support aquatic life designated use, 52% partially support aquatic life designated use, and 12% do not support aquatic life designated use, based on benthic macroinvertebrate screening data, as of 1996. See Table FW-3 and Figure FW-4 (found at the end of this section). (Note: The aquatic life designated use attainment milestone is based on AMNET data. When the milestone was developed for the FY96 PPA, monitoring was completed in three of five basins. The statewide assessment presented here was used to modify the milestone to a reasonably ambitious target of 50% use attainment by 2005.)

- *In-stream water quality (conventional parameters)*: Dissolved oxygen, total phosphorus, nitrogen species and suspended sediment were selected conventional parameters.

  Dissolved oxygen: Dissolved oxygen, which is essential for aquatic life, meets standards at 78 out of 83 monitored locations between 1990 and 1994. Increasing concentrations of dissolved oxygen, indicating improving water quality, were observed at 14 monitoring stations. Decreasing concentrations of dissolved oxygen, indicating declining water quality, were observed at 13 monitoring stations. Water quality, with respect to dissolved oxygen, remained stable at 56 monitoring stations.

Total phosphorus: Between 1990 and 1994, levels of total phosphorus meet the Surface Water Quality Standard at nine out of 83 monitored stations. Decreasing concentrations of total phosphorus, indicating improving water quality, were observed at 37 monitoring stations. Increasing concentrations of total phosphorus, indicating declining water quality, were observed at eight monitoring stations. Water quality with respect to total phosphorus, remained stable at 38 monitoring stations.

Nitrogen species: Between 1974 and 1994, concentrations of total nitrogen decreased at 73 stations, were stable at 10 stations and were increasing at one station. During this same timer period, concentrations of ammonia were declining at 37 stations and concentrations of nitrate were increasing at 46 stations. Between 1990 and 1994, ammonia levels met the Surface Water Quality criteria at 63 out of 69 monitored stations and nitrate levels met the Surface Water Quality criteria at 82 out of 83 monitored locations.

Suspended sediments: Between 1990 and 1994, levels of suspended solids meet the Surface Water Quality criteria at 61 out of 84 monitored stations. There were not sufficient data available to evaluate trends.

- *Sediment quality:* **place holder**

Response Indicators

- *Watershed management implementation*: **place holder**

- *Permit compliance:* Between 1992 and 1995, the number of facilities in Significant Non-Compliance decreased from 44 to 19 nonlocal (typically industrial) facilities and from 15 to eight local (typically municipal) facilities.

- *Infrastructure investment to improve water quality:* Cumulatively, almost $600 million in SRF funds have leveraged $1.2 billion for construction of wastewater projects, including $659.1 million to provide secondary sewage treatment, $111.6 million for sewage treatment plan tie-ins, $199.0 million for sludge management facilities, $180.6 million for collection systems and $49.7 million for CSO abatement. A recent needs survey identified $4.75 billion in additional infrastructure needs. Stormwater and nonpoint source management projects recently became eligible for funding.

- *Evaluation of industrial stormwater program effectiveness*: New Jersey has successfully implemented the Federally mandated Stormwater Permitting Program. Since May 1993, New Jersey has permitted over 4,800 facilities that discharge stormwater to surface waters. The primary requirement of 2,039 of these permits is the development and implementation of facility-wide Stormwater Pollution Prevention Plans (SPPPs). As of December 31, 1996, 1,638 Stormwater Pollution Prevention Plan's have been prepared and 1,151 have been implemented. An additional 2,819 modified SPPP's have been prepared as a function of a general permit issued by the NJDEP through the Soil Conservation Districts.

- *Extent of biological integrity assessments*: In 1979, the Ambient Biological Monitoring Network (AMNET) consisted of 30 stations (approximately 180 miles, 3% of stream miles). Between 1992 and 1996, 3,815 stream miles of 6,450 stream miles (59.1%) have been assessed using the biological integrity assessments. See Table FW-3 (found at the end of this section) for additional information.

- *Explore development of NPS indicator(s)*: Development of indicators of NPS will be conducted in a watershed context. Potential sources of information for NPS indicators include: evaluation of existing research and data assessments, assessing extant and new water quality and flow data in terms of land uses and/or population density, gathering field data on habitat and NPS sources at AMNET stations or through volunteer efforts..

Subgoal: Protect recreational designated uses in freshwaters.

Milestones:

Maintain and improve the number of swimmable stream miles.
Maintain and improve the number of lakes suitable for bathing.
Maintain and improve the aesthetic value of lakes.

Cause Indicators

- *Point source contributions of fecal coliform:* NJDEP was not able to develop a meaningful indicator for point source contributions of fecal coliform.

- *Point source contributions of nutrients and suspended solids*: This indicator was summarized above.

- *Land use status:* **place holder**

Conditions Indicators

- *Swimmable designated use attainment*: Summer levels of fecal coliform exceeded the New Jersey Department of Health and Senior Service's primary contact recreation standard at all but four of 75 stations between 1990 and 1994. Increasing concentrations, indicating declining water quality, were observed at 14 stations; decreasing concentrations, indicating improving water quality, were observed at four stations. Samples were collected in rivers, stations were not located at bathing beaches. The fixed-station non-random monitoring network design precludes generalizing the data to non-monitored locations.

These data were used to conduct the swimmable designated use assessment. As reported in the 1994 Statewide Water Quality Inventory Report, NJDEP regards recreational designated use in all New Jersey waters as “threatened”. Of 525 (8.1%) monitored miles, 80 miles (15.2%) fully support recreational designated uses, but are threatened; 40 miles (7.6%) partially support recreational designated uses; 405 miles (77%) do not support recreational designated uses. See Table FW-2 for additional information.

- *Disease outbreaks associated with recreational use*: **place holder**

- *Lakes use impairment (publicly funded projects)*: There are 380 public lakes in New Jersey, covering 24,000 acres. To date, 116 lakes (10,462 acres) have been evaluated for trophic status and recreational water quality impairment by a combination of intensive surveys, State and Federally funded Phase I diagnostic studies and Federally funded Lake Water Quality Assessments. Of these, 113 lakes (10,351 acres) are considered to be eutrophic.

Response Indicators

- *Municipal permit compliance with FC permit limits:* NJDEP was not able to evaluate municipal permit compliance with FC permit limits for development of this indicator.

- *Extent of recreational designated use assessments:* Between 1974 and 1994, the number and percent of streams monitored for swimmable designated use decreased from 220 stations (approximately 17% of stream miles) to 79 stations (approximately 8.1%). Lake bathing beach data are maintained by county and local health departments and were not available for this analysis.

Subgoal: Protect fish consumption designated use.

Milestone: Continue to evaluate fish tissue for contamination, issue advisories and provide public education.

Cause Indicators

- *Point source levels of acute whole effluent toxicity*: This indicator was discussed previously under aquatic life designated uses.

Conditions Indicators

- *Sediment quality:* **place holder**

- *Fish tissue concentrations*: **place holder**

Response Indicators

- *Issue fish consumption advisories (as needed)*: **place holder**

- *Public education on fish consumption advisories*: **place holder**

- *Report on fish consumption designated use*: An overview of fish contamination and data needs has been prepared. Risk assessment data needs include: additional data on fish tissue concentrations; studies to identify sources of contamination; assessing exposure to humans, especially the pregnant population. Additional chemical concentration data are needed to confirm the current need for consumption advisories and evaluate the need for additional advisories.

Subgoal: Protect drinking water supply designated use. **See Drinking Water Section.**

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Table FW-1: 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 with Increasing Trends (b)**	**# Stations with Decreasing Trend**	**# Stations w/ SWQS Exceedences ©**	**Percent Exceedence of SWQS**	**Notes**
Fecal Coliform	FW2: 200 MPN per 100 ml	14	5	75	65	MPN > 1000 at many stations
Un-ionized Ammonia	FW2 TP & TM: 20 ppb; FW2 NT: 50 ppb	9	42	5	1	Summer data only
Nitrate	FW2: 10 ppm PL: 2 ppm	46	5	1	1	
Total Kjeldahl Nitrogen	none	1	73	N/A	N/A	
Total Phosphorus	FW2: 0.1 ppm, unless not a limiting nutrient	8	37	73	37	Assumes limiting nutrient
Copper	Reserved	Not enough data	Not enough data	N/A	N/A	
Lead	FW2: 5 ppb	Not enough data	Not enough data	23	10	1975-79: 58 stations violated SWQS (d)
Mercury	FW2: 0.144 ppb	Not enough data	Not enough data	16	6	1975-79: 78 stations violated SWQS (d)
Chloride	FW2: 230 ppm	70	1	0	0	
Dissolved Oxygen	FW2 TP: 7.0 ppm FW2 TM: 5.0 ppm FW2 NT: 4.0 ppm	14	13	5	4	Summer data only
% DO Saturation		12	13	N/A	N/A	Summer data only
pH	FW2: 6.5- 8.5 SU PL: 3.5- 5.5 SU	39	1	55	16	
Suspended Sediment	FW2 TP & TM: 25 ppm FW2 NT: 40 ppm	Not enough data	Not enough data	23	4	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-2: Designated Use Attainment for Recreation

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

[1] Percent of 525 monitored miles (not 6,450 total stream miles) meeting designated use.

[2] Due to the extensive land development and high population density, NJDEP regards all waters as threatened.

Table FW-3: Aquatic Life Designated Use Support

Assessment Category	Aquatic Life (Miles)	Aquatic Life (%)[1]
Total Assessment	3,855	60
Fully supports aquatic life uses, not threatened[2]	0	0
Fully supports aquatic life uses, threatened	1,349	35
Partially supports aquatic life uses	2,005	52
No support of aquatic life uses	463	12

[1] Percent of 3855 evaluated miles (not 6450 total stream miles) meeting designated use.

[2] Due to the extensive land development and high population density, NJDEP regards all waters as threatened.

TABLE FW-4

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, organics 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, organics 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;	High peak discharges and runoff volumes;

		Reduction in stream bank cover vegetation	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-5

Changes in Metals Concentrations in Sludge between 1981 and 1995

Conc (mg/kg)

Metal	**1981-1983**	**1987**	**1989-1994**	**1994-1995**	**% Change ***
Arsenic	2.7	NA	2.85	2.1	**-22%**
Cadmium	9.4	9	5.63	3.55	**-62%**
Chromium	93	NA	39	20	**-78%**
Copper	825	895	679	630	**-23%**
Lead	210	166	100	73	**-65%**
Mercury	3.6	NA	2.34	1.7	**-53%**
Molybdenum	NA	NA	15.03	3.14	
Nickel	45.8	43	31	21	**-54%**
Selenium	NA	NA	2.07	1.96	
Zinc	1110	977	826	775	**-30%**

* % change in statewide median sludge concentration from 1981-1983 to 1994-1995.

TABLE FW-6

WATERS WHERE DESIGNATED USE IMPAIRMENT IS SUSPECTED
DUE TO TOXIC DISCHARGES FROM POINT SOURCES

Waterbody Name and 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	Blumbrock
Ramsey Brook (trib. to Saddle River)	Mahwah
Valentine Brook (trib. to Saddle River)	near Allendale
Valentine Brook (trib. to Saddle River)	Allendale
Hobokus 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

Figure FW-1

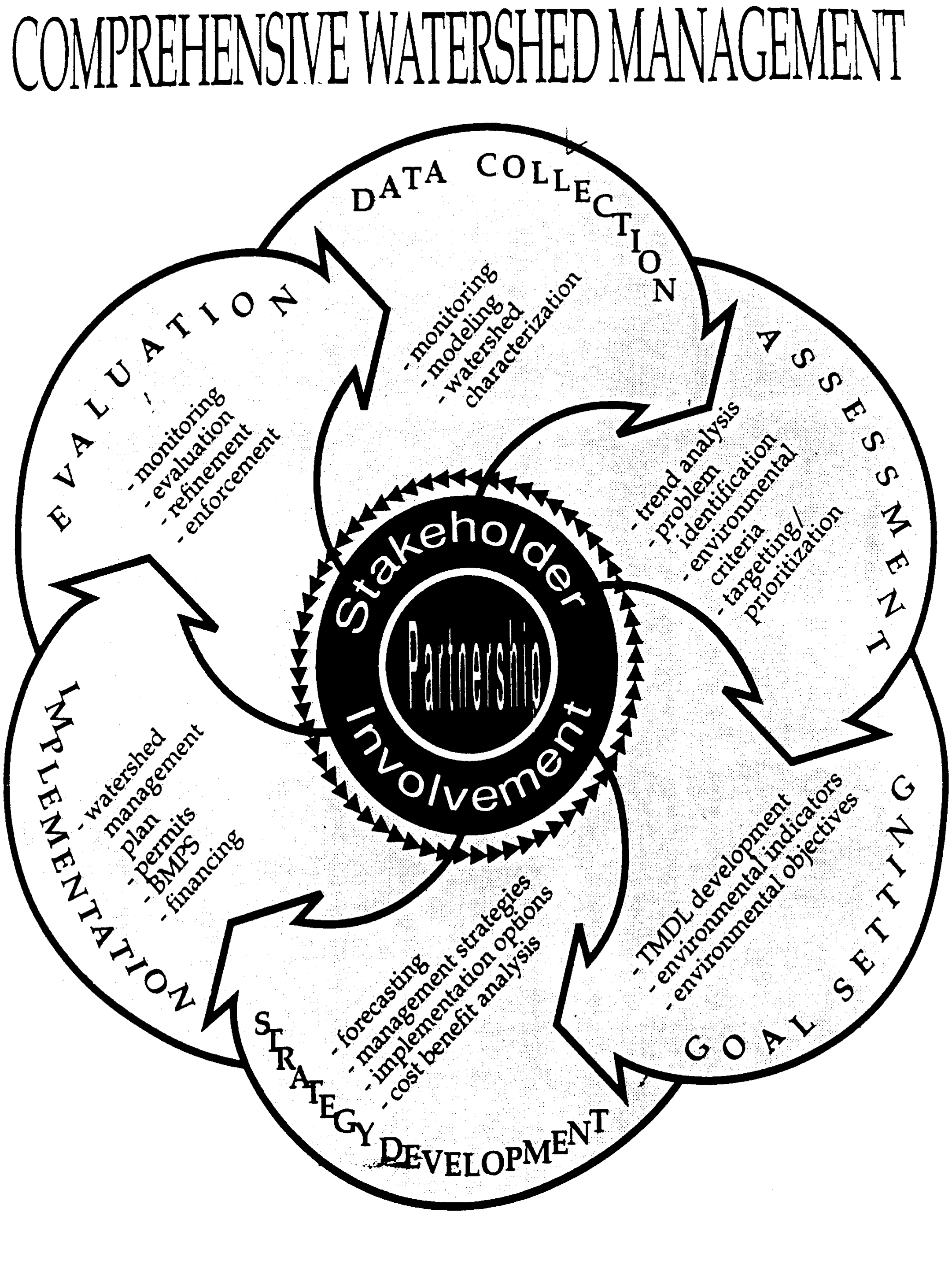

COMPREHENSIVE WATERSHED MANAGEMENT
DATA COLLECTION
- monitoring
- modeling
- watershed characterization
ASSESSMENT
- trend analysis
- problem identification
- environmental criteria
- targetting/ prioritization
GOAL SETTING
- TMDL development
- environmental indicators
- environmental objectives
STRATEGY DEVELOPMENT
- forecasting
- management strategies
- implementation options
- cost benefit analysis
IMPLEMENTATION
- watershed management plan
- permits
- BMPS
- financing
EVALUATION
- monitoring
- evaluation
- refinement
- enforcement
Stakeholder Involvement
Partnership

Figure FW-2

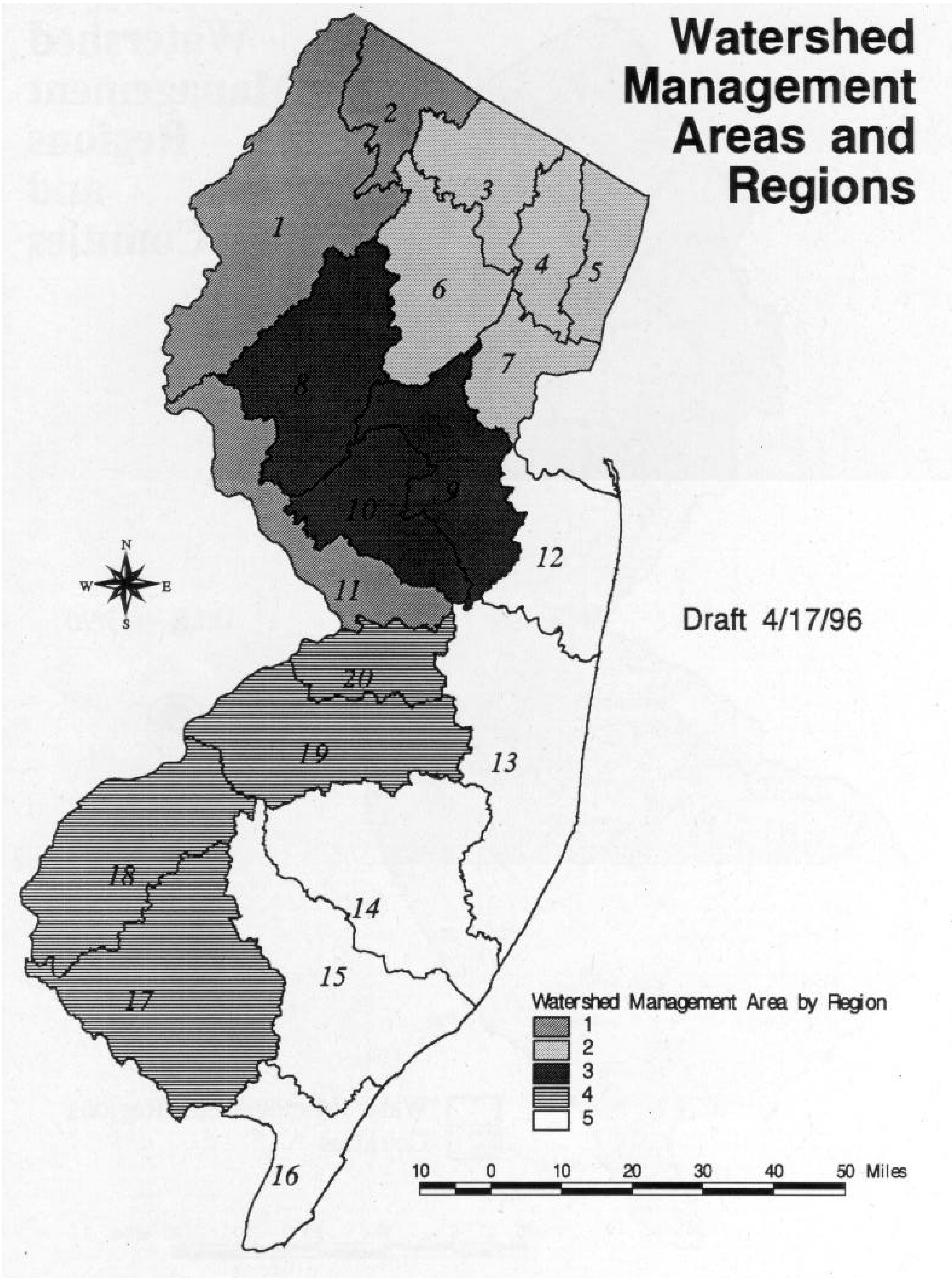

Watershed Management Areas and Regions
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
N
S
E
W
Draft 4/17/96
Watershed Management Area by Region
1
2
3
4
5
10
0
10
20
30
40
50
Miles

Figure FW-3

Ambient Surface Water Monitoring Stations in New Jersey

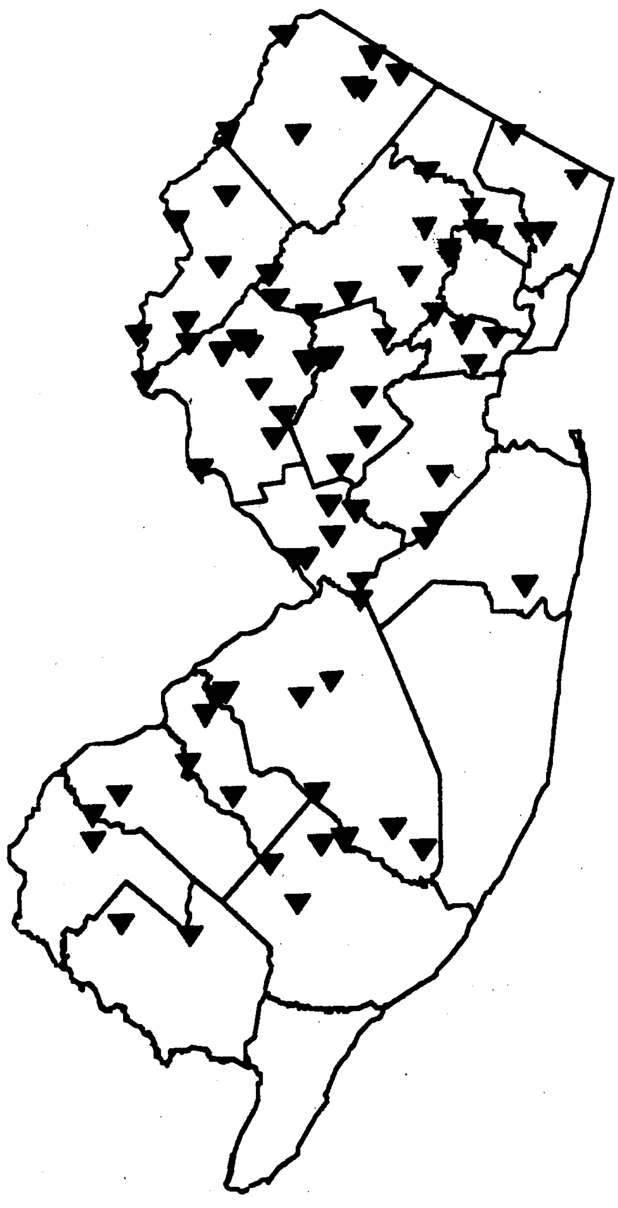
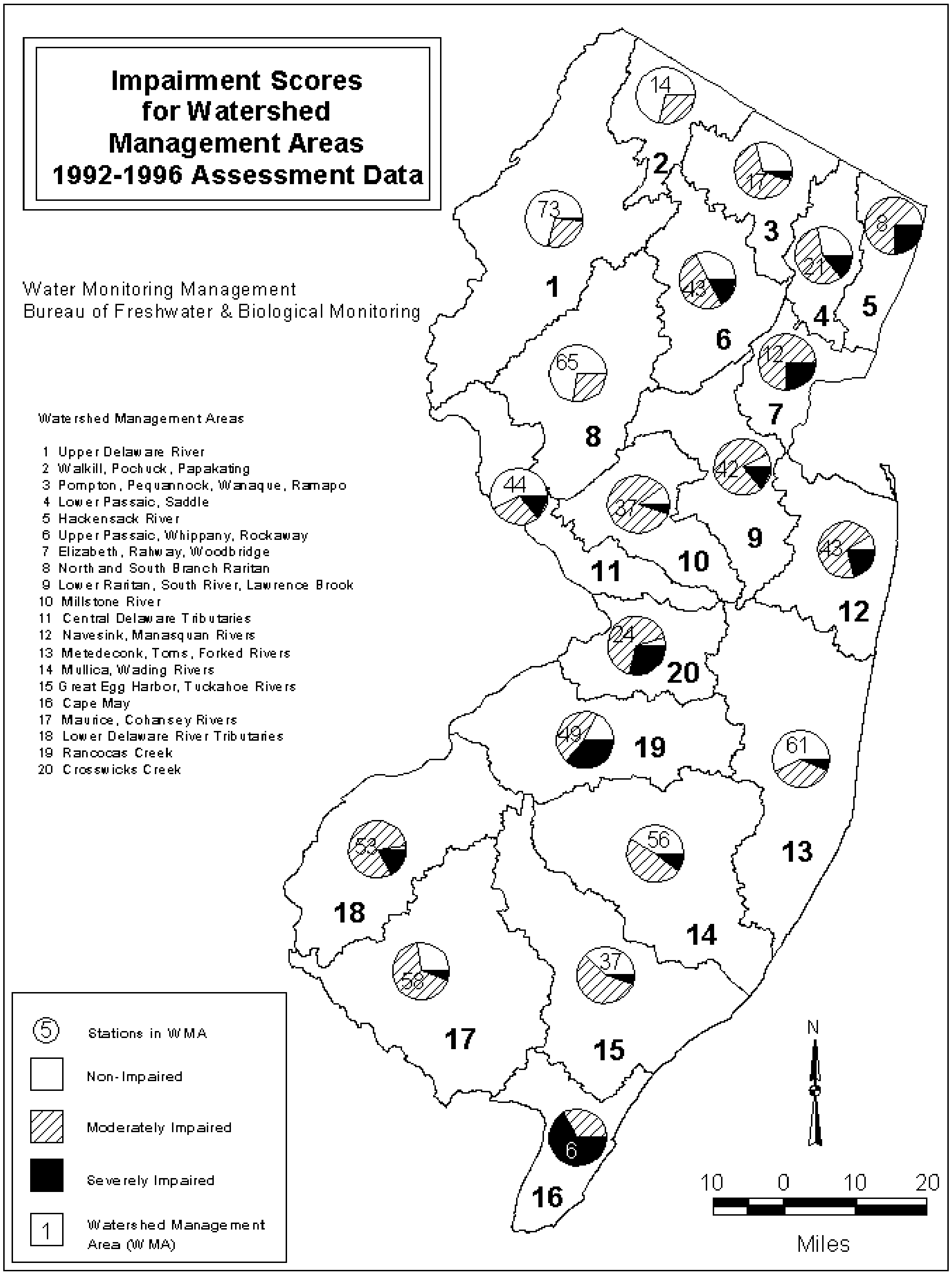


Figure FW-4


Impairment Scores
for Watershed
Management Areas
1992-1996 Assessment Data
Water Monitoring Management
Bureau of Freshwater & Biological Monitoring
Watershed Management Areas
1 Upper Delaware River
2 Walkill, Pochuck, Papakating
3 Pompton, Pequannock, Wanaque, Ramapo
4 Lower Passaic, Saddle
5 Hackensack River
6 Upper Passaic, Whippany, Rockaway
7 Elizabeth, Rahway, Woodbridge
8 North and South Branch Raritan
9 Lower Raritan, South River, Lawrence Brook
10 Millstone River
11 Central Delaware Tributaries
12 Navesink, Manasquan Rivers
13 Metedeconk, Toms, Forked Rivers
14 Mullica, Wading Rivers
15 Great Egg Harbor, Tuckahoe Rivers
16 Cape May
17 Maurice, Cohansey Rivers
18 Lower Delaware River Tributaries
19 Rancocas Creek
20 Crosswicks Creek
5 Stations in WMA
Non-Impaired
Moderately Impaired
Severely Impaired
1 Watershed Management Area (WMA)
N
10 0 10 20
Miles

Water Resources Self-Assessment Part 2: Marine Water Self-Assessment

1. Introduction

1.1. Description of Marine Water Resources: Ocean and Estuarine Waters to Head of Tide

New Jersey is the fifth smallest and most densely populated state in the nation. Population and industrial centers are concentrated in the northeast and along the Route 1 corridor, southwest toward Philadelphia. Surrounded by water on all sides except on the northern border with New York, 14 of the State's 21 counties have estuarine or marine shorelines. Generally, streams and rivers originate in undeveloped, rural, or agricultural areas and then enter suburban, urban or industrial areas adjacent to estuarine waters. In the last few decades, the ocean coastal counties of Monmouth, Ocean, Atlantic and Cape May have been experiencing unprecedented residential and service sector growth, which may affect the quality of estuarine and near shore marine waters. A summary of the State's population and water resources are as follows:

State Area	7,419 sq. miles
State Population (1990)	7,730,188
Municipalities	567 in 21 counties
Watersheds	5 regions, 20 management areas
Area of Estuaries/Bays (open water)	420 sq. miles
Ocean Coast Shoreline	120 miles
Tidal Shoreline	1792 miles
National Shoreline (USACE)	469 miles
Miles of Beach	215
Percent of National Shoreline in Beach	46%
Area of Coastal/Tidal Wetlands	380 sq. mi. (approx.)

Increasing residential populations and seasonal populations in the coastal counties have placed environmental stresses on the estuarine and near shore marine waters and on the habitats these waters support. Both point and nonpoint sources of contamination impact the coastal zone and marine waters. For example, in certain areas intensive boating is damaging to submerged vegetation and may increase turbidity levels; potentially resulting in habitat fragmentation. Another example is the use of chemical preservatives in wood used for bulkheading, which potentially leach toxics into the adjacent waters and sediments.

1.2. Beneficial Uses and Economic Values

The coastal environment and marine waters form the basis for tourism, recreational swimming, boating, fishing and bird-watching activities, and commercial fish and shellfish harvesting. There is an ineffable quality of life available at the shore, which explains why so many of the State's residents live within close proximity of the coast and many thousands more visitors take trips to coastal areas in New Jersey.

Last year, travel and tourism in five coastal counties (Atlantic, Cape May, Cumberland, Monmouth and Ocean) generated over $12 billion and was responsible for 161,000 tourism-related jobs which have a payroll of over $3 billion. If indirect jobs due to tourism are included, the number increases to 231,800 jobs with a payroll of over $4.8 billion. Travel and tourism to the shore communities is highly dependent upon the actual and perceived health of the marine environment. Tourism drops conspicuously when solids/floatables contamination, oil spills or unsafe waters are reported.

The importance of tourism in the State's coastal areas has protected the use of estuarine waters from direct discharges industrial process waste south of Middlesex County on the east coast and Gloucester County on the Delaware River coast. The two nuclear plants in the State, Salem on the Delaware Estuary and Forked River in Ocean County use significant quantities of estuarine water for cooling purposes.

In addition to tourism and recreation, commercial uses of the marine waters are a significant component of New Jersey's coastal economy. Based on 1990 landings data, New Jersey is the largest shellfish producing state in the United States with estimated landings of more than 75 million pounds per year, with a dockside value of over $60 million. Commercial fish harvesting is also important to New Jersey's economy. In 1995, over 173 million pounds of fish with a total value of over $95 million were harvested commercially. The total value is much higher if jobs related to processing and retailing of seafood are included. In order to protect public health, New Jersey places restrictions on shellfish harvesting in areas of degraded water quality. Restrictions are in place in areas degraded by sewage treatment plant, combined sewer overflow and/or municipal stormwater discharges, and near commercial/recreational docks due to potential contamination from boating activities.

The fragile ecosystems and organisms of the estuarine and near shore areas, as well as public health implications, require increasing attention to maintain and improve existing conditions. Competing uses of estuarine and marine resources have resulted in environmental strategies that attempt to maximize these uses, while simultaneously minimizing negative impacts. While significant progress has been achieved, much remains to be done to protect the coastal and marine environment for our future.

1.3. Water Quality Standards

New Jersey's Surface Water Quality Standards (N.J.A.C. 7:9B) are described in the Freshwater Watersheds section of this Self-Assessment document.

Under the New Jersey Surface Water Quality Standards, marine waters are given one of three antidegradation protection levels. Currently there are no marine waters classified as Outstanding National Resource Waters. Category One Waters are regulated to ensure that there are no changes in the mean water quality, on a parameter specific basis. Category Two Waters are protected from changes which would cause water quality to be lowered below the promulgated criteria plus a reserve. All waters are protected from changes which would adversely impact existing uses. Marine water quality criteria have been developed for many toxics (organics and metals) as well as fecal coliform, dissolved oxygen, and pH. Currently, marine water criteria have not been developed for nitrates and phosphorus.

1.4. Point and Nonpoint Sources of Pollution

Point and nonpoint sources of pollution are described in the Freshwater Watersheds section of this Self-Assessment document. Issues specific to tidal waters are discussed below.

There are no direct industrial discharges to ocean waters. However, 17 permitted sewage treatment plants, which treat municipal sewage and industrial waste, discharge treated wastewater through 14 outfalls to the ocean. Municipal and industrial treatment plants discharge treated waste to tidal waters. Regionalization and upgrades of sewage treatment facilities since 1970 have significantly improved the quality of the estuarine waters, allowing shellfish restrictions to be lifted in many areas. However, concerns have been raised that additional nutrients now discharged to the near shore ocean waters from these facilities potentially contributes to the increasing eutrophication of these waters.

Combined sewers collect and transport stormwater and sewage to sewage treatment plants through a single collection system. In wet weather, the collection systems often become overloaded with stormwater. Stormwater and untreated sewage are then discharged via combined sewer overflow pipes (CSOs). Approximately 300 CSO discharge points have been identified, and are generally found in the older, urbanized areas of the State (approximately 240 CSO points exist north of Sandy Hook). The combined sewer systems, associated with 30 municipalities and other public utilities, are primarily concentrated in three areas: 1) throughout the New York/New Jersey Harbor Complex, including the marine and estuarine waters of the Hudson River, Passaic River, Hackensack River, Elizabeth River, Kill Van Kull, Arthur Kill, Rahway River, Newark Bay and non-tidal portions of the Passaic River); 2) in the tidal portion of the Raritan River from the City of New Brunswick; and 3) in the tidal portion of the Delaware River from Camden, Gloucester and Trenton Cities. There are no direct CSO discharges into the Atlantic Ocean. The frequency, magnitude, duration and contaminant profiles of wet weather discharges from CSO points varies greatly and has not been well quantified.

Nonpoint sources of pollution to tidal waters include municipal stormwater, overland runoff, air deposition, inputs from rivers, and shipping and boating. Currently, there are 150 municipal stormwater discharges to the ocean and 7000 to back bays. With the exception of restrictions in the vicinity of CSOs and sewage treatment plants, most of the remaining restrictions on shellfish harvest areas are due to nonpoint source pollution. The rapid suburbanization of the coastal areas has increased the use of impervious surfaces for streets, parking lots, and driveways, thus increasing runoff to coastal waterways. The introduction of grass lawns and non-native plants that require intensive application of fertilizers, pesticides and water has resulted in nutrient and pesticide contamination of stormwater. Further coastal water quality improvements will be achieved only when specific nonpoint sources of pollution are identified and addressed.

1.5. Quality of Life Survey

A 1990 NJDEP study surveyed residents in four municipalities in lower Cape May County to determine how they define quality of life and to identify issues they found critical for their future quality of life. These four municipalities were chosen because they represented a coastal area which experienced 15% population growth in the preceding decade. The study used several methods, including focus groups and a general telephone survey. The cross section of individuals in the study included members of environmental organizations, farmers, business leaders, outdoorsmen, boat captains, fishermen, developers, senior citizens and wage earners.

Study participants identified the second most important concern to be maintenance of a healthy ocean and bay environment. The focus groups almost unanimously agreed that the environment is a critical component of the quality of life. Other priority issues included the absence of congestion, clean air and water, adequate open space, farmland and wildlife. Support for maintaining a healthy, clean ocean and bay was very strong among both users (swimmers, fishermen, boat captains, etc.) and nonusers. The results of the survey are shown in the table below. (Note: Survey respondents were allowed to select all relevant categories, percent of respondents that selected each category is provided).

Similar studies could be conducted throughout the State to evaluate public perceptions on environmental, economic and social issues. Public input regarding environmental issues will be obtained through NEPPS stakeholder outreach efforts and through a comparative risk assessment project which will be initiated by DSR. These efforts will assist NJDEP in establishing environmental priorities.

ISSUE	**PERCENT NOTED AS SERIOUS**
Economic	75%
HEALTHY OCEAN AND BAY	*69%*
Farmland, Open Space and Clean Drinking Water	61%
Cost of Housing	56%
Lack of Jobs	54%

Shorebirds, Wildlife and Traffic Congestion	53%
Sewage	48%
Garbage Disposal	44%
Population Growth	43%
Seasonal Crowds	31%

1.6. Data Sources for Identification of Key Issues

1.6.1. NJDEP - Cooperative Coastal Monitoring Program

The Cooperative Coastal Monitoring Program has established uniform policies and procedures for protecting water quality and public health at recreational bathing areas in coastal waters. NJDEP, New Jersey Department of Health and Senior Services, and local health agencies sample and assess water quality at approximately 180 ocean stations and 140 bay stations each week during the summer from mid-May through mid-September. The fecal coliform data, which are collected within ten yards of the shoreline, and visual sanitary surveys are used to initiate pollution source investigations and to determine the need for beach closings during episodic pollution incidents. Additional water sampling is performed during these incidents. Pre-1994 bacterial data is in STORET and PC databases; data from 1994 and 1995 are on PC databases and will be entered on the revised STORET system.

1.6.2. NJDEP - Phytoplankton Survey

The Phytoplankton Survey assesses the phytoplankton blooms along the coast. These data are used to evaluate algal blooms for the potential presence of toxin-producing organisms that may impact shellfish, as required by the National Shellfish Sanitation Program. Potential effects of algal blooms on bathers are also evaluated. This program is conducted by the Bureau of Marine Water Classification and Analysis in Water Monitoring Management.

1.6.3. NJDEP - National Shellfish Sanitation Program

The National Shellfish Sanitation Program is operated by the Bureau of Marine Water Classification & Analysis in Water Monitoring Management. Approximately 14,000 total and fecal coliform samples from 4,000 monitoring stations in the marine and estuarine environment are analyzed annually. The water data are stored in STORET. Water data are combined with land use, water hydrography and pollution source information to classify of New Jersey’s shellfish growing waters for harvesting. Reports are generated under the guidelines established by the Interstate Shellfish Sanitation Conference for the National Shellfish Sanitation Program. The data are also used to meet the assessment requirements of the Federal Clean Water Act and become an integral part of the 305(b) report.

1.6.4. NJDEP - Estuarine Monitoring Program

The Estuarine Monitoring Program is operated by the Bureau of Marine Water Classification & Analysis in Water Monitoring Management to assess estuarine water quality. At 200 of the 4000 National Shellfish Sanitation Program stations, quarterly samples for several parameters including nutrients, temperature, total suspended solids (TSS), salinity and conductivity are collected. These data are stored in STORET. A status and trends report is generated periodically, comparing concentrations to parameter criteria and/or standards and trends in concentrations.

1.6.5. NJDEP - Toms River Stormwater Monitoring

Water Monitoring Management maintains five sites in the Toms River basin for monitoring stormwater quality. These sites are monitored during eight storm events each year as well as four times a year during base flow conditions. Discharges are measured concurrently with water quality, allowing for the calculation of pollutant loads. Sampling sites were chosen to reflect different land use conditions. This project is providing accurate, current data on the relationship between land use and pollutant loads resulting from stormwater.

1.6.6. NJDEP - DWQ Data

The Division of Water Quality maintains a database of permitted facility information, including permit tracking, effluent limitations, monitoring requirements, compliance schedules and reported discharge monitoring report (DMR) data. DWQ also maintain data on reported sludge quality, quantity and management methods. Substantial ground water quality monitoring results are also available through DWQ's database.

1.6.7. NJDEP - LURP Sediment Data

The Land Use Regulation Program requires sediment chemistry and sediment physical analysis, on a case-by-case basis, to support decisions on permit applications for water quality certificates and waterfront development permits. These analyses are conducted to characterize a given dredging project with respect to depth, and can provide a rough idea of sediment quality and grain size for the location under consideration.

1.6.8. NJDEP - SIIA Data

The Sewage Infrastructure Improvement Act requires coastal municipalities to sample stormwater discharges for bacteria concentrations one to two times each year depending on the use of the receiving waters. Approximately 150 stormwater pipes discharge to the ocean and 7,000 discharge to the bays. Bacterial data is assessed to determine possible stormwater contamination by sewage and nonpoint sources. Data, collected since 1993, is stored on PC databases.

1.6.9. NJDEP - GIS Data

Since the mid 1980's, the NJDEP has been developing a digital data library of environmental information for use with its Geographic Information System. This environmental information includes several files important for coastal and marine analysis including coverages of the current shoreline, the historic shoreline, various monitoring station locations, etc. Digital coverages of particular note include the Integrated Terrain Unit Data (ITUM) data, the freshwater wetlands coverage and the urban coast coverage.

The ITUM data is a set of county-based coverages which contain digital linework and attributes on land use and land cover, in addition to information on geology, soils and floodways. The data is based on photographic basemaps from 1986 (which are based on JSS CIR 1:58000 photographs). The linework is accurate to a scale of 1:24000 and is codified using the USGS land use/land cover classification system.

The Fresh Water Wetlands Coverage is a set of county-based coverages which contain digital linework and attributes on the various types of freshwater wetlands in the State. The original delineations were done on 1986 quarterquad basemaps (1:12000) from an interpretation of 1986 CIR photographs, with some field verification for each quarterquad. All freshwater wetlands greater than one acre and all linear freshwater wetland features greater than ten feet in width were mapped. The classification system used is a modified Cowardin System. The linework is accurate to a scale of 1:12000.

The Urban Coast coverage is a set of residential and commercial land use polygons for the coastal area, which are classified to show in detail the type of land use, the amount of impervious cover per polygon and the level of maintenance (high, medium or low). The level of maintenance refers to the expected application of nitrogen or phosphorus-containing compounds (pesticides and fertilizers) which are expected to be applied to the land surface. The use of the coverage is to estimate nonpoint source loads of nitrogen and phosphorus to waterways along the coast. The linework is accurate to a scale of 1:24000.

1.6.10. National Estuary Programs: Characterization Reports

The National Estuary Programs below have completed scientific characterization reports. Both the NY/NJ Harbor Estuary Program/NY Bight Restoration Program and the Delaware Estuary Program have reports on monitoring and regulatory programs, educational materials, including audio/visuals, and general publications (e.g., newsletters, tip strips, public access guides, etc.).

There are over 80 characterization reports available through the New York/New Jersey Harbor Estuary Program/New York Bight Restoration Program (HEP). These include the following categories: Habitat & Wildlife (8); Nutrients/Organic Enrichment (5) including water quality trends data for conventional parameters as part of the Harbor-wide eutrophication model; bi-state waters reports, including New Jersey waters: Harbor Water Quality Survey Report (NYCDEP) and Status Report on the Interstate Sanitation District Waters (ISC); Biomonitoring & Toxic Effects (8) including NOAA reports; Toxic Contamination & Trace Metals Wasteload Allocation (16); Pathogen Contamination (6); Floatable Debris (6); Pollutant Loadings (2) and Fate (1); Other Related Reports (26); Environmental Monitoring Plan with 35 recommended environmental indicators; and New York Bight Restoration Plan reports (Phase 1-3 reports and Final Plan).

There are over 35 scientific, technical, and status reports available through the Delaware Estuary Program (DELEP). These include at least one report in each of the following categories: water quality, toxic contamination, trace element speculation, economic/natural resource values, surveys of biological resources, primary production, effects of dredging activities, demonstration projects for land use/nonpoint source pollution and control, rare/endangered species, hazardous spills, habitat, nonpoint source pollution sources, land use management, fish consumption patterns, distribution of contaminants and acute toxicity in sediments, and other topics. The Delaware River Basin Commission produces a series of water quality reports annually.

The Barnegat Bay Estuary Program, designated in 1995, has not completed characterization reports, but there is a watershed management plan (1993).

1.6.11. DRBC

The Delaware River Basin Commission (DRBC) is a cooperative agency with representatives of the States of Delaware, New Jersey, Pennsylvania and New York. The DRBC monitors the Delaware Estuary under contracts with each of the three estuary states. Water quality, sediment and fish tissue data are reported regularly for the Delaware Bay, River and tributaries.

1.6.12. Interstate Sanitation Commission

The Interstate Sanitation Commission (ISC), comprised of the State of New Jersey, New York and Connecticut, addresses water pollution in the New York/New Jersey Harbor area. The ISC provides coordination assistance to address regional pollution abatement problems and conducts sample collection and analysis in New Jersey waters. The ISC's programs are designed for gathering information necessary and providing assistance for enforcement actions, shellfish harvest classifications, swimming and the development of water quality and effluent criteria.

1.6.13. EPA

The EPA operates a Coastal Monitoring Network in which they sample 46 stations along the State's ocean coast for fecal coliform and enterococcus concentrations during the summer. EPA also measures surface and bottom dissolved oxygen concentrations and water temperatures at 50 stations on ten perpendiculars from the ocean coast. Stations on each perpendicular are located at one, three, five, seven, and nine miles offshore. All sampling is performed from a helicopter, one day per week.

Another EPA data source is EMAP - EPA's Environmental Monitoring and Assessment Program. This is a nationwide program implemented by EPA's Office of Research and Development (ORD). The goal of EMAP is to assess and document the status and trends and the condition of the nation's forests, wetlands, estuaries, coastal waters, lakes, rivers and streams, the Great Lakes, and agricultural lands on an integrated and continuing basis.

REMAP is a cooperative Regional EMAP effort by conducted EPA Region 2 and a variety of other Federal, state and city government agencies and local universities. Its purpose is to estimate the percentage of area in each of the six sub-basins in the New York/New Jersey Harbor system in which the benthic environment is "degraded," "not evidently degraded," or "marginal." It intends to identify statistical associations between particular chemical contaminants and degraded benthos or toxic sediments. The investigators will conduct biological analyses of sediment samples to determine the health of the benthos in the six sub-basins. Chemical analyses will also be conducted. The investigators will then attempt to determine whether biological impairment or risks to benthic life are associated with particular contaminants or physical characteristics of sediment. Finally, the researchers will use the data obtained on benthic communities to produce an index of environmental quality for the New York/New Jersey Harbor system that will be useful to environmental managers.

1.6.14. NOAA Mussel Watch

The Mussel Watch Project was created as part of NOAA's National Status and Trends Program in 1986. The program monitors trends of chemical contaminants in surface sediments and whole soft-parts of mussels and oysters collected from approximately 200 coastal and estuarine sites. The results from the project describe the spatial and temporal distribution of coastal contamination. There are eleven sites within the New Jersey area. Samples are analyzed for ten trace metals and five groups of organic compounds. The data is reported by the National Status and Trends program on a periodic basis.

2. Description of Marine Water Programs

NJDEP's regulatory programs (i.e., standards, permitting and enforcement), financing programs and most planning functions are conducted on a statewide basis. Monitoring programs focus on a particular type of resource (i.e., separate monitoring networks for streams, lakes, bays, etc.). The following program descriptions focus on activities specific to marine resources. Descriptions of the statewide programs and activities are included in the Freshwater Watersheds section of this Self-Assessment document.

2.1. Policy and Planning

The Office of Environmental Planning, oversees administration, planning and coordination of the Coastal Zone Management Plan, the National Estuary Program (NEP), the National Estuarine Research Reserve System (NERRS) and the Coastal Nonpoint Source Pollution Control Program (Section 6217), in addition to the statewide functions described previously.

The Division of Science and Research (DSR) conducts research and technical support activities on a statewide basis described previously. The Environmental Research and Health Assessment Element conducts research on fish and shellfish tissue contamination, which often focuses on marine species.

Within DSR, the Water Monitoring Management Element implements the National Shellfish Sanitation Program to classify waters for shellfish harvesting, the Coastal and Estuarine Water Quality Monitoring Program, the Toms River Stormwater Monitoring Project and alternate indicators projects.

2.2. Environmental Regulation

The Division of Water Quality operates statewide permitting and finance programs as described previously. The CSO Abatement Program operates primarily in tidal waters where CSO's are located. The Water Supply Element permits water uses to ensure safe and adequate supplies of water for drinking water, industrial, commercial and agricultural users. The Land Use Regulation Program implements land use in coastal areas: the Coastal Area Facilities Review Act, and Coastal Wetlands programs.

2.3. Enforcement

The Water Enforcement Program operates statewide inspection, enforcement and compliance assistance programs. The Office Alternative Dispute Resolution offers dispute resolution alternatives on a statewide basis. The Office of Enforcement Coordination operates the Cooperative Coastal Monitoring Program which coordinates monitoring of bathing beach water quality in cooperation with local health agencies and the Operation Clean Shores Program which utilizes state prisoner labor to remove litter and debris from beaches. The Coastal and Land Use Enforcement Element enforces land use regulations statewide including coastal areas.

2.4. Natural and Historic Resources

The Office of Natural Resource Damages provides for the restoration of New Jersey's natural resources that have been injured by oil spills or other discharges of hazardous substances. The NJDEP works closely with similar programs of the Department of Interior (DOI), the National Oceanic and Atmospheric Administration (NOAA) and neighboring states to address adverse impacts to resources for which these agencies share "co-trustee" authority.

The Bureau of Coastal Engineering is responsible for shore protection and navigation dredging programs. The primary objectives are to provide for protection of the State's coastal area from erosion and storm damage and to maintain the depth and channel markings of the navigable waterways of the State. The Harbor Clean Up Program administers a major cleanup of debris and abandoned structures from the Hudson River, Newark Bay, and the Arthur Kill waterfronts in conjunction with the United States Army Corps of Engineers.

The Blue Acres Program, within Green Acres, provides planning assistance and low-interest loans and grants to municipalities and counties for coastal open space acquisition and recreational development projects.

2.5. Site Remediation

See the Site Remediation section of this Self-Assessment document.

2.6. Pollution Prevention

See the Freshwater Watersheds section of this Self-Assessment document.

3. Stakeholder Involvement

See the Freshwater Watersheds section of this Self-Assessment document.

4. Key Environmental Issues

4.1. Declines in Commercial and Recreational Fish and Shellfish Stocks

Trends in marine fisheries vary from one species to another. For example, there have been marked improvements in stocks of striped bass in recent years, while other species have been declining. The New Jersey Division of Fish, Game and Wildlife believes that overall, stocks of marine fisheries are declining. In the Delaware Estuary and the Harbor Bight, human impacts (overfishing, pollution, etc.) are difficult to differentiate from natural factors which impact marine biota. Water quality may or may not be a factor in those populations that are declining.

Accurate measures of shellfish landings are difficult to acquire due to the independent nature of the business, limited data collection resources by the National Marine Fisheries Services' Statistics Branch, and lack of reporting requirements for some species. While the standing stock of surf clams has increased steadily over the last few years, best estimates by NJDEP's Bureau of Shellfisheries are that estuarine shellfish stocks, principally hard clams and oysters, are declining. Possible reasons for the hard clam decline include overharvest, predation, natural and anthropogenic impacts affecting reproduction. Anthropogenic impacts may include water quality degradation from NPS pollution, leachates from CCA-treated lumber used for bulkhead and dock construction, and petroleum hydrocarbons and heavy metals associated with boating activities. In addition, the turbulence of propellers from numerous boats in New Jersey waters has been shown to have a significant impact on hard clam larvae. Major declines in the Delaware Bay oyster population have occurred over the past 35 years due to the diseases MSX and Dermo. While these diseases are harmless to humans, they have been devastating to New Jersey's oyster industry

4.2. Nutrient Enrichment in Water

A national survey on eutrophication in estuarine waters of the United States ranked New Jersey's estuaries high to very high for existing eutrophic conditions. Eutrophication is the excessive enrichment of a water body by nutrients (nitrogen and phosphorus) and organic materials. Eutrophic waters will often experience massive algal blooms. These blooms can and have resulted in noxious odors, depletion of dissolved oxygen in bottom waters, mass mortality of finfish and shellfish, and die-off of submerged aquatic vegetation. Eutrophication has been confirmed by data from the New Jersey Phytoplankton Survey which measures chlorophyll "a" (an indicator for phytoplankton levels and eutrophic conditions) values at 14 stations along the coastline from Raritan Bay to the Delaware Bay. Data from these stations show that the Raritan Bay has very high intensity and high frequency blooms, the Delaware Bay near Cape May County has chronic but benign red tides and most other areas along the coast have levels considered slightly above normal throughout the entire summer season.

Eutrophic waters have high nitrogen levels, high chlorophyll levels and low dissolved oxygen (DO) levels. Low DO concentrations, referred to as hypoxia, often occur in the coastal waters of portions of the State during the summer months. The ecological effects of hypoxia are severe. Between 1989 and 1994, approximately 15% of the State's coastal waters experienced oxygen levels recognized as stressful to aquatic biota (<4 mg DO/L). As concentrations fall to or below that level, mobile organisms such as fish begin to leave the affected area; less mobile organisms can become stressed and die. At DO concentrations of 3 mg/L and below, effects become progressively more severe. For example, at DO concentrations of 1.5 to 3 mg/L, many organisms leave or die within days to weeks; most organisms die when concentrations below 1.5 mg/L persist for a few days or more. Impacted areas included Raritan Bay, Shrewsbury River, Little Bay, Reeds Bay, Great Egg Harbor and Great Egg River. Periodic red tide blooms have appeared in the Raritan and Sandy Hook Bays.

Eutrophication directly results in water use impairments. In addition, eutrophication may have other adverse effects on marine ecosystems that are more subtle or difficult to identify. For example, changes in the forms or concentrations of nutrients may result in changes in the species composition and diversity of phytoplankton. These changes may affect higher trophic levels, potentially leading to an altered ecosystem.

Dissolved oxygen improvements have occurred throughout the New York/New Jersey Harbor, especially in the Upper Bay. Long term trend analysis indicates that while there is improvement in DO levels in the highly polluted waterways of the Harbor, including the inner Harbor areas, there appears to be declines in the relatively cleaner bays and outer reaches of the Harbor. Studies document that nitrogen is a problem nutrient in the Harbor, as well as the Bight and Long Island Sound. Further, there have been periodic dense “red tides” in the Lower Bay Complex (Sandy Hook and Raritan Bays).

A study of fresh water quality trends of the mid-Atlantic and northeastern watersheds over the past 100 years indicates that a major increase in the levels of nitrates and chlorides occurred between 1965 to 1980. These freshwater loads empty into the State's estuaries and may contribute to the eutrophication problem. In addition, research in the Chesapeake Bay has shown that air deposition contributes to nutrient loads. The factors leading to blooms and eutrophication are complex. It must be noted, however, that the Delaware Estuary is considered to receive the highest nutrient input of any major estuary in North America but blooms, while chronic and intense, have seemingly been benign (not resulting in fish kills or similar impacts). Clearly, additional work needs to be done in this area.

4.3. Toxics in Water

The toxics contamination of the State's marine waters is mainly of concern in estuarine waters adjacent to heavily urbanized and industrialized areas, the most impacted of which is the New York/New Jersey Harbor Estuary. For the New York/New Jersey Harbor, exceedences of the mercury surface water quality standard have occurred harbor-wide. Exceedences of copper, nickel and lead will need to be reassessed through the Phase II TMDL process. Additional efforts are directed toward highly lipophilic organics, such as PCBs, dioxins and polycyclic aromatic hydrocarbons, due to exceedences of FDA guidelines in fish and shellfish tissue, and elevated sediment concentrations. Current releases of these constituents to the environment from NPS pollution, air deposition, and possibly point sources are suspected. Current effort is now being directed toward detection of these compounds in ambient water at sites throughout the Harbor and at discharge points. However, current promulgated analytical methods may not be sensitive enough for water column detection of these compounds. Low-level experimental methods were used recently by the Harbor Estuary Program to detect elevated municipal effluent concentrations of PCBs. Also, more sensitive experimental concentration techniques were utilized to track-down these elevated PCBs in Harbor municipal systems. Additional studies using these sensitive techniques are planned for these compounds, as well as dioxin and mercury, for both discharge and ambient monitoring.

In the Delaware Estuary, which is considered less impacted than the Harbor Estuary, there are data demonstrating exceedences of surface water quality criteria for lead and copper in the lower estuary. Limited data has also indicated potential criteria exceedences for several other metals and two volatile organics in the lower estuary.

Toxic contamination of water and wetlands is also caused by accidental spills of petroleum products and other materials. The impacts of such spills include degradation of the water quality, impacts on marine and coastal biota, pollution of beaches and the subsequent limitations to recreational activities (swimming and fishing).

4.4. Toxics in Sediment

The toxics contamination of sediments in the State's marine waters is distributed on a regional basis, with the greatest contaminant concentrations occurring in estuaries adjacent to heavily urbanized areas. The New York/New Jersey Harbor sediments contain high concentrations of a broad range of contaminants, including dioxins/furans, PCBs, pesticides, PAHs, and metals (HEP CCMP, 1996). The levels of contamination have resulted in adverse environmental effects, including bioaccumulation within the marine food chain and alterations in benthic communities. Sediments in much of the Harbor and some areas of the Bight are toxic to a variety of organisms in laboratory tests. For example, of 57 sediment samples collected in the Newark Bay complex (New York/New Jersey Harbor), 85% were toxic to amphipod survival (NOAA Tech Mem, 1995).

The Delaware River estuary sediments are considered less impacted, with generally lower contaminant concentrations. Of 16 sediment samples collected from Delaware Bay to Philadelphia, 25% were toxic to amphipod survival (DELEP, 1994). Marine sediments in the Barnegat Bay Estuary are not well characterized, but are considered the least impacted of the estuaries.

Many New Jersey tidal water bodies require routine dredging of accumulated sediments to maintain navigation channels and vessel berthing areas, due to both the shallow natural depths of these water bodies and high rates of sedimentation. However, the sediments to be dredged may contain chemical contaminants, which can result in adverse impacts to the marine environment. This is particularly true for estuaries which serve as active shipping ports, and have both important habitat and living resource values. Potential adverse impacts during dredging and disposal operations include increased water column bioavailability through sediment resuspension, and redistribution of previously buried contaminated sediments to benthic living resources. This can result in both degradation of the benthic community and food chain contamination.

4.5. Toxics in Biota

Bioaccumulation of toxins in biota can cause direct adverse impacts to the living resource, and impacts to human health through biota consumption. Elevated concentrations of dioxin and PCBs detected in finfish and blue claw crab in New Jersey marine waters have resulted in the issuance of recreational fishing advisories by the State. Recommendations to limit consumption or to not consume are in effect for striped bass, bluefish over six lbs., American eel, white perch, white and channel catfish, and blue claw crab. New Jersey's marine waters affected by consumption advisories include the New York/New Jersey Harbor, the Raritan Bay complex, northern coastal waters, and the Delaware Estuary.

There is some indirect evidence of contaminant bioaccumulation in coastal associated avian species. NJDEP's Endangered and Nongame Species Program monitors on a statewide basis the annual productivity of osprey, peregrine falcon, and bald eagle populations. For all three species, specific nesting failures have been linked to pesticide and PCB residues identified in embryos collected from the Delaware Bay region. Additionally, reproductive studies have been conducted by the Manomet Observatory (MA) on waterbird colonies which nest in the New York/New Jersey Harbor Estuary. Eggshell thinning, typical of organochlorine contamination, has been documented in cormorants, and failure to hatch despite full incubation and embryonic development occurred more frequently in these colonies as compared to reference colonies.

Acute contamination of coastal biota is seen as an impact of spills in the marine environment. The toxicity of various fractions of petroleum has impacts on finfish, shellfish, birds and other marine organisms.

4.6. Pathogens in Water

Pathogens are disease-causing microorganisms, such as bacteria, protozoans, and viruses, that are present in untreated or inadequately treated human sewage as well as in domestic and wild animal wastes. Major sources of pathogens and their indicators in marine and estuarine waters include CSO (which includes both stormwater and untreated sewage) and stormwater discharges. While treatment plant discharges may contain pathogens, disinfection of wastewater prior to discharge significantly reduce their existence in the discharge, at least with respect to bacterial species. Stormwater is considered to be a source of pathogens, whether as a point discharge or as a nonpoint source, since stormwater may be contaminated by sewage as a result of failing sewage infrastructure, septic systems, or illegal discharges. In addition, freshwater inputs to the estuaries, direct animal contamination and discharges from boats are additional, but unquantified, sources of pathogens.

Overall, trends for pathogen contamination of shellfish harvesting and recreational waters appear promising. Concentrations of coliform bacteria in the Harbor have declined substantially since the 1970's. However, a recent case study of fecal coliform trends in the near shore and backbay waters of the Barnegat Bay found that 10% of the backbay waters which were pristine in the early 1970's now show low levels of chronic fecal coliform degradation. This is in spite of three regional sewage treatment plants which came on-line during the period (and which moved the discharges from the backbays to the ocean), the elimination of dry weather overflows from combined sewers and extensive point source pollution control efforts instituted in the 1970's and 1980's. It is probable that similar low level, persistent degradation exists elsewhere along the coast. This suggests that the existing environmental successes to control pathogens may not be sufficient, in the face of continued development and nonpoint source contamination. In addition, the existence of viruses in water resources has public health implications, particularly with respect to water use limitations.

4.7. Pathogens in Biota

Approximately 14% of New Jersey's marine waters are closed to shellfish harvesting due to actual or potential pollution problems. Another 11% are either seasonally approved or restricted for harvesting as a result of pollution. Restricted harvesting means that shellfish must be cleansed before being marketed for human consumption. The principal concern with pathogens in biota relates to molluscan shellfish. Molluscan shellfish are a concern because they accumulate pathogens to levels much higher than may occur in the overlying waters. They are also a concern because they are often eaten without being cooked. The safety of the State's shellfish landings are important since shellfish harvesting is a significant part of New Jersey's economy.

4.8. Floatables and Debris

Floatables in the marine and estuarine environment include street litter, vessel jetsam, natural and processed wood, sewage-related waste, vegetation, and medical wastes. The sources of floatables include combined sewer overflows, stormwater discharges, deteriorating shoreline structures, and vessel discharges. Floatables and debris can affect beach use, interfere with boating, and injure and kill marine organisms.

Determinations of actual quantities of floatables are done by the US Army Corps of Engineers and Clean Shores Program in various areas of the coast. Previous beach closings caused by floatables from the New York/New Jersey Harbor have been well-documented. Problems associated with floatables in the Delaware Estuary have been fewer and less thoroughly investigated, with the exception of medical waste discharged from CSOs in Philadelphia and Camden. Floatables from the Delaware Estuary are more likely to impact Delaware recreational beaches than New Jersey's beaches due to the currents at the confluence of the ocean and Delaware Bay. The bays of New Jersey's barrier islands have relatively minor floatables problems that are usually associated with littering from recreational boats and streets.

4.9. Wetlands Management and Losses

The environmental value and fragility of wetlands have been officially recognized in New Jersey since passage of the Wetlands Act of 1970**,** N.J.S.A. 13:9A-1 et seq. Tidal and freshwater wetlands have been identified as the most environmentally valuable land areas within the coastal zone. Wetlands contribute to the physical stability of the coastal zone by serving as (1) a transitional area between forces of the open sea and upland areas that absorb and dissipate wind-driven storm waves and storm surges, (2) a flood water storage area, and (3) a sediment and pollution trap that naturally performs as a wastewater treatment process by removing phosphorous, nitrogen and other water pollutants. The Wetlands Act of 1970 authorizes NJDEP to regulate all development on mapped tidal wetlands. Activities for which a permit is required and activities which are prohibited are listed at N.J.A.C. 7:7-2.2 of the Coastal Permit Rules.

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. This is approximately 20% of the State's freshwater and estuarine wetlands. The rate of destruction has slowed somewhat so that by 1988, losses were estimated at a minimum of 500 acres per year, and currently average 100 acres per year. Using several different Geographic Information System coverages from the NJDEP's GIS data, the number of remaining acres of various types of wetlands in the coastal zone has been estimated, shown in the table below (based on wetland information in the GIS coverages collected in the mid 1980's).

TYPE OF WETLANDS	**NUMBER OF ACRES**
Herbaceous Fresh Water Wetlands	14,956
Deciduous Fresh Water Wetlands	76,458
Coniferous Fresh Water Wetlands	43,249
Agricultural Fresh Water Wetlands	11,245
Atlantic White Cedar Fresh Water Wetlands	7,616
Disturbed Fresh Water Wetlands	6,697
Upland Fresh Water Wetlands	549,087
Tidal Wetlands	347,576
Saline Marshes	15,931
Tidal Marshes	22
Vegetated Dune Communities	406

An important component affecting the impact of nonpoint sources of pollution is loss of wetlands in the coastal zone. Wetlands act to filter out many pollutants before they reach marine waters. Estimated wetland losses statewide before 1970 averaged 3,200 acres per year. From 1953 to 1973, Ocean County alone lost 10,929 acres, or 29.5% of its existing coastal wetlands to development. Marshes on developed barrier islands were particularly affected. In a comparison of aerial photos from 1944 and 1986 along the northern half of Long Beach Island, approximately 74% of the land area of the barrier island had been filled, mostly over both fresh and saltmarshes behind the dune line. State and Federal regulations, such as the Wetlands Act of 1970, have been developed to respond to some coastal habitat degradation.

5. Program Strengths

NJDEP's regulatory programs (i.e., standards, permitting and enforcement), financing programs and most planning functions are conducted on a statewide basis. Monitoring programs focus on a particular type of resource (i.e., separate monitoring networks for streams, lakes, bays, etc.). The following assessment of program strengths addresses only the marine (tidal waters) aspects of each program. Additional discussion of the statewide aspects of each program is included in the Freshwater Watersheds section of this Self-Assessment document.

5.1. Reductions in Beach Closings

The primary causes of bathing beaches closures are elevated levels of fecal coliform bacteria, presence of floatable debris, and oil spills. Fecal coliform bacteria may originate from stormwater, CSO's and sewage infrastructure failure. Resuspension of contaminated sediments may also occur in shallow bays. Closings may be affected by weather which affects loads of bacteria from stormwater, CSO's and sediments, and ocean currents which may transport floatables, oil and bacteria to bathing areas.

Ocean beach closings have decreased from 803 in 1988 to four in 1995. Between 1990 and 1995, no closings were caused by the wash-up of floatables. Recent closings have been very localized and usually limited to 24 hours. This contrasts with the closings of the late 1980's when extensive beach areas (e.g., several miles) were closed for up to three weeks due to the presence of high bacteria concentrations or floatable debris. Beach closings of any kind impact on the public's perception of the State's coastal water quality.

Floatable debris, primarily from the New York/New Jersey Harbor, was a significant cause of beach closings in the late 1980's. Since that time, NJDEP participation in EPA's regional Floatables Action Plan has provided a coordinated approach to preventing floatables from reaching recreational water. This approach has involved public education, aerial surveillance of near shore coastal and harbor waters, and floatables removal by the US Army Corps of Engineers, including removal of old wood structures on the harbor shorelines and skimming floatables from the surface of the harbor waters. In addition, NJDEP's Operation Clean Shores Program has resulted in significant accomplishments.

This program uses state prisoners labor to remove floatables from estuarine shorelines to prevent the resuspension and subsequent washups of floatables in recreational areas. The Clean Shores Program has removed over 65 million pounds of debris from the State's shorelines since 1989. In order to ensure the continued control of this problem, these cleanup efforts must be maintained.

Department of Health and Senior Services regulations for recreational bathing and NJDEP's Cooperative Coastal Monitoring Program (CCMP) have standardized the State's water testing, pollution source investigations, and beach closing procedures. Monitoring data from the CCMP showed that in each of the six years from 1990-1996, at least 98% of ocean bathing beaches met the fecal coliform standard in saline coastal (SC) waters (50 FC/100mL from the shore to 1,500).

At least 92%, of the 130 CCMP stations located in estuarine waters met the 200 FC/100mL standard. This standard, for saline estuarine one (SE-1) waters applies to Raritan Bay, Barnegat Bay, the Shrewsbury-Navesink complex, and the waters along most of the State's intercoastal waterway west of the barrier islands.

Research-based monitoring for the CCMP showed that 100% of the CCMP stations in SC waters sampled for enterococcus (EC) were within the 33 EC/100mL standard for these waters and 90% of the stations in SE-1 waters met the 35 EC/100mL standard for those waters.

Regionalized coastal sewage treatment facilities with higher performance capabilities, more stringent permit requirements, and better compliance records have been instrumental in achieving the significant improvements to coastal water quality.

5.2. Additional Open Shellfish Harvesting Waters Opened

New Jersey has opened additional marine waters for shellfish harvesting each year since 1988. No other east coast state can make this claim. Over a 20 year period, the overall availability of marine and estuarine waters to shellfish harvesting has increased from 75% to 86%.

The increased acreage of available shellfish waters, based on total coliform levels of 70/100mL and fecal coliform levels of 14/100mL, can be attributed to the removal of backbay municipal wastewater discharges and refinements in closures around ocean discharges. Closures are maintained around point sources and in areas contaminated with bacteria to protect public health. Through the coordinated activities of monitoring, permitting, financing (construction grants) and enforcement, upgrades and regionalizations of wastewater treatment plants have resulted in improved water quality and additional availability of shellfish harvest acreage.

Closures around point sources are based on water quality model results. Data from routine monitoring around ocean discharges showed that initial models were too conservative. Additional shellfish waters have been opened around the ocean discharges as a result of refined water quality assessments. Routine monitoring has also identified areas where failing or illegal septic systems are a problem. Enforcement actions are gradually reducing these problem areas, which will allow for the opening of additional waters for shellfish harvesting.

Over the past 20 years, New Jersey has made significant improvements to its coastal water quality through upgrading sewage treatment in coastal communities, but challenges remain. Temporary closures are also implemented as needed in response to sewage spills. As coastal municipalities become more densely populated, nonpoint source management will become essential to maintaining opened areas.

5.3. Improved Rules, Guidance and Plans

5.3.1. Adoption of Uniform Guidance for Dredge Material Management

Recognizing the importance of establishing environmentally sound and uniform guidance for dredged material management in State waters, the NJDEP released the draft "Management and Regulation of Dredging Activities and Dredged Material in New Jersey Tidal Waters" manual for public comment in March 1996. Finalization of the manual is planned for Summer 1997. To protect marine water quality, the manual specifies dredging practices that must be used to reduce the short-term water quality impacts associated with the dredging of contaminated sediments. The manual also specifies that point source discharges to marine waters from the upland disposal of dredged material are not to degrade existing water quality. In order to implement this, limits will be placed on these point source discharges through either the water quality certificate program or a NJPDES permit.

5.3.2. Coastal Zone Management and Planning

In 1980, New Jersey's Coastal Zone Management Plan received final approval under the Federal Coastal Zone Management Act administered by the Department of Commerce. The approved plan identified eight goals for the Coastal Zone Management Program to be achieved through the implementation of various NJDEP programs. The Plan also described the strategy which New Jersey proposed to manage the future protection and development of the coast and its resources. The plan integrates policies for New Jersey's bays and ocean shore, and other tidally influenced waterfront areas in the State including the Delaware River and its tributaries. The approved Coastal Zone Management Program involves planning, permitting and enforcement components to meet the mandates outlined in the Plan. NJDEP receives Federal funding annually through the NOAA to administer and implement the approved CZMP. In addition, NJDEP administers a financing program for upgrade of wastewater facilities and stormwater/nonpoint source management which is available to assist in implementation of needed projects.

The New Jersey Coastal Nonpoint Source Pollution Control Program was developed by NJDEP in response to the Coastal Zone Act Reauthorization Amendments of 1990 (Section 6217) and was incorporated into the New Jersey Coastal Zone Management Program. The 6217 Program, although administered at the Federal level by the National Oceanic and Atmospheric Administration (NOAA), is a joint venture with EPA. The Federal agencies have collaborated in the preparation of guidelines specifying management measures for the major categories of activities that generate nonpoint source pollution. Both agencies have review authority. The program requires that each state with an approved Coastal Zone Management Program develop a Coastal Nonpoint Pollution Control Program. NJDEP submitted its Coastal Nonpoint Pollution Control Program Plan to NOAA and EPA on July 19, 1995. This plan provides for protecting the State's coastal waters from the effects of nonpoint source pollution. Implementation of the plan will occur over the next several years, with full implementation targeted for the year 2004.

The strengths of the Wetlands programs are described in the Land and Natural Resources section of this Self-Assessment document.

5.4. Improved Data Collection, Analysis and Evaluation

5.4.1. Use of Innovative Technologies

The NJDEP has begun to employ data logging sondes in the monitoring of marine waters. These devices are self-contained "laboratories" that measure and record basic water quality over periods of days to months. They allow measurements to be made on a continuous basis. This capability provides information at various times of day and at various tide stages when water quality conditions can vary considerably. Since they can operate unattended, they provide a wealth of information with a minimal investment of labor.

5.4.2. Development of improved analytical methods

The presence of pathogenic organisms in water resources are not monitored directly. Fecal and total coliforms are monitored as surrogates for disease-causing organisms. Currently, however, it is believed that the most common marine pollution-related disease agents are viruses. Coliforms are not as persistent in the water environment as viral pathogens and may not reflect the actual presence of pathogenic viruses and, thus, health risk. Studies are underway at both the Federal (National Indicator Study) and State (New Jersey Alternative Pathogenic Indicator Study) levels to evaluate indicators that may better assess public health risk or track and identify sources of contamination.

Toward this end, the Division of Science and Research has developed methods for testing waters for indicators of viral pathogens. DSR has investigated new bacterial indicators (Enterococci, *E. coli*, *C. perfringens*) and the use of coliphage to distinguish human versus animal contamination. These methods have been used in recent years in marine water monitoring.

5.4.3. Improved monitoring strategies

Over the past ten years, NJDEP has greatly improved its ability to monitor nonpoint source pollution. With the availability of improved computer technology, water quality results from monitoring programs are quickly correlated with rainfall to show where stormwater is affecting marine water quality. Additional monitoring by the municipalities under the Sewage Infrastructure Improvement Act is providing valuable information to NJDEP on the location of storm drains and on the concentration of bacterial contaminants coming from those drains. NJDEP and the U.S. Geological Survey will use the information gained from this monitoring effort to develop a model to predict pollutant loads based on land use characteristics.

5.4.4. GIS for decision making

The NJDEP has developed the ability to use the GIS to overlay coastal water quality conditions with pollution sources and land use to make informed decisions on restricted water use for shellfish harvesting. Trends analyses were recently conducted on eight environmental indicators in the Barnegat Bay to assess cumulative nonpoint source impacts for the Coastal Management Program. Additional GIS analysis is planned for the coming year and data sets are being developed to further use of the analytical capabilities of GIS.

5.5. Watershed Management

The development of a Framework Document for Watershed Management and implementation efforts in freshwaters are described in the Freshwater Watersheds section of this Self-Assessment document.

5.5.1. National Estuary Program Established

In 1987, Congress established the National Estuary Program (NEP) as part of the Clean Water Act (Section 320); Congress also mandated that a restoration plan be developed for the New York Bight. The mission of the NEP is to protect and restore the water quality, biota and habitat of estuaries that are threatened by pollution, overuse, and development. The EPA administers the program and designated three estuaries in New Jersey as nationally significant including: the New York/New Jersey Harbor Estuary Program/New York Bight Restoration Plan (HEP, 1988), the Delaware Estuary Program (DELEP, 1989), and the Barnegat Bay National Estuary Program (1995). These programs build watershed management partnerships to fulfill environmental quality objectives for New Jersey's estuaries and develop environmental quality indicators. On the HEP and DELEP programs, scientists and environmental managers from the States of New Jersey, New York, Delaware, and Pennsylvania have convened to develop regional monitoring programs and to identify environmental indicators to judge the success of the Comprehensive Conservation and Management Plan (CCMP) actions to address sources of toxic and pathogenic contamination, nutrient enrichment and loss of habitat and living resources. In the New York/New Jersey Harbor Estuary, the New Jersey Harbor Discharger Group, comprised of 11 major sewerage authorities in New Jersey, and New York City dischargers are working with the HEP to develop pilot projects to reduce toxic contamination from municipal discharges throughout the Harbor. Both the HEP and DELEP have successful mini-grant programs that have distributed over $300,000 in funds to over 100 organizations and local governments to conduct outreach and educational projects throughout the Harbor and Delaware regions.

<u>NY/NJ Harbor Estuary and NY Bight (HEP</u>)

Established in 1988, the HEP CCMP was approved by the Policy Committee on February 20, 1996 and the Governors of New York and New Jersey in February 1997. The HEP CCMP contains over 300 actions to address priority issues of toxic and pathogen contamination, habitat loss, dredged material management, floatable debris, nutrient enrichment and point/nonpoint sources of pollution, public involvement, and environmental indicators.

<u>Delaware Estuary Program (DELEP</u>)

Established in 1989, the DELEP CCMP was approved by the Governors of New Jersey, Pennsylvania and Delaware in September 1996. The CCMP contains over 75 actions that address land management, water use management, habitat and living resources, toxics, education and public involvement, monitoring and data management.

<u>Barnegat Bay</u>

Designated in 1995, the Barnegat Bay Estuary Program has established a Management Conference and is conducting scientific characterization studies building on previous efforts (e.g., Watershed Management Plan for the Barnegat Bay, 1993). Nonpoint source control and multiple user impacts are issues of concern.

5.5.2. Monmouth-Ocean Alliance to Enhance the Manasquan River

The Monmouth/Ocean Alliance to Enhance the Manasquan River (a consortium of State, county, municipal and private agencies) was formed three years ago. The Alliance was formed as a direct result of shellfish water quality concerns presented in the Bureau of Marine Water Classification and Analysis' 1992 shellfish growing area report on the Manasquan River. The primary goal of the Alliance is to institute pollution control strategies for the protection of shellfish water quality and resources in the river. The goal of the Alliance is to assess actual and potential sources of pollution in the Manasquan watershed and their relationship to coliform concentrations in the river. The Alliance, a valuable asset to the NJDEP in protecting shellfish resources in the Manasquan River, conducts pollution investigations and cleanup, provides monitoring assistance, provides land use analysis via GIS, implements septic system dye studies and coordinates public education.

5.5.3. Navesink River Shellfish Protection Program

Since 1981, a major inter-agency initiative involving Federal, State, county and private institutions (representing environment, health and agriculture) and costing several million dollars, has been underway to reduce nonpoint source bacterial pollution of the Navesink estuary. The sources have been attributed to a combination of stormwater runoff associated with residential development, livestock waste from concentrated horse breeding operations, and human waste from marina/boat operations. A comprehensive, coordinated management plan was implemented in 1986 to reduce these bacterial source loadings to the estuary and to restore recreational and commercial shellfish harvesting. The marine water monitoring program, conducted by the NJDEP Bureau of Marine Water Classification & Analysis, provided the basis for measuring the response of the Navesink River to the nonpoint source pollution management practices implemented.

Water quality in the Navesink River has improved significantly during the last five years. As a result, for the first time in 25 years the long-term goal of improving water quality in the Navesink has been realized. It has improved to the point that unrestricted shellfish harvesting in a large portion of the Navesink is now permitted. These improvements are a direct result of the successful reduction of nonpoint source loadings from coastal development, agricultural waste and marina and boating-related contamination. Changes in the land use characteristics of the shoreline and surrounding watershed have been minimal and are expected to remain stable over the next 15 years.

5.5.4. National Estuarine Research Reserve System

The National Estuarine Research Reserve System (NERRS) is administered by the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce. Congress created NERRS in 1972 in recognition of the human threat to the natural values of estuaries. NERRS is dedicated to fostering a system of estuary reserves that represents the wide range of coastal and estuarine habitats found in the United States. NERRS works with Federal and state authorities to establish, manage, and maintain reserves and to provide for their long-term stewardship. The Mullica River-Great Bay Estuary has been identified as a NERRS candidate site. A Draft Environmental Impact Statement (DEIS) and Draft Management Plan have been submitted to NOAA for final review; approval of these documents and designation of the candidate site is anticipated in early 1997.

5.6. Reductions in Point Source Loadings

5.6.1 Upgrade and Regionalization of Sewage Treatment Plants

Sewage treatment facility upgrades to the minimum of secondary treatment as defined in 40 CFR 133.102 were required to be completed by dischargers to surface waters by the Federal statutory deadline of July 1, 1988. Through the combined efforts of planning, permitting, enforcement and financing programs in NJDEP, all existing domestic wastewater treatment facilities in the State, including those discharging into the marine environment, are in compliance with this Federal mandate.

Regionalization of the domestic wastewater treatment facilities discharging into the marine environment has also resulted in the closure of six sewage treatment facilities and the removal of all associated backbay point source discharges. As a result, significant progress has been achieved in improving the quality of the State's marine and estuarine waters.

5.6.2. Regulation of Ocean Dischargers

In addition to compliance with Federal NPDES requirements, direct dischargers to the ocean must also satisfy the requirements of the Federal Ocean Discharge Criteria (ODC) as established at 40 CFR 125, subpart M. In order to renew a NJPDES permit for an ocean discharger, the DWQ must make either a favorable preliminary or favorable final finding under the ODC, based on the information submitted by the permittee. In order to make a preliminary finding, data is needed on: priority toxic pollutants, acute bioassays, mapping of sensitive/special ecological areas and a biological survey. If a preliminary finding is made, the permit must also contain a compliance schedule for the permittee to collect the data necessary to make a decision on the final finding. As a result of extensive coordination with these dischargers over the past two years, sufficient information has been generated to allow the DWQ to make a favorable finding for one outfall and favorable preliminary findings for 12 other outfalls. The studies for the 14th outfall have been completed and are currently being evaluated. Biological studies have been completed for five facilities and the remaining 8 are being conducted this summer. It should be noted that, based on review of discharge monitoring report data (1994-95) for the 17 permitted treatment facilities which discharge into the ocean through the 14 outfalls, the average effluent quality is significantly better than the permitted levels.

5.6.3. Improvements in Combined Sewer Overflow Management

New Jersey has maintained an aggressive policy in addressing the discharges from combined sewers in eliminating dry weather overflows and establishing a requirement that solids no greater than one half inch in diameter be allowed in CSO discharges. The half inch standard was established to substantially reduce the solids and floatable materials discharged into the State's waterways, and to assure capture of needles or other dangerous medical wastes prior to discharge. However, due to the presence of untreated sewage and associated pathogens during wet weather discharges, CSOs remain a human health concern.

The NJDEP permitting, enforcement and financing groups have worked together to minimize the impacts of this category of point source discharges throughout the State. Recent permitting initiatives, in conformance with EPA's objectives of the National Combined Sewer Overflow Control Policy (National Policy), have resulted in the identification and regulation (permitting) of all portions of combined sewer systems and their respective CSO discharge points. Current permits mandate the implementation of technology-based requirements, and initiation of the first phase of development of Long-term Control Plans by requiring the characterization of all CSO discharges with respect to frequency, duration and quality. Future regulatory actions will include the development of enforceable instruments requiring the monitoring and modeling of receiving water quality, CSOs, sewage treatment plants and other pollution discharge impact assessments, water quality standards compliance assessment, development and evaluation of control alternatives as appropriate, plan selection and implementation. The ultimate goal is to achieve compliance with the technology-based and water quality-based requirements of the Federal Clean Water Act.

In response to the issuance of permits to CSO owners/operators, a coalition of 11 major sewerage authorities, known as the New Jersey Harbor Dischargers Group, has agreed to cooperate in a regional effort, working with NJDEP, New York and other agencies, to develop a long-term CSO abatement plan for the region to prevent exceedences of water quality standards, restore and/or maintain beneficial uses, and eliminate adverse ecosystem impacts due to CSOs. Similar progress is being made with respect to other authorities that have received CSO permits.

In order to address coastal pollution problems, the Legislature enacted the Sewage Infrastructure Improvement Act (SIIA), N.J.S.A. 58:25-23 et seq., which includes two principal components: (1) stormwater and sewage collection system mapping and nonpoint source control (discussed in section 5.5.1 below) and (2) combined sewer overflow abatement. The SIIA's CSO management component requires that any public entity operating a combined sewer system provide abatement measures at overflow points which require NJPDES permits. The measures include the elimination of dry weather discharges and solids/floatables controls. In addition, the Act authorized the availability of grants for planning and/or design of needed CSO facilities. Through the Municipal Wastewater Assistance Program, grants have been awarded to several CSO operators in the northeastern portion of the State and Camden County. Low interest loans are also available for CSO abatement projects from the Municipal Wastewater Assistance Program through Federal and State sources of funds. These loans will assist municipalities and authorities in meeting the CSO abatement requirements at significantly reduced local costs.

5.6.4. Cessation of Ocean Dumping of Sludge

Until 1989, just over half of the sewage sludge being generated in New Jersey (by six sewage treatment facilities) was disposed in the Atlantic Ocean. Under Federal and State Judicial Consent Decrees (JCDs), these six facilities agreed to implement plans for their residuals to be reused as beneficial products. Improvement of the water quality was intended as a result of the elimination of ocean disposal practices.

5.7. Reductions in Nonpoint Source Loadings

5.7.1. Increased Stormwater and Sewage System Investigations and Remediations

As indicated above, the Sewage Infrastructure Improvement Act (SIIA) included two principal components: (1) stormwater and sewage collection system mapping and nonpoint source control and (2) combined sewer overflow abatement. The SIIA established requirements for 94 coastal communities to address stormwater management within their jurisdiction. These municipalities were required to map stormwater collection systems, monitor stormwater quality, identify and remediate inter- and cross-connections of stormwater and sewer systems. The remediation of these connections is intended to reduce the impacts of sewage-contaminated stormwater discharges on coastal water quality. The Act also authorized a grant program, which is administered by the OEP, to financially assist with the mapping activities. Grants have been awarded to the majority of the 94 coastal municipalities, with pending grant awards to all remaining eligible municipalities. Coastal municipalities have contributed to improvements in coastal water quality and reductions in beach closings by performing mapping, investigations and remedial activities required by the Sewage Infrastructure Improvement Act. However, the near shore coastal waters and the barrier island bays, in particular, remain susceptible to the bacterial contamination that stormwater often conveys.

5.7.2. New Jersey Clean Vessel Program

The Clean Vessel Act of 1992 is allowing New Jersey to address concerns related to vessel-generated sewage, which is considered to be a nonpoint pollution source of pollution. In New Jersey, 60-70% of boating occurs in coastal counties and is a particular concern in coastal embayments where marinas and other boating facilities are located. The success of the program can be measured as follows: 12 marinas have been approved for pump-out stations with 30 more marinas pending. A No Discharge Zone application has been filed with EPA for the Manasquan River.

5.8. Blue Acres Program

New Jersey's Green Acres Program provides planning assistance and low-interest loans and grants to municipalities and counties for open space acquisition and recreational development projects. In November 1995, New Jersey voters endorsed a $15 million bond referendum (P.L. 1995, c. 204) to fund a State Blue Acres Program modeled after the successful Green Acres program. The referendum generates funding to acquire, coastal lands most susceptible to storm damage and erosion from willing sellers. This acquisition program is a bold step for New Jersey’s evolving shore protection strategy. A publicly funded acquisition program that extends beyond undeveloped land and non-buildable lots to presently developed, very vulnerable land, could be quite controversial. The extent to which public money should be spent for land that may be under water within a few years is being evaluated as the Blue Acres Program develops its acquisition criteria.

6. Program Limitations

NJDEP’s regulatory programs (i.e., standards, permitting and enforcement), financing programs and most planning functions are conducted on a statewide basis. Monitoring programs focus on a particular type of resource (i.e., separate monitoring networks for streams, lakes, bays, etc.). The following assessment of program limitations addresses only the marine (tidal waters) aspects of each program. Additional discussion of the statewide aspects of each program is included in the Freshwater Watersheds section of this Self-Assessment document.

6.1. Limitations of Data Collection, Analysis and Evaluation

6.1.1. Toxics in water

High quality ambient and loads data for toxics are essential to determine whether or not a surface water body is exceeds toxics criteria, and is therefore impaired by toxics. The historical database for both ambient conditions and loadings of metals from point sources has been questioned because of the potential for contamination due to sampling and analytical limitations. Recent recognition of the potential contamination problem mandates that marine and estuarine water bodies be re-examined to determine conclusively if there are any current exceedences of water quality criteria for toxic metals. Currently, there are insufficient data to answer this question for near shore coastal waters.

Effluent monitoring for selected toxics has been performed by NJDEP. In recent years, this has included sampling in the Passaic, the Whippany and the Maurice Rivers. Additional toxics data will be needed for permitting decisions as watershed management is implemented.

6.1.2. Toxics in Biota and Sediments

Routine monitoring of heavy metals in shellfish tissue was performed by NJDEP staff in the mid 1980's. New Jersey has never funded routine monitoring of marine sediments for toxics on a statewide basis. In recent years, the NJDEP has relied on toxics monitoring (tissue and sediment) by Federal programs such as EPA's EMAP and NOAA's Mussel Watch. However, these programs are very limited geographically, focusing mainly on the New York/New Jersey Harbor and the Delaware Bay. Continuation of these Federal programs is uncertain. To protect human health, additional routine monitoring of chemical contaminants in consumable marine biota is needed. Also, trophic transfer, bioconcentration, and bioaccumulation in marine systems are not well understood.

6.1.3. Pathogens in Water

Bacterial and viral pathogen contamination of marine and estuarine waters is inferred by the measurement of concentrations of indicator organisms: total coliform (TC), fecal coliform (FC), and enterococcus (EC). The three indicators have a variable effectiveness in accurately representing the actual presence of pathogens in waters. They are used because of the ease and practicality of the indicator analyses and their relatively low cost.

However, coliforms are not as persistent in the water environment as viral pathogens and may not reflect the actual presence of pathogenic viruses and, thus, health risk. Continuation of studies underway at both the Federal (National Indicator Study) and State (New Jersey Alternative Pathogenic Indicator Study, funded through HEP) levels to evaluate indicators that will better assess public health risk or track and identify sources of contamination, important to our efforts in classifying marine and estuarine waters for various uses particularly with respect to shellfish consumption and recreational bathing, should be maintained. Once established, these indicators should be further assessed to determine if any changes to the State's disinfection requirements are needed.

6.1.4. Pollutant Fate and Transport

Significant gaps exist in our understanding of tidal currents and flows in New Jersey's coastal bays which transport pollutants and affect natural processes. Data exists for the New York/New Jersey Harbor and Delaware Bay. Data are also under development for Barnegat Bay. For the remaining bays of New Jersey, NJDEP's knowledge of tidal currents is limited. This information is important when responding to spill situations, phytoplankton blooms and water quality models.

6.1.5. Characterization of Nonpoint Sources of Pollution

Additional research needs to be conducted concerning nonpoint sources of pathogens, nutrients, and toxic contamination to marine waters. Statewide data sets, such as the GIS Urban coast coverage, should be used to model and assess nonpoint source nitrogen and phosphorus contributions along the entire coast, instead of only in special study areas. Statewide data sets to assess other nonpoint contaminants, such as toxic or oil and grease, should be developed. Research on stormwater loads, such as that being conducted in Toms River, needs to be continued and used within a watershed management framework. Cumulative loads and relative contribution studies are needed so that future management efforts are targeted at the most important sources.

Previously unstudied sources, such as air deposition, should be studies using test sites in New Jersey. For example, in the Chesapeake Bay air deposition has been shown to contribute 11% of the nitrogen load and 6% of the phosphorus load. Clearly, there is some amount of the nonpoint source load of nutrients being contributed by the air in New Jersey also, warranting further study.

6.1.6. GIS Data Needs

Current land use/land cover information is needed to perform trend analysis and nonpoint source loads estimates. Existing coverages are based on 1986 data. It should be stressed that GIS is becoming an important tool, both for data cross referencing, as well as analysis. With this in mind, efforts should be made to encourage all environmental data collection to include a usable spatial location with the measurement, meet minimum GIS accuracy standards and be stored in such a manner that it can be brought into the GIS when needed.

6.1.7. Marine Biological Assessment Method Needed

Currently, routine biological assessment of New Jersey's marine waters are not performed. In freshwater systems, the rapid bioassessment protocols have successfully been used to assess 60% of New Jersey's freshwater streams to screen waters for aquatic life designated uses. The rapid bioassessment methods do not require the time-consuming identification of organisms to the species level, as was needed in the more traditional bioassessment methods. Similar protocols for the marine environment are under development by the EPA, but are currently not available. New Jersey continues to encourage the EPA to develop these methods as soon as possible. Once available, use on a routine basis in the State's marine environment would provide useful information to track environmental progress.

6.1.8. Cause and Effect Studies and Assessments

Lack of cause and effect studies (especially for phytoplankton blooms, declines in fish stocks and nonpoint sources of contamination) hinders management of our marine waters. The causes of hypoxia, algal blooms and other eutrophication effects are also not well understood. Research on the causes of low dissolved oxygen, and baseline studies of "normal" phytoplankton community composition and variations would also be useful in management of these pollution effects on water resources.

6.1.9. Prioritization of Issues

Through conduct of a comparative risk assessment project, anticipated to be undertaken shortly, NJDEP will be able to assess estimated and perceived risks of environmental issues. Human health, ecological health and quality of life concerns will be assessed, which will allow the NJDEP to establish priorities across air, water and land resources. Additional work could be done to identify and measure perceptions of our citizens on those aspects of the environment which are most important to their quality of life.

6.2. Point Source Impacts

Program limitations related to management of point source impacts have been discussed in the Freshwater Watersheds section of this Self-Assessment document. Issues germaine to marine waters are the focus of the following discussion.

6.2.1. Combined Sewer Overflows

EPA's National CSO Control Policy required the implementation of the Federal technology-based requirements within two years or by January 1997. While significant progress has been achieved in this regard, the time frames as established under the Federal CSO regulation requirements need to be applied in a flexible manner in order to facilitate environmental progress through a watershed management framework. Through comprehensive watershed management, appropriate watershed-specific decisions will maximize cost-effective environmental benefits, which includes coordination of CSO control efforts with other point and nonpoint source management activities.

Implementation of existing Federal requirements applicable to CSOs will be costly, a burden that the local government entity which owns the CSO point will bear. Many of these communities are small and/or economically distressed urban areas. The award of planning and design grants under the Sewage Infrastructure Improvement Act, administered by the Municipal Wastewater Assistance Program, has significantly assisted with program compliance. Although low interest loans are also available through MWA, the costly nature of CSO projects may still be prohibitive to some municipalities.

In addition, the application of existing surface water quality standards considerations for frequency, magnitude and duration in the regulation of CSOs has been questioned. Resolution of how existing or modified water quality standards can be developed and/or applied under wet weather conditions to achieve attainment of human health and ecological goals is needed.

6.2.2. Unmet Wastewater Facility Needs

Although there have been significant accomplishments under the State's Construction Grants, SRF and State-only financing programs, the 1992 National Wastewater Needs Survey indicated that $4.75 billion in wastewater treatment improvements are still needed in New Jersey. A major component of this need includes projects to address CSO's, which are very costly.

In addition, wastewater facilities are not being replaced or upgraded as needed, particularly in urban areas with marginally effective sewage infrastructure systems that are approaching or exceeding their maximum useful life. Millions of dollars are spent transporting and treating extraneous flows which enter these systems which may substantially contribute to CSO discharges, rather than eliminating these flows through sewer upgrades. In view of the significant costs associated with the rehabilitation or replacement of these inadequate conveyance systems, municipalities frequently do not place a high priority on such infrastructure projects when allocating limited local financial resources. Through watershed management, appropriate watershed-specific decisions with respect to infrastructure improvement priorities can be made to facilitate cost effective environmental benefits.

6.2.3. Industrial Stormwater Controls

The Federal regulations that establish the authority to regulate industrial stormwater specifically excludes industrial facilities in areas served by combined sewers. As a result, NJDEP does not permit industrial facilities under the stormwater permit program in areas served by combined sewers. Therefore, Stormwater Pollution Prevention Plans are not being developed and implemented at these facilities. It is expected that this pollution source will be addressed in conjunction with implementation of watershed management plans in these areas.

6.3. Stormwater Runoff

Currently 150 municipal stormwater outfalls discharge to ocean waters and 7,000 to bay waters. Controlling these nonpoint sources of contamination is needed to manage the marine environment. Increased water quality improvement efforts are expected to be facilitated through watershed management activities.

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Water Resources Self-Assessment: Part 3: Ground Water

1. Background

1.1. Ground Water Overview

Ground water is a vital resource for New Jersey. 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 is the major source of water sustaining flows in streams and water levels in lakes and wetlands. During dry weather conditions, ground water is usually the only source of water recharging surface water bodies. As such, the quality of ground water directly impacts the quality of surface water and aquatic ecosystem health. Up to 90% of the annual stream flow in the New Jersey coastal plain is from ground water.

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, which also control landform evolution, are different in each province. From north to south the provinces are: the Valley and Ridge, Highlands, Piedmont and the Coastal Plain (Figure GW-1, found at the end of this section). The three northern provinces are made up of fractured lithified bedrock with a surface layer of unconsolidated glacially deposited materials occurring in the northeastern 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 pollution sources 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.

A subset of 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 selected to become part of New Jersey's Ambient Ground Water Quality Network. The present goal of this monitoring network is to characterize natural ground water quality on a regional basis as a function of geology, not to track pollution impacts. 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 New Jersey Geological Survey, within NJDEP, and USGS to monitor the quality of ground water in New Jersey. Each year, a region is selected and 22 wells are sampled and analyzed for major ions, nutrients, trace constituents, organic carbon and gross alpha activity. Results are compared to drinking water standards to assess actual and potential potable use of the aquifers. Parameters monitored and drinking water standards are provided in Table GW-1 (found at the end of this section). A volatile organic chemical (VOC) scan is also conducted on each sample as a screen for detecting polluted ground water. In addition, the levels of pesticides in ground water resources are periodically monitored by the Pesticide Control Program. Monitoring discharges to ground water is a function of the Division of Water Quality (DWQ), as well as management of the Subsurface Wastewater Disposal program, pursuant to the Realty Improvement Act

1.3. Overview of Natural Ground Water Quality

1.3.1. Valley and Ridge Physiographic Province

This province, located in the north western part of the State, 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. From a surface area viewpoint, the dominant geologic units are the dolomite-dominated Kittatinny Supergroup and the Martinsburg Formation.

Chemical analyses of water samples from a limited number of wells (17 in the Kittatinny Supergroup 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 attaining the State's secondary drinking water standards.

1.3.2. 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. The most common problem identified in the Ambient Ground Water Monitoring Network are associated with attaining the state's secondary drinking water standards (Table GW-4, found at the end of this section). In a 1987 research study, 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 picocuries per liter (pCi/L), and 5.4% of the wells had levels greater than 10,000 pCi/L. EPA has proposed a

Maximum Contaminant Level of 300 pCi/L for radon in ground water. However, concentrations of 10,000 pCi/L in domestic water are thought to contribute approximately 1 pCi/L of radon to in indoor air (Hess, 1985). Currently, the standard for indoor air is 4 pCi/L.

1.3.3. Piedmont Physiographic Province

The Piedmont Physiographic Province in New Jersey is comprised of late Triassic aged sedimentary Stockton and Lockatong Formations 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 the natural quality of the 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 attaining the state's secondary drinking water standards. The standards exceeded are shown on Table GW-5 (found at the end of this section). A few samples exceeded the state primary drinking water standards for gross alpha particle activity (6.5%), radium (3%, only Ra-226 measured), and lead (0.7%).

In the urbanized lower Hackensack river basin and the nearby Newark area, the water quality is generally poor due to anthropogenic (i.e., human induced) and natural factors. Localized saltwater intrusion due to historical over pumping and the production of deep, slowly moving, naturally mineralized water has resulted in high total dissolved solids, including chlorides.

1.3.4. 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 from northern New Jersey, 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 State's secondary drinking water standards for iron, total dissolved solids and hardness do occur (Miller, 1974).

1.3.5. Coastal Plain Physiographic Province

The Coastal Plain is the largest of the physiographic provinces in the State, covering an area of nearly 4,400 square miles of southern New Jersey. 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, the Englishtown aquifer system and the Potomac-Raritan-Magothy aquifer system. All of the 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 has 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 (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 pCi/L and 15 pCi/L, respectively. The source(s) of these radiological contaminants is not known and ongoing NJDEP and USGS studies are being conducted to better understand their occurrence in the Coastal Plain. Mercury, pesticide, radiological and nitrate contamination have also been documented in the Coastal Plain. They are 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 Potomac-Raritan-Magothy, and high chloride in aquifers affected by salt water intrusion. The confined aquifers are more susceptible to pollution inputs in their outcrop areas than areas where they are overlain by impermeable strata.

1.4. Point and Nonpoint Sources of Pollution

Ground water is naturally of good quality in many areas of the State, as described above. However, New Jersey's significant industrial base and high population have led to pollution of ground water in numerous locations due to underground storage tanks, spills, historical industrial practices, leaching from landfills and other point sources. Nonpoint source pollution to ground water include septic systems, small unregulated sources, application of fertilizers, and pesticides (Table GW-7, found at the end of this section). Additionally, naturally occurring contaminants, such as radon and radium, may affect water uses locally. These contamination problems are discussed in more detail in the Key Ground Water Issues section.

1.5. Overview of Ground Water Quality Standards

New Jersey adopted Ground Water Quality Standards in January 1993 which assign designated uses, including the protection of human and ecosystem health, 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.

Class I: Class I ground waters are waters with special ecological significance, including Class I-A which are areas with endangered species, undisturbed ecosystems, trout production streams, etc. and Class I-PL, which are Pinelands areas. For Class I areas, the ground water criteria relate to the natural quality of ground water or background.

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 January 1993, 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.

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 to restore them to Class II-A, 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 included in the discharge are higher. The intent of this 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.

Class III: Class III waters are divided into Class III-A, which are ground waters within major aquitards which do not yield water in sufficient quantity to serve as water supplies, and Class III-B, waters with natural characteristics such as high total dissolved solids or chloride which make them unsuitable for potable and most other uses.

2. Description of Ground Water Programs

Numerous programs and functions within NJDEP manage and monitor ground water. In addition to NJDEP programs, efforts are coordinated 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.

2.1. Policy and Planning

- **Office of Environmental Planning**

The Office of Environmental Planning is responsible for several activities which affect ground water quality and uses. These activities include developing the Water Supply Master Plan, Wellhead Protection Program, Aquifer Recharge Area Protection Program, Ground Water Quality Standards, Nonpoint Source Management and Water Conservation Programs. Ground water quality is summarized in the Statewide Water Quality Inventory Report (305b Report) every two years.

- **Division of Science and Research**

Environmental Research and Health Assessment Element

The Environmental Research and Health Assessment Element in the Division of Science and Research 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, radiological and pesticide contamination in ground water, pesticide and VOC vulnerability assessments of public water systems, and development of models to assess impacts of contaminated ground water on surface water.

New Jersey Geological Survey

The New Jersey Geological Survey element is a public service and technical agency which provides mapping, Geographic Information Systems (GIS) support, research and interpretation functions and provides scientific information regarding the state's geology and ground water resources to state, regional and public entities. An in-house GIS system and comprehensive hydrogeologic database support these services. Some of the Survey's major projects include the Ambient Ground Water Quality Network, the delineation of Wellhead Protection Areas, and mapping of aquifers and recharge areas. Technical support is also provided to the Water Allocation and Site Remediation Programs.

Water Monitoring Management

The Water Monitoring Management element collects environmental samples including ground water, surface water, biological and stream sediment.

- **Office of Quality Assurance**

The Office of Quality Assurance (OQA) has the responsibility for developing and administering the annual quality assurance management plan (QAMP) and for overseeing all the quality assurance activities associated with NJDEP's environmental programs. The OQA acts as the liaison between NJDEP and the EPA on all quality assurance issues and analytical data collection techniques. Additionally, OQA administers NJDEP's laboratory certification program, responsible to certify laboratories performing analysis of drinking water, wastewater, radon in air and water, and operates a contract laboratory program (CLP) for use by NJDEP programs.

2.2. Environmental Regulation

- **Division of Water Quality**

The Division of Water Quality (DWQ) issues NJPDES discharge to ground water (DGW) 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 DGW 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, spray irrigation systems, overland flow systems, certain drywells, infiltration/percolation lagoons, and operating landfills. Industrial septic systems and high volume sanitary septic systems are managed through the Underground Injection Control Program of the NJPDES regulations. Significant ground water monitoring information is maintained within the DWQ's NJPDES database. The NJPDES program also administers the standards for the Construction of Individual Subsurface Sewage Disposal Systems pursuant to the Realty Improvement Act. In addition to the above, the upland disposal of sediments dredged from channels and harbors is regulated under this program. Financing of wastewater and stormwater/NPS management projects by the Municipal Wastewater Assistance Program also address various ground water quality problems.

Water Supply Element

Bureau of Water Allocation

The Bureau of Water Allocation in the Water Supply Element is responsible for permitting construction of all wells, permitting ground water diversions (greater than 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**

The Division of Solid and Hazardous Waste 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 ground water 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.

2.3. Enforcement

- **Water Compliance and Enforcement Element**

The Water Compliance and Enforcement Element is responsible for inspecting all facilities issued NJPDES permits by the Division of Water Quality for compliance, including the federally mandated Underground Injection Control (UIC) program. This Element offers compliance assistance, brings non-filers into the NJPDES program and does confirmational sampling of discharges and/or ground water monitoring wells.

- **Pesticide Control Program**

The Pesticide Control Program (PCP) is responsible for enforcing State and Federal pesticide regulations to prevent pesticide contamination and to reduce adverse environmental and ecological effects resulting from legal and illegal use of pesticides on a statewide basis. The Pesticide Control Program manages the Aquatic Pesticide Permit Program and the Mosquito/Fly Control Permit Program for the State. Treatment records for the type and amount of pesticides that are applied to the aquatic environment are reviewed, permitted, tracked and monitored. In addition, PCP also conducts pesticide training, outreach and education activities, collects and evaluates pesticide use and impact data, and conducts residue monitoring projects.

2.4. 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 are 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.

2.5. Pollution Prevention

See the Freshwater Watersheds section of this Self-Assessment document.

3. Stakeholder Involvement

See the Freshwater Watersheds section of this Self-Assessment document.

4. Key Ground Water Issues

4.1. Toxics in Ground Water

Through a variety of monitoring and research efforts, NJDEP has identified localized 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 sampling of private wells. Private wells tend to be in shallow, unconfined aquifers, and thus are often more vulnerable to contamination from pollution sources at the surface than deeper community water supply wells. In addition, contaminants in ground water may migrate to surface waters, potentially contaminating streams, sediments and biota. In New Jersey, most to all of the surface water in streams is derived from ground water.

The NJDEP has contracted with the USGS to conduct research to investigate the relationship between the occurrence of contaminants in ground water (i.e., nitrate, pesticides, metals, radon and other radionuclides) with various water quality parameters. 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 in 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 and radionuclides are also elevated in some wells in northern and central New Jersey.

4.1.2. 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 New Jersey (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 industrial land use.

Often when the sources of VOCs ground water are identified, the contamination is attributed to point sources. However, as noted in Table GW-7 (found at the end of this section), sources of ground water contamination have not been identified in 40% of the cases in seven counties. Some common point sources of chemical contamination by VOCs include accidental spills, leaking underground storage tanks, hazardous waste sites, septic systems, and wastewater discharges from industries or sewage treatment plants. Common NPSs of VOCs include improper disposal of household waste or small business hazardous waste and misuse of septic systems as a disposal avenue.

4.1.3. Metals

There are a number of metals that are of concern in ground water. For some, data exists to validate their inclusion as a key issue. For others, there is not enough data to know conclusively if they are key issues or not.

Mercury

Mercury levels exceeding the drinking water maximum contaminant level (MCL) of two parts per billion (ppb) have also been found in private wells tapping the Kirkwood-Cohansey aquifer in southern New Jersey. Over 2,300 private, potable wells have been sampled in southern New Jersey 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 were found to have levels of mercury routinely above the MCL have either been supplied point-of-entry treatment units to 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.

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 to which 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 New Jersey's results.

Since ground water contributes up to 90% of surface water in the Coastal Plain, elevated levels of mercury in ground water are potentially contributing to finfish contamination. The ambient levels of mercury in ground water in New Jersey have been measured to be one to 40 ng/L (nanograms per liter) (Murphy, et al., 1994), so levels above this are believed to be caused by anthropogenic sources. Further, an assessment of the mineralogy in the area indicates that the mercury found in ground water cannot be contributed from natural aquifer sediments (Dooley, 1992). 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; and 4) atmospheric deposition. A draft report completed by the USGS for NJDEP has identified 32 contaminated areas in southern New Jersey 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.

Arsenic

It is known that large quantities of arsenic-based pesticides were applied to New Jersey agricultural land and golf courses from the turn of the century through the 1960s. Much of this arsenic remains on the surface soils. However, there is indication in the literature that newly-applied arsenical pesticides could be mobile. Therefore, there is the possibility that arsenic, applied from 1900 to 1960, has leached to ground water. Only limited data exist. DSR conducted a study with USGS investigating the impact of pesticides in ground water. Among the analytes they investigated was arsenic. While only one of 35 wells sampled in southern New Jersey showed detectable levels of arsenic (4 ug/L), 24 of 39 wells sampled in northern New Jersey showed detectable levels (1 to 15 ug/L). Information is needed to evaluate whether arsenic is reaching New Jersey ground water.

Chromium

Chromium has been found at elevated levels in specific areas in the state. While most of the contaminated chromium sites are located in areas where ground water is not used for drinking, the overall issue of chromium in ground water is considered important.

Other metals

There is no formal monitoring program for metals in ground water. Although some metals seldom appear in ground water (i.e., lead), others appear sporadically or are problematic in localized areas of the state. Routine monitoring or assessment of data collected by external agencies (i.e., health departments) is needed.

4.1.4. Unidentified or Tentatively Identified Synthetic Organic Compounds

Recent investigations in certain parts of the State have shown the presence of synthetic organic compounds not routinely tested for as part of the conventional ground water monitoring regime. Most monitoring efforts focus on the presence of volatile and semi-volatile compounds because these types of chemicals are: 1) commonly used industrial and commercial chemicals; 2) water soluble and mobile in the environment; and 3) known to contaminate ground water and 4) are of concern to human health. As analytical technologies have improved and our knowledge of chemical fate and transport in the environment has progressed, it has become apparent that there may be chemicals in ground water that were not detectable by former technologies but that can be detected by more sophisticated methodologies. Unknown "peaks" have been seen in the analytical results for water samples collected near contaminated sites. These peaks may signify the presence of unidentified synthetic organic chemicals in ground water.

4.1.5. Ground Water Pollution at Contaminated Sites

There are 7,041 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 2,048 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 from 111 sites in one southern and one northern county was reported in SRP's Site Status Report (NJDEP, 1992) which are summarized on Table GW-6 (found at the end of this section). 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 seven counties was conducted and reported in the State Water Quality Inventory Report (NJDEP, 1992). Results for the 1,200 cases in these counties are shown on Table GW-7 (found at the end of this section). Major sources (i.e., greater than 10%) of contamination cases (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 five of the IEC cases were provided with permanent or temporary alternate water supplies and work was in progress to provide supplies for these five 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. In addition, when contaminated ground water plumes intersect stream banks, ground water contaminants may leach into streams. Although concentrations generally do not exceed surface water quality standards after controls are in place, these pollutant loads may contribute to nonpoint source pollution in streams.

4.2. Nitrate in Ground Water

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 in agricultural areas, levels up to 22 ppm were found in shallow private wells in the Coastal Plain (Louis & Vowinkel, 1990) and elevated nitrate levels were correlated with the presence of pesticides in agricultural areas. A follow-up study to the USGS project, conducted by DSR and representing a more randomly distributed population of wells than the USGS study, focused on nitrate levels in approximately 800 private wells in both agricultural and residential areas as well as land near sod farms and forested areas in five southern and central New Jersey counties. The results showed that the application of fertilizer, either chemical or manure, near a well and the proximity of a well to a septic tank were associated with the vulnerability of the well to nitrate contamination (Murphy, 1993). These follow-up studies confirmed the USGS conclusion that shallow wells (less than 100 feet deep) are more vulnerable to nitrate contamination than deeper wells, regardless of the source of the nitrate. Nitrates from ground water may impact surface water.

4.3. Pathogens in Ground Water

Pathogens include bacteria, protozoans, and viruses that are a potential health threat to humans. Both human and animal wastes may contain pathogens that present human health risks. Pathogens that threaten human health may be present in septic system effluent, nonpoint source runoff, and sewage infrastructure failure.

It is time-consuming, and difficult to test for most human pathogens, and for others, not technically possible. Therefore, fecal coliform bacteria are used as an indicator of fecal contamination of water. Fecal coliform bacteria are an imperfect indicator. Due to greater survival or resistance to disinfection or differences in spatial transport, human pathogens may be present in the absence of fecal coliform bacteria. Conversely, because not all fecal coliform bacteria are in fact derived from fecal contamination, fecal coliform bacteria may be present in the absence of fecal contamination. However, in most situations, fecal coliform data provide a reasonable basis for evaluating whether a potable well is impacted by anthropogenic activity.

Pathogen contamination of ground water is usually confined to a finite distance from the source, that is, fecal coliform from a septic tank will contaminate ground water near the tank but will not travel great distances. Therefore, pathogen contamination is of concern for private, potable wells in areas where densely packed septic tanks may be present.

4.4. Radiologicals in Ground Water

Szabo (1990) of the USGS has shown that the concentration of radium is higher in ground water in southwestern New Jersey (the Kirkwood-Cohansey Aquifer System) than in ground water in contact with the uranium-rich rocks of the Piedmont Province of north-central New Jersey, where concentrations of uranium tend to be high.

Starting in 1987 with routine analyses of ground water from public supply wells in Washington Township, Gloucester County, elevated levels of radium have been detected in the shallow parts of the Kirkwood-Cohansey aquifer across the New Jersey Coastal Plain. In addition to direct exposure concerns, radium-226 decays to radon gas, which can contaminate ground water, soil and indoor air. Of 81 samples, including some potable wells, collected during 1988-89 in Cumberland, Gloucester, Salem, Camden and Atlantic counties, 26 contained dissolved radium-226 plus radium-228 concentrations greater than the human-health based maximum contaminant level (MCL) of 5 pCi/L. Associated gross alpha activities ranged from 0.6 to 25 pCi/L with a median of 5.5 pCi/L. The MCL for gross alpha is 15 pCi/L.

Work conducted cooperatively by DSR and USGS has demonstrated the widespread nature of the radium problem in the Kirkwood-Cohansey Aquifer System, and links the distribution of radium to the Bridgeton Formation (Zapecza & Szabo, 1989). The distribution of radium in localized areas is shown to be related to the presence of elevated concentrations of nitrate and magnesium, probably due to the addition of soil additives to the land surface, especially in agricultural areas where the Bridgeton Formation outcrops. The relation of radium to other chemical constituents is discussed in detail elsewhere (Kozinski, et al., 1994).

Additional sampling of the Kirkwood-Cohansey aquifer in Burlington and Ocean counties in 1990 show somewhat lower radium levels in the ground water in these two counties than in areas farther south (Szabo, et al., in press). Although some elevated levels of combined radium-226 and 228 were detected in these counties, none exceeded the MCL. Both the median and maximum gross alpha and radium 226 were about half the values for the region of southern New Jersey as a whole. Unusually high values of gross alpha from raw water serving public supply wells in the Toms River area in Ocean County have been detected. The occurrence of highly variable levels of gross alpha is currently being investigated by the NJDEP.

4.5. Ground Water Quantity Issues

Water level monitoring by USGS, in cooperation with NJDEP, have indicated declines in ground water level in areas throughout the state as well as salt water intrusion in coastal areas. These ground water depletions occur in areas dependent on these aquifers for drinking water supplies as well as for industrial and agricultural uses. Depletion of ground water aquifers as well as reduction of aquifer recharge has been the focus of several water supply planning and/or management programs.

4.5.1. Critical Area Designation

Two critical areas have been established by the NJDEP 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. Critical Area 1 is located in areas of the Northern Atlantic Coastal Plain. Critical Area 2 is the Potomac-Raritan-Magothy in parts of southwestern New Jersey. Uses of ground water affected by over-pumping 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 Drinking Water Self-Assessment of this document.

4.5.2. 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. Historically, areas such as the industrial Newark Bay region and areas of the northern Farrington Aquifer in Middlesex County have succumbed to salt water intrusion through over-pumping in localized sections, rendering their ground water non-potable and inappropriate for most industrial practices. More recently, the lower portion of Cape May County has proposed the use of a desalinization plant due to salt water intrusion affecting their drinking water. The USGS has released a report of this area of the State identifying areas to be impacted over the next 40 years at current pumping rates. See the Drinking Water Self-Assessment of this document for a more complete discussion of salt water intrusion.

4.5.3. Reduction of Aquifer Recharge

The maintenance of aquifer recharge has become a crucial issue to the State due to land use decisions which have increased impervious cover. Increased impervious cover (paved parking lots, driveways, rooftops, etc.) decreases the ability of rainfall to enter the ground water, often conducting this water to nearby streams through overland flow or storm sewers instead. The NJGS has developed a methodology for municipalities and counties to delineate areas of aquifer recharge in their jurisdictions to enable local agencies to plan sufficiently for their ground water needs by mapping these areas. NJGS is mapping recharge areas on a county basis; Middlesex County was completed in 1996.

In many instances, ground water is pumped from one aquifer and discharged as wastewater into another watershed or the ocean. This is called interbasin transfer. Interbasin transfer decreases the amount of water available for recharge and is a subject which will be addressed as part of the Water Quality Management Plan rule process.

5. Program Strengths

5.1. Ground Water Quality Standards Adopted

New Jersey adopted Ground Water Quality Standards in January 1993 which assign designated uses, including the protection of human and ecosystem health, 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. The classification facilitates management of aquifers for appropriate uses. A proposal for readoption of Ground Water Quality Standards is undergoing internal review at NJDEP.

5.2. 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 have 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 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.

5.3. Existing Regulatory Programs Address Pesticides

5.3.1. 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 four samples have contained detectable levels of pesticides. Additional information regarding pesticide vulnerability assessment is provided in the Drinking Water Self-Assessment section of this document.

5.3.2. Implementation of New Jersey Pesticides and Ground Water State Management Plan will Promote Environmental Benefits

Implementing the New Jersey Pesticides and Ground Water State Management Plan (SMP) will decrease the risk of ground water contamination from specific pesticides. The Pesticides Control Program is currently implementing a non-regulatory SMP that identifies and tracks pesticide use on the GIS, and monitors for the pesticides potentially contributing to nonpoint source pollution. Analytical methods useful for multi-pesticide residue screening have been developed and implemented. Education, training and outreach are included in the Plan. Enforcement, compliance, ground water assessments and remediation activities may also be coordinated under the SMP.

5.4. Progress in NPS Management and Wellhead Protection

Currently, NJDEP is gathering information on the threats to ground water through the Wellhead Protection Program. Through work with county health and planning agencies, Nonpoint Source (NPS) pollution threats from septic systems, agriculture and abandoned wells are being identified on the GIS and management strategies are being developed.

The NJDEP has an active education and training program for NPS ground water management. Focus is placed on regional and statewide pollution prevention outreach/education efforts to a wide variety of audiences including local, county and state agencies, business and industry as well as private citizens.

Nonpoint sources of pollution from fertilization, pesticide application and septic system discharges deteriorate the quality of ground and surface waters on a regional scale. More quantitative data needs to be collected in New Jersey so that the magnitude of this impact can be better understood in order to address this pollution problem.

In order to incorporate NPS management into a watershed management plan, an understanding of certain factors is required. These include:

1) The assessment of the relative percentage of point versus nonpoint contributions to ground water to prioritize NPS management in NPS dominated watersheds and aquifers;

2) The assessment of land use within the watershed to determine where pollution risks may originate and compare these locations to that of drinking water supplies and sensitive areas;

3) The assessment of hydrogeologic factors which increase the risk of ground water to NPS pollution (i.e., limestone), and;

4) The contribution of NPS pollution of ground to surface water bodies.

Limited scientific data currently exists on these factors. However, data collection on sensitive area locations, pollution sources and land use is occurring through several NJDEP programs utilizing GIS (i.e., wellhead protection). The diffuse nature of NPS pollution requires a non-regulatory approach to its management in the form of public education focused on pollution prevention.

5.5. NJDEP Monitoring of Landfill 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 the ground water, the case is referred to the Site Remediation Program.

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

In New Jersey, there are more than 1,200 facilities that have permits to discharge pollutants to the ground waters 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 at a designated location. The New Jersey Ground Water Quality Standards require that permissible discharges do not exceed the ground water antidegradation criteria. Antidegradation criteria vary from 0% 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).

5.7. Major Revisions to Discharge to Ground Water Rules

Major revisions have been proposed to the NJPDES Discharge to Ground Water (DGW) rules, which were published in the February 5, 1996 <u>New Jersey Register.</u> The intent of these revisions as prepared by the Bureau of Operational Ground Water Permits is to make the State's 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 system, which requires discharges of no significant environmental consequence to submit an annual inventory to the NJDEP as a certification of what the discharge consisted of and where and how the discharge occurred. NJDEP has addressed the comments received on the rule proposal and filed for its adoption in February 1997. Publication of the final rule in the New Jersey Register occurred on May 5, 1997.

5.8. Statewide Identification and Remediation of Contaminated Sites

Ground water contamination has been identified at 7,041 sites. These cases have been prioritized and 2,048 (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 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 CEAs to allow remediation to progress. In the two years since the adoption of the Ground Water Quality Standards, NJDEP has received only one petition for Class II-B classification, which is currently under review.

In January 1995, SRP completed its final Immediate Environmental Concern (IEC) Standard Operating Procedures which are designed to ensure uniform IEC 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 have been identified as the highest priority and are assigned to SRP staff, which includes eight site investigators and geologic support as needed.

5.9. 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 (mostly anything other than heating oil use) for onsite use of approximately 50,000 tanks at 15,000 facilities are subject to Federal regulation.

As noted in Table GW-7 (found at the end of this section), leaking underground storage tanks are a significant source of ground water contamination. The NJDEP has aggressively pursued remediation of these sites. In 1993, 1,418 cleanups or closures were completed (NJDEPE, 1993).

5.10. 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 prevented further depletion of ground water resources (i.e., the critical areas program) and salt water intrusion is being controlled in most areas. Further analysis of both critical areas is required to better understand existing problems.

5.11. Progress under the Federal Underground Injection Control (UIC) Program

The Federal Underground Injection Control (UIC) program was delegated to the NJDEP pursuant to the Safe Drinking Water Act via a Memorandum of Agreement in 1982. In New Jersey, underground injection wells are one of many categories of ground water discharges regulated under the New Jersey Water Pollution Control Act, as well as discharges regulated by the Spill Compensation and Control Act (for remedial measures). The UIC program involves the control of discharges to ground water via underground injection wells that can be true wells (i.e., deeper than they are wide), cesspools, seepage pits, drywells, leach fields, etc. The fluids which can be injected via these wells include non-contact and contact cooling water as well as wastewater (note: the injection of liquids classified as hazardous waste are prohibited). The NJDEP provides the EPA with a tally of UIC activities, which includes the issuance of applicable NJPDES DGW permits, inspections of permitted facilities conducted by the Enforcement Element, and closures conducted through the Site Remediation Program.

The number of unpermittable injection wells is being reduced by NJDEP actions through the Industrial Site Recovery Act, the Underground Storage Tank program, and the detection and subsequent cleanup of ground water contamination through other various programs administered by the Site Remediation Program. Unpermittable injection wells are also being closed through banking, insurance industries and trade associations notifying clients and members of the liabilities associated with operating such injection wells.

5.12. Wastewater Financing

While the majority of financing through the various programs administered by the Municipal Wastewater Assistance Program including the State Revolving Fund (SRF) relate to surface water quality improvements, various wastewater projects eligible for SRF or State funds have ground water quality improvement implications. Construction of collection systems typically result in taking failing on-site septic systems or community systems out of service (which are frequently in areas that were not adequate to support the amount of development that ultimately occurred). In particular, such development has occurred in areas that started out as seasonal attractions and ultimately became year-round residences. Other examples throughout the State include development in areas in which the soil limitations and discharge loadings could not adequately be supported. This problem is exacerbated since, in many instances, such development is typically served by private, on-site wells for drinking water. Both ground water and surface water improvements are frequently the result of the construction of collection system projects since elimination of inadequately treated discharges to ground water resources as well as direct discharges to surface waters (a not so uncommon practice used to deal with raw sewage surfacing problems in areas located near waterways) are achieved.

In addition, inflow/infiltration (I/I) and rehabilitation projects have ground water implications and are eligible for low interest financing. Both types of projects result in correction of leaking sewers. I/I projects include the repair of conveyance systems (through mechanical or physical means, such as grouting, replacement of joints, etc.). Rehabilitation projects are more major, in which the system or large portion thereof are replaced. While I/I and rehabilitation projects are frequently pursued as a result of the impacts to the downstream sewage treatment facility, the correction of sewer system integrity problems result in the elimination of discharges to ground water resources as well.

Collection system, I/I and rehabilitation projects are eligible for financing. Between 1987 and 1994, the Wastewater Treatment Financing Program provided loans totaling over $93 million to 17 project sponsors for the construction of collection facilities, and nearly $29.5 million for seven sewer system rehabilitation projects.

6. Program Limitations

6.1. Comprehensive Ground Water Quality Assessment Needed

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 sources: Site Remediation, NJPDES permits, Underground Storage Tanks, Safe Drinking Water, Ambient Ground Water Network, and from special studies such as those conducted by the USGS, NJGS, or through DSR research projects. Generally each program or project is responsible to examine a specific facet of ground water quality or a specific region of the State. Currently, monitoring efforts do not include assessment of nonpoint source pollution. This lack of data organization hinders NJDEP's ability to effectively target pollution prevention efforts.

Currently, ground water information is managed in approximately 21 different databases. Some of these databases are administrative and the associated ground water quality data is mostly in paper files. While 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. Further, data storage, retrieval and analysis ability is poor.

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. Appropriate data should be stored in the GIS. Aquifer maps should be available through the GIS database.

6.2. Impacts to Surface Water Quality Ground Water Pollution

Land use activities such as the application of fertilizers and pesticides on agricultural lands and residential lawns, and the discharge of septic wastes into the subsurface are sources of nonpoint source (NPS) ground water pollution. The pollution of ground water from these sources has been documented in New Jersey (Vowinkel and Tapper, 1993). However, the degradation of surface water quality from ground water discharges impacted by NPS pollution has not been quantified. The magnitude of these impacts as a function of land use needs to be better quantified in order to establish effective management efforts.

6.3. 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 seven counties, has been delayed due to reallocation of priorities.

6.4. 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 25 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 those due to nonpoint sources. Further, funding is insufficient to remediate identified sources. Examples of these sources include NPS pollution from fertilizers, pesticides and clusters of residential septic systems as well as residential underground storage tanks.

Closed landfills represent another type of source of ground water contamination for which the existing regulatory programs provide an inadequate response. These sites will not score high enough in relation to other contaminated sites to qualify for publicly funded remediation (CERCLA or State equivalents). The overall severity of these sites are low and there are frequently no readily identifiable responsible parties to compel to perform remediation.

6.5. Enhanced Public Education, Pollution Prevention, NPS Control and Water Conservation Needed

Given the expense and complexity of ground water remediation efforts, and the extent of potable uses of ground water, more emphasis needs to 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, water purveyors and the regulated community. Examples include implementing good housekeeping and best management practices within wellhead protection areas and NPS dominated aquifers and watersheds.

Nonpoint sources of pollution to ground water include private septic systems, agriculture, lawn care, road salt, 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 and coordination, with emphasis of efforts in the NPS priority aquifers and watersheds.

Water conservation measures are needed to ensure adequate water supplies now, and in the future for areas which may be impaired 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.

Management of nonpoint source pollution from pesticides under the New Jersey Pesticides and Ground Water State Management Plan (SMP) is currently voluntary, and is supported by limited State and Federal resources. Assessments of ground water vulnerability to pesticide contamination and monitoring ground water for pesticides are major components in implementing the SMP. The program's effectiveness also relies heavily on pollution prevention efforts which include public education, pesticide applicator training and outreach to the public, agricultural and other pesticide-related sectors, which are activities that traditionally are resource intensive.

As discussed in greater detail under the surface water quality section of this Self-Assessment document, management of the State's water resources will be more effective through a watershed management context. Watershed management activities are intended to include extensive public participation and education efforts, establishment of watershed-specific priorities and management strategies, including emphasis on pollution prevention activities, to effectively address the point and nonpoint source impacts to ground and surface water resources. In view of the costs and inherent complexities involved, it is possible that watershed management efforts may initially focus on surface water issues, at least in some areas. More detailed ground water assessment and management activities at the State and local level in coordination with on-going watershed management efforts inherent in this management context will continue to move the State toward effective and comprehensive water resource management now and into the future.

6.6. Unmet Wastewater Facility Needs

As a result of the significant expenses related to the construction and the repair or replacement of collection systems, local government units and homeowners frequently avoid the correction of these problems until there is an external motivation (such as facing fines and/or where the severity of structural repairs pose a threat of collapse due to age) to address these water quality and public health needs. A component of the 1992 National Needs Survey includes estimates of $1.2 billion for conveyance system construction and repairs. As discussed under the freshwater watershed section, the continued efforts of the NJDEP permitting, enforcement and financing programs are necessary in order to reduce the ground water quality impacts associated with leaking conveyance systems.

6.7. UIC Program Limitations

NJDEP, as a whole, has made significant progress in identifying and, more importantly, closing unpermittable UICs. However, because UIC functions are spread out between three Divisions (SRP, DWQ, and Enforcement), the reporting of these achievements has not been accurate or consistent. For example, if a Class IV well was identified and closed as a result of an underground storage tank investigation by SRP, that UIC closure was not reported as a separate UIC activity. As a result, the NJDEP's UIC grant activity reports did not accurately reflect the true number of actions taken by the department.

A proposal to develop a new Memorandum of Agreement was offered by the NJDEP in September 1995, with negotiations expected to be completed during 1997. The proposal focuses on identifying UICs in wellhead protection areas and aquifer recharge areas; the use of local agencies (such as health departments) to identify and inspect facilities that may have UIC wells; closure of unpermittable wells and identification of ground water contamination at such facilities; and remediation of such contamination following existing State criteria.

Historically, EPA has provided $73,000 for UIC activities, and NJDEP activities have greatly exceeded the grant and match requirements. The effectiveness of the UIC program would be greatly enhanced if additional resources were made available to fund local agencies to conduct source inventories. This assistance from local agencies would greatly reduce the level of effort needed at NJDEP to address this issue.

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Table GW-1: Ambient Ground Water Quality Network Parameters and Drinking Water Standards

PARAMETER	DW-STD	PARAMETER	DW- STD
GROUND WATER CHARACTERISTICS			
Temperature (°C)	--	Field Alkalinity (mg/L as CaCOs)	--
Specific Conductance (uS/cm)	--	Solids, dissolved (mg/L)	500^{s}
Oxygen, dissolved (mg/L)	--	Corrosivity (pH units)	-1 to 1^{s}
pH (standard units)	6.5 to 8.5	Hardness, (mg/L as CaCOs)	50 to 250^{s}
MAJOR AND MINOR DISSOLVED CONSTITUENTS (mg/L)			
Calcium	--	Chloride	250^{s}
Magnesium	---	Sulfate	250^{s}
Sodium	50^{s}	Fluoride	4^{p}
Potassium	--	Silica	--
DISSOLVED NUTRIENTS (mg/L)			
Nitrogen, NH_3, (as N)	--	Nitrogen, NO_2+NO_3, (as N)	--
Nitrogen, NO_2, (as N)	10^{p}	Nitrate, [NO_2+NO_3] - [NO_2](as N)	10^{p}
Nitrogen, NH_3 + Organic, (as N)	--	Phosphorous Ortho, (as P)	--
TRACE AND MINOR DISSOLVED CONSTITUENTS (ug/L)			
Aluminum	50 to 200^{s}	Lead	15^{p}
Arsenic	50^{p}	Manganese	50^{s}
Barium	2000^{p}	Mercury	2^{p}
Cadmium	5^{p}	Selenium	50^{p}
Chromium	100	Silver	10^{s}
Copper	1300	Zinc	5000^{s}
Iron	300^{s}		
ORGANIC CONSTITUENTS			
Carbon Organic, (mg/L)	--		
RADIOACTIVITY (pci/L)			
Gross Alpha	15^{p}		

Notes:
p = health-based primary drinking water standard
s = aesthetic-based secondary drinking water standard

Table GW-2: VALLEY & RIDGE AND HIGHLANDS REGIONS
Water Quality from Wells Sampled in the Kittatinny Supergroup

CHARACTERISTIC OR CONSTITUENTS	TOTAL NUMBER OF WELLS SAMPLED	% WELLS WITH SAMPLES EXCEEDING MAXIMUM CONTAMINANT LEVEL
pH	26	7.7% (too alkaline)
Corrosivity	24	12.5%
Hardness as $CaCO_s$	26	30.8% (too hard)
Iron	26	3.8 %
Manganese	26	7.7 %

Table GW-3: VALLEY AND RIDGE AND HIGHLANDS REGIONS
Water Quality from Wells Sampled in the Martinsburg Shale

CHARACTERISTIC OR CONSTITUENT	TOTAL NUMBER OF WELLS SAMPLED	% WELLS WITH SAMPLES EXCEEDING MAXIMUM CONTAMINANT LEVEL
pH	26	15.4% (too alkaline)
Corrosivity	26	27.9%
Hardness as $CaCO_s$	26	11.5% (too soft)
Iron	26	15.4%
Manganese	26	23%

Table GW-4: HIGHLANDS REGION
Water Quality From Wells Sampled in Metamorphosed Bedrock

CHARACTERISTIC OR CONSTITUENT	TOTAL NUMBER OF WELLS SAMPLED	% WELLS WITH SAMPLES EXCEEDING MAXIMUM CONTAMINANT LEVEL
pH	44	30.2% (too acidic)
Corrosivity	44	50%
Hardness as $CaCo_3$	44	13.6% too soft, 4.5 % too hard
Iron	45	6.7%
Manganese	45	16.3%
Gross Alpha (radioactivity)	21	19.0%

Table GW-5: PIEDMONT (NEWARK BASIN) REGION
Water Quality in Wells Sampled in Metamorphosed Bedrock From Wells Sampled
in the Sedimentary Stockton and Lockatong Formations and Sedimentary Formations of the Brunswick Group

CHARACTERISTIC OR CONSTITUENT	TOTAL NUMBER OF WELLS SAMPLED	% WELLS WITH SAMPLES 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%
Hardness as CaCO	147	3.4% too soft, 20.8% too hard
Sodium	147	8.5%
Sulfate	147	8.2%
Iron	147	14.5%
Manganese	147	27%
Gross Alpha (radioactivity)	259	5.8%

Table GW-6 : Types of Ground Water Contaminants at
Site Remediation Cases in Two Counties

Contaminant Type	Number of Cases
Volatile Organics (VOs) (chlorinated and aromatics)	45%
Petroleum Hydrocarbons	20%
Metals	14%
Base/Neutral and Organic Compounds	13%
Polychlorinated Biphenyls	5%
Radionuclides	3%

Table GW-7: Ground Water Contamination Sources in 7 NJ Counties

Source	Number of Cases	% of Total Cases
Agriculture	1	0.08
Above Ground Storage Tank	4	0.33
Coal Tar	8	0.67
Drums	11	0.92
Lagoons	72	6
Land Spray Applications	1	0.08
Landfill	**159**	**13.25**
Other	16	1.33
Road Salt Pile	1	0.08
Septic Systems	67	5.58
Surface Spill	**134**	**11.17**
Unknown	**490**	**40.83**
Underground Storage Tanks	**236**	**19.67**

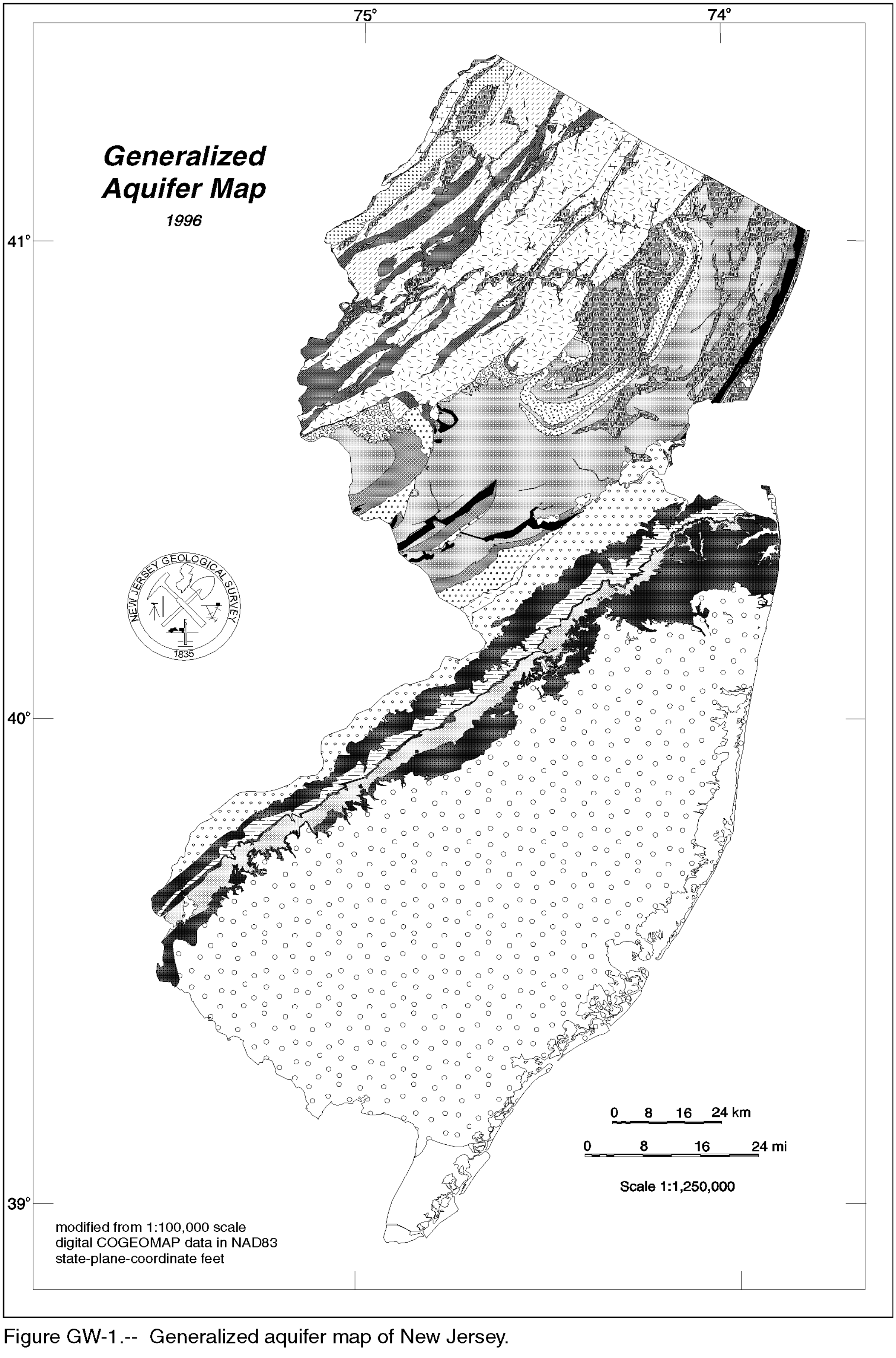


Figure GW-1.-- Generalized aquifer map of New Jersey.

Figure GW-1 (continued).-- Description of aquifers and confining units for the New Jersey generalized bedrock aquifer map.

Pleistocene Glacial Sediments - Till and stratified deposits of sand, gravel, and lake-bottom sediments that exceed 50 ft thickness. Inlcudes glacial fans or deltas, fluvial outwash, ice-contact and morainal deposits. Primary intergranular porosity and permeability. Average yield of high-capactity wells in sands and gravels approximately 525 gpm. Ground-water quality varies with the sedimentary texture and mineral content. Average ground water is fresh, slightly alkaline, moderately-hard to hard, and of the calcium-bicarbonate type.

Sand and Gravel Aquifers of Tertiary Age (shown near Cape May only) - Sand and gravel deposits of the Beacon Hill Gravel, Bridgeton Formation, and Cape May Formation. Water-table aquifers. Primary intergranular porosity and permeability. Average yield of high-capacity wells in Cape May Formation is approximately 220 gpm Ground-water quality is similar to the unconfined portions of the Kirkwood-Cohansey aquifer system.

Tertiary Kirkwood-Cohansey Aquifer System - Sand, gravel, and clay. Includes water table aquifer, confined Kirkwood aquifers (Atlantic City 800-foot sand aquifer and Rio Grande water-bearing zone), and confined Cohansey aquifer in Cape May County . Primary intergranular porosity and permeability. Leakage to confined parts provides water. Average yield of high capacity wells is approximately 390 gpm Average ground water is fresh, acidic, highly corrosive, and has low dissolved solids. Less corrosive water is common in confined aquifers. High iron and magnanese problems locally. Salinity may be elevated in confined parts near coastal areas. Sodium chloride type water is common.

Cretaceous Mount Laurel-Wenonah Aquifer - Glauconitic sand overlying micaceous sand. Unconfined in outcrop and confined in the subsurface. Primary intergranular porosity and permeability. Leakage to confined parts provides water. Average yield of high-capacity wells is approximately 200 gallons per minute. Average ground water is fresh, moderately hard and alkaline. Iron levels may be elevated. Calcium and magnesium levels decrease with depth while sodium and potassium levels increase. Calcium-bicarbonate type waters dominate.

Cretaceous Englishtown Aquifer System - Upper and lower sand with localized clay beds. Unconfined in outcrop and confined in the subsurface. Primary intergranular porosity and permeability. Leakage to confined parts provides water. Average yield of high-capacity wells approximately 290 gpm. Average ground water is fresh, moderately hard and is alkaline. Salinity, sodium, and potassium levels increase with depth. Calcium and magnesium levels decrease with depth. Locally elevated Iron and manganese levels. Calcium-bicarbonate type waters dominate.

Cretaceous Potomac-Raritan-Magothy Aquifer System - Interbedded sand, gravel, silt, and clay separated into lower, middle and upper aquifers. Unconfined in outcrop and confined in the subsurface. Primary intergranular porosity and permeability. Leakage to confined parts provides water. Average yield of high-capacity wells 600 gpm. Average ground water is fresh, moderately hard with a near-neutral pH. Salinity increases towards the coastline near Delaware and Raritan Bays. Elevated iron and manganese are common. Calcium and magnesium levels decrease and sodium and potassium levels increase with depth. Calcium-bicarbonate type waters dominate.

Confining Units of Cretaceous and Tertiary Age - Composed of silt, clay, and thin layers of sand. Includes the stratigraphic interval from the Shark River Fm. to the Navisink Fm., the Marshalltown Fm., and the the combined Woodbury, Merchantville, and Cheesquake Fms. The confining units locally contain important sandy aquifers such as the Red Bank Sand, Tinton Sand, Vincentown Formation, Shark River Formation, and Piney Point aquifer. Ground-water quality is generally good, but may locally require quality treatment.

Jurassic Basalt - Hard, dense, and highly-fractured igneous rocks. Secondary fracture porosity and permeability. Average yield of high-capacity wells 90 gpm. Ground-water quality data is sparse but normally fresh, somewhat alkaline, moderately hard, and of the calcium-bicarbonate type.

Jurassic Diabase - Hard and dense igneous rocks. Secondary fracture porosity and permeability. Few high capacity wells. Ground-water quality data is sparse but normally fresh, somewhat alkaline, moderately hard, and of the calcium-bicarbonate type.

Jurassic-Triassic Brunswick Aquifer System - Sandstone, siltstone, and shale of the Passaic, Towaco, Feltville, and Boonton Formations. Secondary fracture porosity and permeability Average yield of high capacity wells approximately 200 gpm. Average ground water is fresh, slightly alkaline, non-corrosive and hard. Calcium-bicarbonate type waters dominate. Subordinate calcium sulfate waters are associated with high total dissolved solids. Inlcudes conglomerate of Jurassic-Triassic age along the Newark Basin border fault system.

Triassic Lockatong Formation - Silty argillite, mudstone and fine-grained sandstone and siltstone with minor limestone. Secondary fracture porosity and permeability. Average yield of high capacity wells approximately 50 gpm. Average ground water is fresh, slightly alkaline, noncorrosive and hard. Calcium bicarbonate type waters dominate.

Triassic Stockton Formation - Arkosic sandstone. Secondary fracture porosity and permeability Average yield of high capacity wells approximately 200 gpm. Average ground water is fresh, slightly acidic, corrosive and moderaterly hard. Calcium-bicarbonate type waters dominate.

Devonian Formations - Sandstone, shale, conglomerate and limestone in the Valley and Ridge and Green Pond Mt. Region. Stratigraphic interval from the Rondout Fm. and Connelly Conglomerate to the Marcellus Shale and Skunnemunk Conglomerate. Secondary fracture porosity and permeability. Few high capacity wells. Yields best in bottom carbonates. Ground-water quality is very good for most purposes, however, treatment may locally be required for parameters such as hardness, iron and manganese.

Silurian Formations - Conglomerate, sandstone, siltstone and shale in the Valley and Ridge Province and Green Pond Mt. Region. Stratigraphic interval from the the Shawangunk Formation and Green Pond Conglomerate to the Roundout and Bershire Valley Limestone. Secondary fracture porosity and permeability. Few high capacity wells yielding approximately 35 gpm in Bloomsburg Red Beds. Ground-water quality is very good for most purposes but may locally exceed hardness, iron, and manganese parameters.

Ordovician Martinsburg Formation - Claystone slate, siltstone and sandstone. Secondary fracture porosity and permeability. Average yield of high capacity wells approximately 50 gpm. Average ground water is fresh, slighltly alkaline, noncorrosive, and moderately hard. Calcium-bicarbonate waters dominate.

Cambrian-Ordovician Carbonates - Dolomite and limestone with minor shale, sandstone, and quartzite. Sequence includes the Jacksonburg Limestone, Kittatinny Supergroup, and Hardyston Quarzite. Secondary fracture porosity and permeability with solution enhancement of both bedding-plane and non-bedding fractures. Average yield of high capacity wells approximately 250 gpm. Average ground water is fresh, slighltly alkaline, noncorrosive and hard. Calcium-magnesium-bicarbonate type waters dominate.

Lower Paleozoic and Precambrian Igneous and Metamorphic Rocks - Gneiss, granite, and marble of the Reading and Trenton Prongs. Secondary fracture porosity and permeability. Solution channels occur in marble. Average yield of high capacity wells approximately 85 gpm. Average ground water is fresh, slighlty acidic, corrosive and moderately hard. Calcium-bicarbonate type waters dominate.

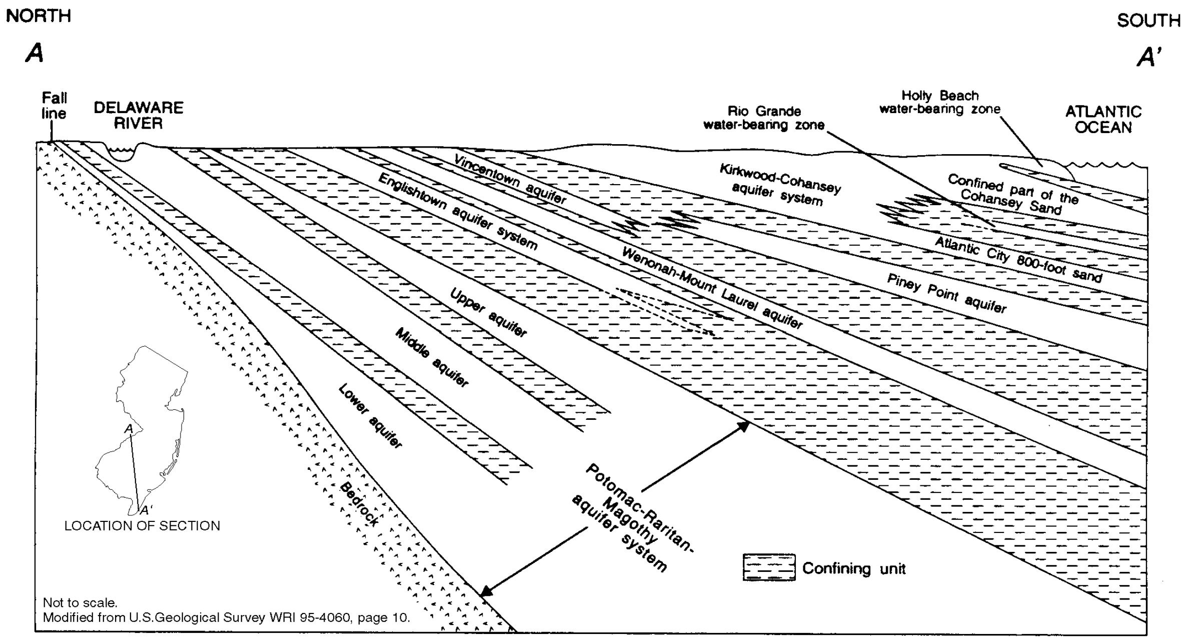


Figure GW-2.-- Diagrammatic hydrogeologic section of the New Jersey Coastal Plain.

VI. DRINKING WATER SELF-ASSESSMENT

GLOSSARY

BER	Bureau of Environmental Radiation
BSDW	Bureau of Safe Drinking Water
BWA	Bureau of Water Allocation
CWS	Community Water System
DSR	Division of Science and Research
DWQI	Drinking Water Quality Institute
EPA	Environmental Protection Agency
GIS	Geographic Information System
GPS	Global Positioning System
HAA	Haloacetic acid
IOCs	Inorganic Compounds
MCL	Maximum Contaminant Level
NJDHSS	New Jersey Department of Health and Senior Services
NJGS	New Jersey Geological Survey
NPS	Nonpoint source
NTNC	Nontransient Noncommunity Water System
OEP	Office of Environmental Planning
OTIS	Office of Telecommunications and Information System
PPA	Performance Partnership Agreement
ppb	part per billion
POE	Point-of-Entry
SDWA	Safe Drinking Water Act
SOCs	Synthetic Organic Compounds
THM	Trihalomethane
TNC	Transient Noncommunity Water System
USGS	United States Geological Survey
VOCs	Volatile Organic Chemicals
WHPA	Well Head Protection Areas
WHPP	Well Head Protection Program

1. Background

The drinking water program self-assessment has been written to include the Safe Drinking Water Program, the Well Head 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. The roles of the Enforcement Program and Pollution Prevention Programs in relation to the drinking water program are also discussed.

1.1. The Potable Water Resources in New Jersey

At the end of 1995 there were 625 active community water systems (CWS) in New Jersey. A CWS serves at least 25 year-round residents or has 15 or more service connections (e.g., municipality, mobile home park). Seventy-three systems used surface water sources. Of these, 30 provided their own treatment and 43 purchased surface water. A total of 552 water systems used ground water sources. Of these, 529 provided their own treatment, 22 purchased ground water, and one system was reclassified as "ground water under the direct influence of surface water." This system will be required to meet the more stringent surface water treatment requirements. The 625 CWS serve approximately 87% of the State's estimated 1995 population of 7,750,000. The 20 largest CWS serve about 50% of the State's estimated 1995 population. Of the 20 largest CWS, 13 deliver mainly surface water to consumers and the remaining seven deliver mainly ground water.

There were 4,182 active noncommunity systems in New Jersey in 1995. A noncommunity water system generally serves a nonresidential population. There are two types of noncommunity water systems: nontransient and transient. There are 1,072 nontransient systems and 3,110 transient systems. Nontransient noncommunity water systems (NTNC) serve at least 25 of the same people daily for 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 New Jersey noncommunity systems utilize ground water sources.

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

2. Description of Drinking Water Programs

2.1. The Safe Drinking Water Program

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

1) to assure safe public and nonpublic 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 water quality monitoring and reporting by purveyors;
5) to improve purveyor compliance through ongoing enforcement actions;
6) to assure that source waters are protected and the best available source waters are used for drinking water purposes;
7) to improve compliance with well construction requirements for the purpose of aquifer

protection and public health; and

8) to improve existing requirements for well inspections and certifications.

The goals of the Bureau of Safe Drinking Water (BSDW), the lead agency for administering the Federal and State Safe Drinking Water Acts (SDWA), 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 and provide potable water that is in compliance with the drinking water standards or maximum contaminant levels (MCLs) for regulated contaminants. The BSDW will also continue to spend considerable effort reinforcing water system efforts to deliver water that complies with secondary drinking water standards which are set to insure that water is also palatable.

In order to determine the quality of the public drinking water being consumed in New Jersey, the BSDW collects mandatory monitoring data generated by New Jersey State certified drinking water laboratories. Each 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 (ground water or surface water). Monitoring data are stored in a database managed by the BSDW. 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.

Various chemical groups are required to be monitored in CWS and NTNC water systems including: inorganic chemicals (including asbestos), lead and copper, volatile organic chemicals, pesticides, synthetic organic chemicals (SOCs), radionuclides (CWS only) and total trihalomethanes (CWS only). Since individuals consume water from these types of systems on an ongoing basis, the MCLs or action levels developed for these contaminants are based on protection from chronic health effects resulting from long term exposure. The monitoring frequency for each contaminant group, outlined in Table DW-1, depends on the base monitoring frequency specified in the regulations and the monitoring waiver program developed for each contaminant group in the regulations. All public water systems are required to monitor annually for nitrate (quarterly for the surface water supplies) and either monthly, for CWS, or quarterly for noncommunity systems, 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 would most likely adversely affect people drinking the water on a short-term basis.

The BSDW is supported in the lead role for the SDWA by the following units in NJDEP: the Enforcement Element for formal enforcement actions; the Office of Quality Assurance for the laboratory certification program; the Bureau of Water Allocation for review and issuance of well permits and surface and ground water allocations; the Bureau of Exams and Licensing for operator certification and training; the Division of Science and Research (DSR) for technical assistance. Additional assistance is also provided by the New Jersey Department of Health and Senior Services **(**NJDHSS)**,** Public Health and Environmental Laboratories for analysis of

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

Contaminant	Sampling Frequency	Types of System Required to Sample	No. of Reports Expected/Year
Microbiological	Monthly Quarterly	CWS[1] NTNC, TNC	7,536 16,728
Turbidity[2]	Daily	CWS NTNC	816 36
Inorganic Chemicals <u>Surface Water</u> Nitrate Nitrite <u>Ground Water</u> Nitrate Nitrite	 Annual Quarterly Once in a cycle Once every 3 Yrs (1/1/93 to 12/31/95) Annual Once in a cycle	 CWS, NTNC CWS, NTNC CWS, NTNC CWS, NTNC CWS, NTNC, TNC CWS, NTNC	 36 144 36 570 4,743 570
Lead and Copper	Every 6 months[3]	CWS, NTNC	1700 (1992-1994)
Volatile Organic Chemicals	4 quarterly samples every 3 years[4]	CWS, NTNC	750
Synthetic Organic Chemicals	4 quarterly samples every 3 years[5]	CWS, NTNC	100
Radionuclides	Once every 4 years	CWS	150
Total Trihalomethanes	Quarterly[6]	CWS	116

[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 six month intervals, a frequency that continues after installation of corrosion control. A monitoring reduction may be granted if two consecutive six month monitoring cycles meet the action levels for lead and copper.

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

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

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

drinking water samples, Consumer and Environmental Health Services Unit in NJDHSS for technical assistance, 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 noncommunity program by 15 delegated counties. The BSDW directly implements the SDWA for the noncommunity systems in the remaining six counties which have not yet been delegated the safe drinking water responsibility.

Additional units within the NJDEP support safe drinking water activities. The NJDEP Office of Environmental Planning (OEP) is using the Global Positioning System (GPS) data to accurately locate CWS wells. The New Jersey Geological Survey (NJGS) is determining well head protection areas for New Jersey. The Site Remediation Program, both the publicly and privately funded divisions, 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 Program discovers contaminated water systems, primarily in private wells.

Staff from the BSDW and DSR support the New Jersey Drinking Water Quality Institute (DWQI), a 15 member body established by the 1983 amendments to the New Jersey SDWA to establish drinking water standards called ‘maximum contaminant levels’, or MCLs, for drinking water contaminants and to provide general guidance to the overall drinking water program. The DWQI is comprised of six ex officio members from NJDEP and NJDHSS 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.

2.1.1. Maintaining Safe Drinking Water Act Primacy

In 1978, New Jersey was granted "primacy" or primary enforcement responsibility for the Federal SDWA by EPA. The State has maintained a strong primacy program since that time. The Federal SDWA requires that a primacy state maintain the following:

1. Regulations no less stringent than the National Primary Drinking Water Regulations. (New Jersey adopts all the National Primary Drinking Water Regulations by reference in its 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 and 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. Requires the adoption of plans by the water systems for the emergency provision of drinking water.

In addition to the these Federal statutory requirements, EPA regulations also require the following activities:

1. A sanitary survey/inspection program. (Periodic inspections of all CWS are performed by NJDEP's enforcement program, and either the BSDW or 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 nonpublic systems.)

2.2. The Water Allocation Program

The Bureau of Water Allocation (BWA) is the lead regulatory unit that controls the allocation of all water resources in New Jersey. The BWA regulates withdrawals from the State's surface and ground water resources and issues Water Allocation Permits and Agricultural Certifications to water users who withdraw at least 100,000 gallons of water per day. Water Use Registrations are issued to those who have the pump capacity to withdraw at least 100,000 gallons of water per day, but who actually withdraw less than that amount. The goals of the Water Allocation program are:

1) to provide adequate and dependable supplies for the State's present and future drinking water needs;
2) to prevent adverse impacts to surface and ground water supplies due to overuse;
3) to promote the most efficient use of water resources through implementation of water conservation programs and encouragement of water reuse practices; and
4) to provide adequate drinking water supplies during periods of drought or other circumstances where normal available supplies are insufficient.

The intent of the permits, certifications, and registrations is to help preserve an adequate water supply for the State's present and future water needs. Consequently, the permittees and registrants must adhere to specific conditions and restrictions which limit water diversions to prevent overuse, encourage water conservation, require development of drought management plans and monitor aquifer static water levels and chloride concentration levels.

The Bureau also maintains a Statewide water use database related to issued permits, certifications, and registrations, and has a lead role in regional water supply planning in conjunction with OEP, NJGS and USGS.

2.3. The Source Water Protection Programs

2.3.1. The Well Head Protection Program

The 1986 Federal SDWA Amendments (Section 1428) require that 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% of the population of New Jersey consumes ground water, and numerous cases of ground water pollution have been documented over the years. For this reason, the State 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 a well. In New Jersey this area is calculated based upon "time of travel" and the hydrogeologic characteristics of the well and the aquifer into which the well is drilled.

The WHPA delineation project is a multi-year endeavor which involves all levels of government, a variety of agencies and the public in an effort focusing on pollution prevention. Over the course of several years, NJDEP will be delineating WHPAs 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 well head 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 when available.

2.3.2. Watershed Protection

The OEP is responsible for the preparation and updating of a Statewide water supply master plan. The State's first water supply master plan was adopted in 1982, and there have since been several updates. A complete revision to the master plan was completed in 1996. Protection of drinking water supplies is included in the NJDEP'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. 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 specific watershed management areas, established planning, regulatory and pollution prevention programs will focus their efforts in those areas. Other programs which are oriented toward drinking water, such as wellhead protection and nonpoint source (NPS) management will play an important role in education, management and outreach into those areas where drinking water is identified as a priority.

2.3.3. Well Permitting and Management

The Well Permitting and Management Program is administered by the BWA. The goals of the program are to improve compliance with well construction requirements for the purpose of aquifer protection, to administer requirements for well inspections and local agency certifications, and to insure wells are constructed or abandoned by appropriately licensed individuals.

The threat of contamination to New Jersey's aquifers is reduced by regulating well construction and the procedures to follow upon abandonment of wells through the following activities: tests for the licensing of well drillers, pump installers and dewatering contractors, and for the certification of soil borers and well sealers to insure those performing well construction and sealing are adequately trained to perform these important functions. The BWA also issues well drilling permits; conducts well site inspections; orders the sealing of damaged, improperly constructed, or abandoned wells; and collects and reviews well construction records and well abandonment reports for compliance.

Recent legislative amendments to the Subsurface and Percolating Water Act (N.J.S.A. 58:4A-4.1 et seq.) now provide the BWA with the requisite authority to adopt comprehensive well construction requirements for all types of water supply wells which was previously lacking. This, in conjunction with revisions to the BSDW rules for private and public wells, will enhance our ability to protect public health and ground water supplies.

2.4. Pollution Prevention Programs for Drinking Water

Pollution prevention in the drinking water program is accomplished through three major initiatives: 1) the well head protection program which is described in Section 2.3.1., 2) nonpoint source pollution prevention activities which are described in the Water Quality Self-Assessment, and 3) water supply well construction regulations as mentioned in Section 2.3.3.

3. Stakeholder Involvement

A NJDEP/EPA co-sponsored workshop was held on April 30, 1996 to discuss the NEPPS process with key New Jersey environmental stakeholders. The drinking water components of the Self-Assessment and of the FY96 Performance Partnership Agreement (PPA), signed by NJDEP and EPA on March 29, 1996, were generally well received at the drinking water breakout session of the NEPPS workshop. Several major discussions of the session centered around: 1) support of the effort by the drinking water program to evaluate the feasibility of gathering domestic well data collected by other agencies for nitrates, mercury and VOCs and expansion of this effort to other contaminant groups, 2) the development of a public education/outreach and testing program for private wells to explain the drinking water quality safety issues of domestic wells compared to the water quality that is delivered by public water supplies, 3) the need for comparative risk in the selection of important contaminants and important routes of exposure in the NEPPS process, and 4) the need for a goal, milestone(s) and indicator(s) for radionuclides in drinking water. The participants also requested more justification for the derivation of milestones presented in the PPA. The above issues are addressed in this Self-Assessment document.

4. Key Drinking Water Issues

Four areas were identified in the 1995 Self-Assessment as important for maintaining safe drinking water in New Jersey. These four areas are also included in this 1996-1997 Self-Assessment. They are: 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.

4.1. Continuous Improvement of Drinking Water Quality

4.1.1. Drinking Water Monitoring Data

The BSDW has a regulatory program that measures its success by comparing drinking water monitoring data generated by New Jersey certified laboratories for the water utilities against a set of drinking water standards. The BSDW relies on water systems contracting with New Jersey 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 New Jersey understand and implement the data collection process well. However, the more numerous smaller community and 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, NTNC, that serve schools or factories now have to comply with a relatively new set of regulations that are complex and expensive. Education of the owners/operators 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.

In 1995, the drinking water violation data was evaluated in order to develop a baseline for determining the quality of drinking water in New Jersey's public water supplies. For microbial contaminants, in 1995, 98% of the public water systems delivered water that met the microbiological standards. New Jersey has already met the milestone identified in the FY96 PPA which reads, "By 2005, 95% of the public water systems will provide water that meets the microbiological drinking water standards." However, only 93% of the population is served by supplies that meet this standard, and only 77% of the noncommunity water systems submitted sample results in 1995. In the future the goal will be to increase the percent of the population served by supplies that meet the microbiological standard, and to increase the number of noncommunity systems that sample for microbiological contaminants. In the FY97/98 PPA, the milestone has been changed to read, "By 2005, 95% of the public water systems (**and 95% of the population served)** will provide water that meets the microbiological drinking water standards."

For chemical contaminants, 89% of community water systems and 84% of nontransient noncommunity water systems that submitted results in 1995 met all chemical drinking water standards. The significance of this indicator is not clear since not all water systems or points-of-entry were required to sample for all chemical parameters in 1995. Another difficulty with calculating this indicator is that not all drinking water rules apply to all types of public water systems. The milestone for chemical drinking water standards in the FY96 PPA reads, "By 2005, 95% of the public water systems will provide water that meets the New Jersey chemical drinking water standards." Based on 1995 data, this milestone has not been met.

4.1.2. Construction Project Review

Prior to collecting any drinking water samples for new water sources, technical reviews of sources and facilities are conducted by the BSDW. These activities include approval of drinking water sources, water distribution systems, and water treatment facilities. New regulations for construction projects were adopted in November 1996.

4.1.3. Compliance Evaluations

Treatment facilities and water sources are inspected at the time a facility is built. Compliance evaluations are performed on a routine basis afterwards by the Enforcement Element and include a field review of the 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 samples and analyze water quality data from CWS throughout the State.

The milestone developed in the FY96 PPA reads that "By 2000, 90% of public water systems will have compliance evaluations that are acceptable." Progress has been made towards meeting this milestone. In 1994, 70% of the community water systems had an acceptable rating for their compliance evaluation. In 1995, more compliance evaluations were performed and the number of acceptable evaluations increased to 78%. Additional work will be needed to meet this milestone.

Compliance evaluations of noncommunity water systems are required once every five years. In the five year time period 1991-1995, 78% of the noncommunity water systems were inspected by the BSDW or the designated county health agencies. The rate of inspections for these systems needs to increase, and a method needs to be developed for determining the results of the inspection.

4.1.4. Development of New Drinking Water Standards

In addition to the Federal standards developed by EPA, NJDEP has the authority to set drinking water standards for contaminants of particular concern to New Jersey. NJDEP can adopt standards for contaminants not regulated by EPA and/or adopt standards that are more stringent than those adopted by EPA. The 1983 amendments to the New Jersey SDWA (A-280 Amendments) contains a list of synthetic organic contaminants for which standards were to be developed. In 1989, 16 drinking water MCLs were adopted. In 1994, MCLs for five additional contaminants were proposed and revisions to four existing standards were proposed, based on review of recent health effects information. The changes proposed in 1994 were adopted as final in November 1996. Through these activities, the BSDW maintains a drinking water program that delivers water of acceptable quality to consumers.

4.2. Drinking Water Source Water Protection

Drinking water sources in New Jersey are a crucial resource which have been affected by pollution and can benefit greatly from pollution prevention activities 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.

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. Additional activities focusing on nonpoint source pollution will further improve surface water quality.

New ground water protection initiatives such as well head protection provide a delineated geographical area whereby pollution sources may pose a threat to the drinking water source as described in Section 2.3.1. Approximately 78% of community water supply wells are located in unconfined aquifers. An unconfined aquifer is an aquifer with a direct connection to the land surface. This type of aquifer has no clay layers between the land surface and the aquifer that could absorb contaminants. In 1995, 71% of the wells were accurately located using the global position system (GPS). By the end of

1996, 5% of the community water systems wells had wellhead protection areas delineated.

A key element for a successful WHPP is assurance that water supply wells are constructed properly as mentioned in Section 2.3.3. The BWA program in conjunction with the reviews/ inspections performed by local administrative authorities have a key role in meeting these initiatives.

4.3. Maintenance of Adequate Water Supplies

4.3.1. Saltwater Intrusion

The historic overuse of certain aquifer systems in New Jersey has caused the migration of saltwater into those aquifer systems. In particular, the use of areas in the Coastal Plain aquifers in Cape May, Southeastern Middlesex County, and Northeastern Monmouth County, and a large portion of Southwestern New Jersey, have been compromised leading to closure of wells, drilling new wells in other aquifer units and a desalinization plant in Cape May City. The NJDEP has limited water withdrawals in two critical areas in order to conserve water resources; has initiated conservation programs; and has been involved in the development of additional regional water supplies. The New Jersey Statewide Water Supply Plan recommends the optimization of all available resources including the possible use of alternative technology such as aquifer storage and recovery as an additional solution to saltwater intrusion.

The critical water supply areas are managed through the BWA water diversion permit program. These water supply areas are discussed in more detail in Section 5.3. NJDEP will continue to evaluate saltwater intrusion in the coastal areas of the State and, if necessary, develop any additional regulations to complement existing water allocation regulations, to address the problem.

4.3.2. 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. The NJDEP no longer allows new withdrawals from several aquifer systems. However, New Jersey is susceptible to droughts. The most recent one occurred in 1995. A continuing challenge is to manage existing resources as well as to plan for the establishment of future water supplies.

Through work undertaken in the New Jersey Statewide Water Supply Plan, as well as regional planning efforts, the NJDEP has compared water supply availability and demand for both ground and surface waters. Water availability estimates are critical tools for water supply planning. Furthermore, the BWA includes in its water allocation permits, requirements for the development and implementation of water conservation and drought management plans. In addition, the NJDEP encourages, wherever possible, the reuse of wastewater in order to maximize the use of allocated water diversions.

4.3.3. Management of Aquifer Recharge

The maintenance of aquifer recharge has become a crucial quality and quantity issue to the State due to land use decisions which have increased impervious cover in many areas of high recharge. Increased impervious cover (paved parking lots, driveways, etc.) decreases the ability of rainfall to enter the ground water system. The rainfall is thus diverted to nearby streams through overland flow or storm sewers. The NJGS has developed a methodology for municipalities and counties to delineate areas of aquifer recharge in their area to enable local agencies to plan sufficiently for their ground water needs by mapping these areas. To date, NJGS has completed an aquifer recharge map for Middlesex County. The OEP has developed best management practices for use by local governments to manage these areas and has provided education and training to local, county, and State agencies as well as private businesses and citizens on the methodology as well as best management practices. Aquifer recharge will be addressed as part of the Water Quality Management Rule Process.

4.3.4. Interbasin Transfer

Water pumped from one basin and discharged as wastewater into another basin or to the ocean is called interbasin transfer. Interbasin transfer decreases the amount of water available for recharge. It is estimated that interbasin transfer of wastewater occurs in 50% of the aquifers in the State resulting in a net loss of water available for potable purposes. NJDEP is evaluating this issue in order to determine the potential impact and significance.

4.4. Important Contaminants in New Jersey Drinking Water

New Jersey public water systems are required to monitor for approximately 90 different contaminants depending on water system characteristics. Although many contaminants are rarely found in New Jersey drinking water systems, the following contaminants continue to be a concern: 1) microbiological contaminants, 2) lead, 3) mercury, 4) nitrates/nitrites, 5) VOCs, 6) disinfection byproducts, and 7) radon and other radionuclides. Pesticides will also be discussed in this Self-Assessment because of the extensive effort put forth by NJDEP since 1993 to identify CWS and NTNC systems that were susceptible to pesticide contamination. As a result of this effort, pesticides were determined to be of minor importance in CWS and NTNC and therefore were not included as an important contaminant category.

4.4.1. Microbiological Contaminants

Fecal wastes from warm-blooded animals such as birds, rodents, farm animal, and pets often contain pathogenic microorganisms. Pathogenic organisms can cause diseases such as hepatitis, typhoid fever, cholera or gastroenteritis if ingested by humans. Therefore, a waterborne infectious disease outbreak can occur if drinking water becomes contaminated by fecal pollution.

The microbiological quality of drinking water is excellent. In 1995, 98% of the public water systems were in compliance with the microbiological drinking water standard. This exceeded the milestone in the FY96 PPA of 95% of the public water systems in compliance with the microbiological drinking water standard. (See Section 4.1.1.) There has been only one drinking water-related infectious disease outbreak in New Jersey in the last 16 years (in 1989 at a campsite). However, disease outbreaks, especially if small numbers of people are involved, are difficult to detect and it is possible that other outbreaks have occurred, but gone undetected.

The microbiological safety of public drinking water is assured through three types of regulations: 1) disinfection requirements for most of the public water supplies in the state; 2) limits on turbidity (the amount of suspended particles) in treated waters derived from surface sources such as rivers, lakes and reservoirs; and 3) monitoring treated water for "total coliform bacteria".

All surface waters contain fecal waste from warm-blooded animals and a few surface water sources contain <u>treated</u> human fecal waste from sewage treatment plants. Treated sewage may still contain pathogens. All surface waters are <u>assumed</u> to contain pathogenic microorganisms. In addition, some ground water sources are under the influence of surface waters (GWUI). A well that is under the influence of surface water is defined as “any water beneath the surface of the ground with (1) significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as *Giardia lamblia*, or (2) significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions”. These wells are regulated like surface waters. Therefore, all treatment plants that use surface waters or GWUI sources must continuously disinfect the water (*e.g.* chlorination). In New Jersey, five wells have been identified as being under the influence of surface water. In addition, systems using surface water or GWUI must maintain a disinfection residual in their delivered water. In 1995, the disinfection residual in community water systems utilizing surface water or GWUI sources did not fall below the minimum requirement of 0.2 mg/l.

Ground waters not under the direct influence of surface water are assumed to be free of pathogenic microorganisms because of the assumption that the soil acts as a filter. However, New Jersey regulations require that all CWS disinfect their source waters. A CWS using ground water that serves 100 or fewer dwellings may elect not to disinfect the water provided it increases the number of microbiological samples taken from its distribution systems to a minimum of two samples per month at biweekly intervals. In 1995, 71% of all community water systems and 11% of all nontransient noncommunity water systems disinfected their source waters.

Treatment plants with surface water sources or GWUI waters are also required to filter their water under the Surface Water Treatment Rule. Only one surface water system in New Jersey does not filter its water, and is out of compliance with the Surface Water Treatment Rule. Filtration reduces the amount of suspended particles in the water. Suspended particles in the water, such as soil particles, interfere with the chlorination process.

Turbidity is a measure of the amount of suspended particles in water. The BSDW analyzed turbidity information submitted by public water treatment systems using surface or GWUI water sources. Turbidity is measured in Nephalometric Turbidity Units, or NTU. Treated waters must never exceed five NTU, and no more than 5% of samples may exceed 0.5 NTU. In 1995, there were no exceedances of the five NTU standard, but 14% of the systems exceeded the 0.5 NTU standard in 5% of their samples.

Total coliform bacteria monitoring has always been an important component of New Jersey's drinking water program. Because coliform bacteria are always present in high numbers in untreated fecal wastes, the absence of total coliform bacteria has historically been considered indicative of the absence of disease-causing microorganisms. Federal law regulates coliform bacteria in finished water under the "Total Coliform Rule" (TCR). The total coliform assay is performed to insure that coliform bacteria are not present in drinking water. When coliform bacteria are detected, further analysis is conducted to determine if either fecal coliforms or *E. coli* are present. Most of the fecal coliform group is derived from fecal contamination and *E. coli* is derived solely from fecal contamination. Many members of the total coliform group are found in the environment in the absence of fecal contamination.

In general, coliform bacteria are a good indicator of some but not all waterborne pathogens. Some pathogenic microorganisms have greater resistance to disinfection than coliforms and therefore may be present in the absence of coliforms. The parasite *Cryptosporidium*, which has caused several drinking water-related disease outbreaks in other states in the past few years, is one such organism. Recent disease outbreaks in the U.S. due to *Cryptosporidium* contamination of drinking water may result in Federal regulations for this organism as well as possible revisions to the existing *Giardia* and virus regulations under the pending Enhanced Surface Water Treatment Rule.

4.4.2. Lead

Lead is important because it is a cumulative neurotoxin. Fetuses and small children are most vulnerable to lead toxicity. There are many sources of exposure to lead - air, soil, dust, food, and drinking water. Drinking 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 level of concern for lead toxicity from 25 micrograms per deciliter of blood to 10 micrograms per deciliter of blood, concluding that lower levels of lead may be more harmful to growing children than previously believed.

The major sources of lead in drinking water are lead service lines, lead solder and household plumbing fixtures. Lead may reach drinking water through the dissolution of lead-containing materials by corrosive water. Corrosivity is a property of water that causes it to dissolve certain materials in the water distribution system. In New Jersey, some of the major urban centers are served by lead service lines. If the water is corrosive, the lead from the service lines may increase the concentration of lead in the water and thus, the body burden of lead among urban children. Another source of lead in drinking water is the lead solder used in homes constructed before the lead solder ban in 1987. More recently it has been determined that plumbing fixtures that contain brass may be an additional source of lead in drinking water. 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.

Lead does not have an MCL. When the lead "Action Level" (AL) is exceeded, the water system is required to either install corrosion control treatment or use other means such as flushing to reduce lead concentrations in the drinking water. An AL exceedance occurs when 10% or more of the required samples exceed 15 ppb. Lead monitoring regulations were phased in so that the largest water systems sampled first, followed by the medium systems and the small systems including NTNC. In the period from July 1, 1992 through June 30, 1995, 50% of the large community systems, 33% of the medium community systems, 22% of the small community systems, and 31% of the nontransient noncommunity systems exceeded the lead action level in at least one sampling period.

Since children spend a great deal of time at schools and day care facilities, 1988 amendments to the Federal SDWA 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). EPA recommends that schools and day care centers monitor their water for lead and copper, however, there is currently no mandatory monitoring program in place, and advice about flushing faucets is not always followed.

An additional concern is homes served by private wells because these systems tend to have no treatment. Since there are no State requirements for routine private well testing, many potential problems are going unidentified.

4.4.3. Mercury

Over 3,000 public water system samples have been analyzed for mercury since 1993. During this period, four CWS samples and three NTNC samples exceeded the MCL of 2 ppb. Since 1993, three CWS and three NTNC have been issued MCL violations for mercury. Therefore, mercury would not appear to be a significant problem in New Jersey PWS. However, over 2,300 private, potable wells have been sampled in southern New Jersey for mercury. Of these wells, approximately 300 have yielded water samples with mercury levels exceeding the MCL of 2 ppb. The highest mercury concentration found in a water sample was 72 ppb. A draft report completed by the USGS has identified 32 areas of contamination in southern New Jersey 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.

Previous research by NJGS and DSR indicates that ambient mercury levels in ground water in the New Jersey coastal plain are in the range of 0.001-0.040 ppb and concentrations higher than this indicate contamination by anthropogenic (i.e., human) sources. Preliminary investigation suggest 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 drinking water sources to affected residences, and determine the potential source(s) of the contamination. A discussion of potential sources of mercury in ground water is located in Section 4.1.3. of the Ground Water section of the Water Resources Self-Assessment.

4.4.4. Nitrates

Nitrates 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"). In addition, conventional water treatment at drinking water facilities will not remove nitrate from source water.

Surface Water - Control of nitrate concentrations in freshwaters is important to protect surface water supplies of drinking water. Data from the New Jersey Ambient Monitoring Network show that although exceedances of the nitrate criteria occurred at only one of 79 monitored stations, concentrations are rising at 46 (58%) of the stations. (See the Freshwater Watersheds section of this Self-Assessment document.) Nitrate increases may be attributed to upgrades of sewage treatment plants, which reduces the concentrations of ammonia in the effluent by converting the nitrogen to nitrate; and/or increased nonpoint source contributions from stormwater, runoff, air deposition, contaminated ground water, etc.

Special studies on the Passaic River during the Drought Emergency of 1995 documented algal (blue green) blooms on the Pompton River that interfered with routine water treatment operations. Concurrently elevated levels of nitrate as high as 6 ppm (MCL=10 ppm) were measured at raw water supply intakes.

Ground Water - The presence of nitrate in a potable well indicates that the well is susceptible to contamination from surface activities, since nitrate moves from the surface to the groundwater faster than most other contaminants. Thus, data on nitrate concentrations in wells can be used as an early warning of the potential for contamination from other contaminants such as pesticides, VOCs and microbiological contaminants. Studies by USGS have verified that the presence of nitrate in a well is related to the presence of pesticides in that well.

Status of nitrate sampling in New Jersey - Since 1993, all public water systems using ground water have been required to sample annually for nitrate and those using surface water are to sample quarterly. In 1995, three CWS (0.6%), 13 NTNC (1.4%), and 27 TNC (1.2%) had at least one sample with nitrate concentrations greater than the MCL of 10 ppm. Compared to 1993, the number of CWS with at least one sample above the standard did not change. The number of NTNC with at least one sample above the standard decreased from 3.7% to 1.4%, which represents a 62% reduction in the number of NTNC systems with nitrate above the MCL. The percent of TNC wells with at least one sample above the standard decreased from 1.6% to 1.2% from 1993-1995. The EPA strategy of requiring all PWS to monitor for nitrate at least annually appears to be reducing the number of public water systems with nitrate concentrations above the MCL. Noncommunity water system compliance with the monitoring requirement for nitrates needs to be improved.

Pesticides - A group of contaminants that are likely to occur with nitrates are pesticides. Because of the expense associated with the EPA regulations requiring monitoring for 23 specific pesticides between 1993-1995, NJDEP concentrated a major work effort on determining whether pesticides were a problem for New Jersey drinking water.

The source waters for all CWS and NTNC using surface water were sampled twice for pesticides during the pesticide application season (May through September) in 1994. The samples were collected under both high flow and low flow conditions. No pesticides were detected during this sampling regime.

In response to EPA regulations, BSDW and DSR developed a model to predict the vulnerability of public ground water wells to contamination by pesticides. 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 distance from an outcrop area, soil type, and depth of the well were important factors in determining the susceptibility of a particular well. The use of pesticides in an area (five-year time of travel) was determined using information provided by each purveyor. Screening samples were collected for vulnerable CWS and NTNC wells that had a pesticide source within a five-year time of travel. Three CWS and three NTNC wells were found to contain trace concentrations of pesticides well below their MCLs. Pesticide occurrence in CWS and NTNC source waters does not appear to be a major issue in New Jersey.

Less is known about pesticides in private wells. From 1986 to 1988, USGS and DSR conducted a study of susceptible agricultural wells (irrigation and private potable). In this worst case study pesticide residues were detected in ground water from 27 of 81 wells. The most frequently detected pesticides were aldicarb and its metabolites, carbofuran, atrazine, and alachlor.

4.4.5. Volatile Organic Chemicals (VOCs)

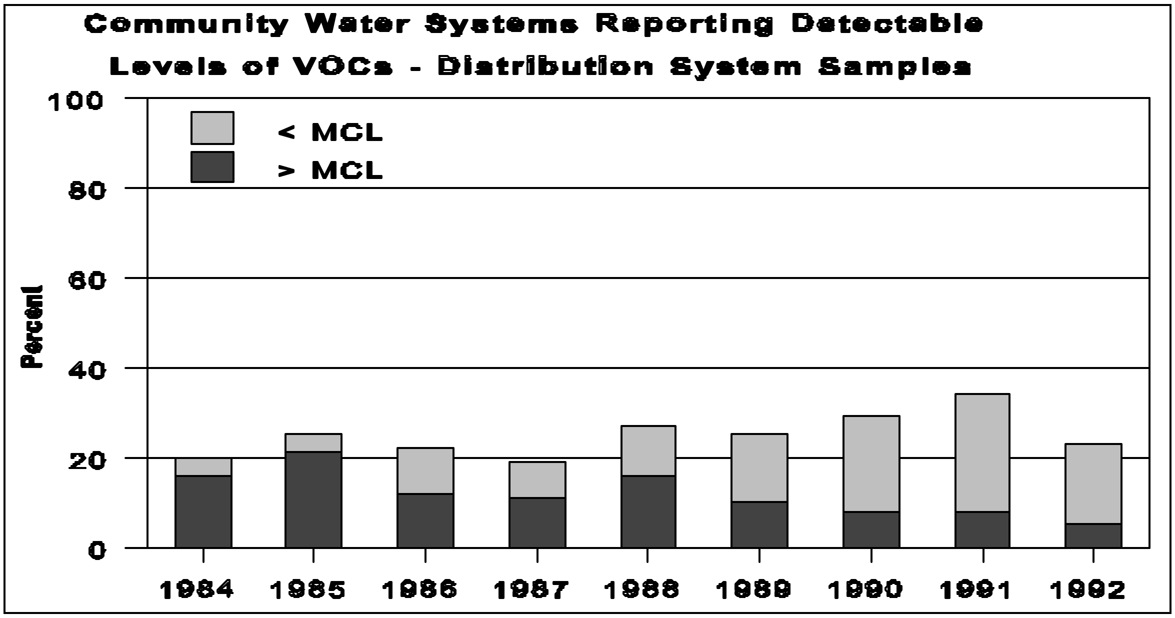
Volatile organic chemicals (VOCs) are of concern because they pose a risk of health effects, which may include cancer and/or systemic toxicity, depending on the particular contaminant involved. VOCs were first studied in New Jersey drinking water supplies in the early 1980's, as part of a State-wide drinking water survey. National VOC surveys had shown that approximately 20% of CWS had detectable concentrations of VOCs. At the time when VOCs were first detected, there were no drinking water standards (MCLs) for these contaminants, so it was not possible to determine the significance of the concentrations found. Landmark legislation passed in 1983 gave NJDEP the authority to require semi-annual monitoring of all CWS for a list of 22 synthetic organic chemicals, mostly VOCs. In addition, NJDEP was authorized to adopt drinking water standards for those 22 synthetic organic chemicals, and any others known to occur in New Jersey drinking water upon recommendation of the DWQI. Extensive work was done by BSDW, DSR, NJDHSS, and the DWQI to evaluate human health risk, analytical capabilities, and treatment techniques. In 1989, MCLs for 17 of these hazardous contaminants were adopted. Millions of dollars have been spent by CWS to improve drinking water quality and to comply with the standards. In November 1995, standards for five new VOC contaminants were proposed in the New Jersey Register: 1,1-dichloroethane, methyl tertiary butyl ether, naphthalene, 1,1,2-trichloroethane, and 1,1,2,2-tetrachloroethane. These standards were adopted November 1996.

Regular semi-annual monitoring by CWS in New Jersey between 1984 and 1992 revealed a significant number of water systems with VOC contamination (See Figure 1). For this reason, when federal regulations for VOCs were adopted in 1989, 1991, and 1992, New Jersey had already addressed most VOC problems in CWS. Beginning in 1989, NTNC began monitoring for a limited number of VOCs for the first time. At the present time in New Jersey, 15 of 22 monitored VOCs have New Jersey MCLs lower than those in the Federal regulations. This includes one chemical monitored in New Jersey that does not have a federal monitoring requirement.

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 now being monitored. Blending of marginal drinking water sources with clean water sources to reduce the concentration of contaminants in the water distribution system is no longer allowed.

VOC data collected from 1993-1995 under the new federal regulations was analyzed. For CWS, 8% of the systems and 6% of the POEs had at least one sample with a VOC concentration greater than the New Jersey MCLs. Seven percent of the NTNC had at least one sample with a VOC concentration greater than the New Jersey MCLs. MCL violations are based not on a single sample but on an annual average concentration. There were 22 VOC violations in CWS between 1993-1995. For NTNC, 46 systems had VOC MCL violations between 1993-1995. Between 1984-1996, the percent of community water systems with concentrations of VOCs greater than the associated MCLs has fallen from roughly 20% to 6%.

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. Ocean 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 in Ocean County will be discovered.



VOCs are more common in ground water and therefore VOC contaminated ground water resources have often been abandoned by water utilities in favor of surface water. However, another set of VOCs, disinfection byproducts such as TTHMs, occur at higher concentrations in surface water. Drinking water quality concerns regarding disinfection byproducts are discussed below.

4.4.6. Disinfection Byproducts

When chlorine reacts with dissolved organic matter in the untreated 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. The four regulated trihalomethanes are chloroform, chlorodibromomethane, bromodichloromethane, and bromoform. 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, and its public health importance cannot be overemphasized.

However, the THMs and other disinfection byproducts formed as part of the chlorination process are classified as 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 drinking water standard of 100 ppb calculated as an annual concentration. By plant modifications and changes to chlorine application practices, the levels of THMs have dropped, and systems returned to compliance. In 1995, one CWS exceeded the 100 ppb annual average concentration for total trihalomethanes. Recent federal regulations have proposed changing the standard to 80 ppb. In the 1996 PPA, a milestone was developed stating that "By 2000, the annual average of total trihalomethanes will be reduced to 80 ppb in surface water systems." In examining the data for 1995, four surface water facilities exceeded an annual average THM concentration of 80 ppb, with one of the facilities exceeding 100 ppb. This surface water facility is now blending ground water with surface water in order to reduce the concentrations of total THMs in their finished water.

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

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 to provide high quality drinking water.

4.4.7. Radionuclides

Radium and other radionuclides

Radium is the most important of the naturally occurring radionuclides in New Jersey. Minute traces of radioactivity are normally found in all drinking water. The concentration and composition of these radioactive constituents vary from place to place depending on the type of soil and rock present. Radium is a known human carcinogen and has been shown to cause bone cancer in occupational settings.

USGS has shown that the concentration of radium is higher in ground water in southwestern New Jersey (the Kirkwood-Cohansey Aquifer Systems) than in ground water in contact with the uranium-rich rocks of the Piedmont Province of north-central New Jersey, where concentrations of uranium tend to be high.[5] Starting in 1987 with routine analyses of ground water from public supply wells in Washington Township, Gloucester County, elevated levels of radium have been detected in the shallow parts of the Kirkwood-Cohansey aquifer system across the New Jersey Coastal Plain. Work conducted cooperatively by NJDEP-DSR and USGS has demonstrated the widespread nature of the radium problem in the Kirkwood-Cohansey Aquifer System, and links the distribution of the radium to the presence of the Bridgeton Formation[6]. Of 81 samples collected during 1988-89 in Cumberland, Gloucester, Salem, Camden, and Atlantic Counties, 26 contained dissolved radium-226 plus radium-228 concentrations greater than the MCL of 5 picoCuries per liter (pCi/l). Associated gross alpha activities ranged from 0.6 to 25 pCi/l with a median of 5.5 pCi/l. The distribution of radium in localized areas is shown to be related to the additives at the land surface, especially in agricultural areas where the Bridgeton Formation outcrops. Additional sampling of the Kirkwood-Cohansey aquifer in Burlington and Ocean counties in 1990 show somewhat lower radium levels in the ground water in these two counties than in areas farther south. Although some elevated levels of combined radium-226 and 228 were detected in these counties, none exceeded the MCL. Both the median and maximum gross alpha and radium 226 were about half the values for the region of southern New Jersey as a whole.

Elevated values of gross alpha from raw water serving public supply wells in the Toms River area in Ocean County have been detected. The corresponding radium levels are relatively low. The gross alpha levels in the area are highly variable and the issue of analytical as well as areal variability in gross alpha activity in this system is currently being investigated by NJDEP. It has been determined that holding time for the gross alpha samples is a major reason for the variability.

Community water systems are required to monitor for gross alpha particle activity once every four years. A total of 131 CWS sampled for gross alpha and radium 226/228 in 1995. Three CWS had gross alpha MCL violations, and two of these exceeded the radium 226/228 MCL.

Radon

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[5] Szabo, A., Rice, D.E., MacLeod, C.L., and Barringer, T.H. (In press). Relation of Distribution of Radium, Nitrate, and Pesticides to Agricultural Land Use and Depth, Kirkwood-Cohansey Aquifer System, New Jersey Coastal Plain, 1990-1991, U.S. Geological Survey Open File Report. 96-XXX.

[6] Zapecza, O. and and Z. Szabo (1989). Source of natural radioactivity in ground water in the Kirkwood-Cohansey Aquifer System, southwestern Coastal Plain, New Jersey: Geological Society of America, Abstracts with Program, v. 21, no. 2, p.78.

Radon is a gas which is formed by the natural decay of uranium. Radon is soluble in water. The concentration of radon in ground water depends on the amount of uranium in the soil and the flow of the ground water. Ground water radon concentrations are greatest in the New England region where concentrations of two million picoCuries per liter (pCi/l) have been found. In New Jersey, the highest radon concentration recorded in ground water was 170,000 pCi/l in Warren County. Currently, there is no MCL for radon in drinking water.

From 1985 to 1987, the Bureau of Environmental Radiation (BER) analyzed drinking water samples from public and private water supplies for radon as part of its confirmatory radon testing program. Additionally, the radon cluster study programs tested drinking water for radon from 1985 until March 1996. A total of 1,302 drinking water samples were analyzed for radon.
(See Table DW-2.)

This past summer, U.S. House and Senate conferees agreed to compromise language in the SDWA Amendments of 1996 that addressed the issue of a radon in water standard. The compromise reached allows EPA to adopt its radon in water standard, expected to be 300 pCi/L, based on traditional drinking water standard-setting criteria. However, the amendments also require EPA to adopt an alternative standard based on equalization with radon levels in ambient, outdoor air. This alternate standard is expected to be 3,000 pCi/l. States may work under this alternate standard by demonstrating that existing or additional radon in air program initiatives can achieve equivalent or greater health benefits than that achieved through complying with the more stringent 300 pCi/l standard. The EPA radon in water standard is not expected until late 1999.

Table DW-2: Radon Concentrations measured in New Jersey Groundwater 1986 to 1995

County	Number of Radon in Water Tests	Mean Concentration (pCi/l)	Range of Concentrations (pCi/l)
Bergen	2	975	870-1,080
Burlington	6	190	90-410
Cumberland	1	81	81
Gloucester	1	890	890
Hunterdon	409	5826	45-139,000
Mercer	76	3165	9-52,100
Middlesex	1	230	230

County	Number of Radon in Water Tests	Mean Concentration (pCi/l)	Range of Concentrations (pCi/l)
Monmouth	17	457	120-1,010
Morris	211	9026	42-88,800
Passaic	18	5203	194-35,000
Salem	3	1950	220-5,170
Somerset	213	7260	19-132,000
Sussex	102	3778	31-47,000
Union	1	159	159
Warren	232	7145	36-170,000

5. Program Strengths

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. Subsequently, EPA delegated primacy to New Jersey for enforcement of the Federal SDWA.

Recent drinking water program successes include: 1) promulgating and revising New Jersey MCLs for VOCs and other contaminants; 2) obtaining primacy for new EPA drinking water regulations and implementing these new programs; 3) insuring adequate water supplies through the critical area process and regional water projects; 4) improving data management; 5) maintaining a research program on drinking water issues; and 6) continuing the water supply loan program.

5.1. Promulgating and Revising New Jersey MCLs

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 ground waters and in the ground waters of other states in the early 1980's, prompted the New Jersey legislature to pass these amendments to the New Jersey SDWA (P.L. 1983, N.J.S.A. 58:12A-12 to 21, 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 NJDEP 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 NJDEP from 1985 through 1988.

NJDEP, in conjunction with DWQI, has completed a review of the basis for the 22 MCLs which were adopted in 1989 pursuant to the 1983 amendments to the New Jersey SDWA. 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-dichloroethylene, 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. These 10 MCLs were adopted into regulation at the end of 1996.

5.2. Obtaining Primacy for New EPA Drinking Water Regulations, and Implementing These New Programs

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

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

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 five year time of ground water 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.

5.3. 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 ground water withdrawals, and encourage the use of new regional sources of water to offset the loss of ground water resources. Critical Area No. 1 (portions of Middlesex, 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) has been built with a shifting from ground water use to the new surface water supply.

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 provided additional water to four large water systems in northeastern New Jersey and has prevented at least three drought emergencies since being placed into service.

The NJDEP has taken steps to manage water quantity through conservation education. Over the last two years a demonstration project grant was awarded to Cape May County to educate their residents and municipal officials on the need for water conservation. The drinking water supply of Cape May has been impaired by saltwater intrusion. This grant provided funding for the education of hotels, businesses and residents on use of low flow fixtures and an intensive public outreach campaign to the individual municipal officials on saltwater intrusion, the need for conservation and best ways for individuals to protect their water supplies. The goal of the grant is to reduce county-wide water use by 15%.

5.4. Improving Data Management

5.4.1. 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 has been translated into a Geographic Information System (GIS) file. This information will be very valuable for future program decisions that involve potable water considerations.

Community Water Supply 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 (BSDW, BWA, and the New Jersey office of USGS) maintained databases on public supply wells which could not be easily linked. 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 containing well location and construction information which could then be then used by all three programs. This database currently is managed by the 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 1892 of the State's 2652 CWS wells has been collected and correlated, and 113 well head protection areas have been delineated. Gaps in the available data exist for some of the smaller CWS wells.

Noncommunity Water Supply Wells - The OEP is currently working with county planning and health departments (through the County Environmental Health Act or CEHA program) to develop a WHPP for the NTNC and TNC wells. In coordination with CEHA, staff have met with or spoken to many of New Jersey's CEHA counties. Many of these counties have committed to perform a series of three tasks to develop a WHPP. The steps include: 1) identification of all noncommunity wells using GPS, well data collection and delineation of WHPA (using GIS), 2) pollution source inventory of WHPA, and 3) development of a ground water management program (consisting primarily of outreach and education activities). The majority of the counties have completed step 1 and are focusing on step 2. Cape May and Salem Counties are focusing primarily on domestic wells.

5.4.2. 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 New Jersey Department of Treasury to develop a personal computer based data presentation system for information on all public water systems in New Jersey. Prior to the development of this system, all records regarding water systems were maintained on a mainframe computer that was difficult to access. Now each NJDEP 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.

5.4.3. Developing a Vulnerability Ranking for all CWS and NTNC Wells

EPA 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, in 1992-94 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. 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. In 1995, the questionnaires were distributed and data on a total of 2063 CWS wells were collected. This corresponds to 1,307 CWS points-of-entry (POE) or treatment plants. 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. A total of 326 CWS wells were targeted for sampling in 1995. Only three CWS wells had detectible concentration of a pesticide. This model is also discussed in Section 4.4.4.

Data were available for a total of 1215 NTNC wells. Using the susceptibility ranking developed by DSR and the information from the 1995 questionnaire, 591 POEs were given susceptibility waivers and an additional 374 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. Only two NTNC wells 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 ground water wells where pesticide contamination was most likely to be found.

5.5. 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 New Jersey with a focus on New Jersey 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 *Cryptosporidium* and *Giardia* in source waters; and the development of approaches such as the model being used to conduct vulnerability assessments for VOCs and SOCs. Approximately five projects are funded annually through this fund.

5.6. Continuing the Water Supply Loan Programs

NJDEP has actively promoted its Water Supply Loan Programs intended to benefit the State, the consumer, and the waterworks industry. The Water Supply Bond Act (Bond Act), P.L. 1981, c. 261, as amended by P.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 publicly-owned water utilities to conduct improvements in accordance with the recommendations of the 1982 New Jersey Statewide Water Supply Plan. The New Jersey Statewide Water Supply Plan of 1996 recommends continuation of the Water Supply Loan Programs with consideration for expansion of loan eligible local projects. Loans are repaid to the "Water Supply Fund" and are available for future loans for other projects. See Table DW-3.

Table DW-3: Water Supply Bond Act Loans

Loan Program	Master Plan Allocation	Legislative Appropriation Executed	Loans Executed	Applications in Process
High Priority infrastructure rehabilitation (122 loans)	$120 M	$120 M	$81.3 M	$44.7 M
Interconnection testing and improvement (2 loans)	$ 15 M	$ 8 M	$ 0.45 M	$ 5.6 M

Loan Program	Master Plan Allocation	Legislative Appropriation Executed	Loans Executed	Applications in Process
Contaminated wellfield replacement (20 loans)	$ 27 M	$ 27 M	$21.9	$ 3.7

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.

In August 1996, the SDWA was reauthorized. This legislation established a drinking water state revolving fund (DWSRF) program in order to assist community and non-profit noncommunity water systems in meeting the requirements of the federal SDWA. In support of this effort, federal appropriations have been made in the amount of $1.275 billion for federal fiscal year 1997. A state-level DWSRF will be established to continue the progress made through the existing water supply loan program. New Jersey's anticipated share for FY97 is $27 million.

6. Program Limitations

The following seven program limitations were identified in the August 1995 Self-Assessment of New Jersey's Environment and NJDEP Programs and continue to be listed: 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, ground water management, and ground water 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) the need to assess the interrelationship between potable water withdrawals and wastewater discharges.

6.1. Inflexibility 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 many legal battles between the 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 must occur. 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. NJDEP continues to participate in EPA's Chemical Monitoring Reform Workgroup. This workgroup is attempting to give states more monitoring flexibility. Regulations will be proposed by the end of 1997 to implement the recommendations of the workgroup. It is unclear how extensive this reform will be until NJDEP reviews the new regulations.

6.2. Data Management

6.2.1. Need to Implement Electronic Submission of Analytical Data

All monitoring results are reported to the BSDW on paper. There are approximately 20,000 summary reports for total coliform monitoring alone submitted each year to BSDW. Many drinking water laboratories store analytical results in a database and then generate the standard BSDW reporting forms on paper for manual entry into BSDW's database. After entry into a database, compliance determinations with drinking water standards are done automatically. A more efficient way to handle data would be for the laboratories or the purveyors 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.

6.2.2. Need to Improve Laboratory Certification and QA/QC Program

NJDEP needs to put a higher priority 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 performed on a method specific basis, not on a contaminant specific basis, and
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 is not data managed. This means that this information is not readily available to other programs in NJDEP. This information includes laboratory method detection limits (MDL) and precision and accuracy data for each method/analyte for which a laboratory requests certification. The BSDW needs access to this 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 detections at the MDL, and 2) in developing drinking water standards, analytical considerations are integral parts of the process.

6.2.3. 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. These databases exist in various programs under different Assistant Commissioners with different data support units. 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. Individual programs have strong needs to improve data management portions of their programs. Once programs have invested resources in a certain data management direction, changes to that program are usually difficult. There are currently initiatives within NJDEP to address this issue.

6.2.4. 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, unique State well permit numbers, and treatment facilities identified, is critical.

6.2.5. 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. The way that data programs are developed in the BSDW should be reassessed to consider whether data can be managed for purposes other than compliance.

6.3. 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, etc.). 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 but not 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.

During 1995, the BSDW sponsored workshops on the SDWA with Rural Water and the New Jersey Section of AWWA Small Systems Committee.

6.4. Additional Emphasis Needed for Nonpoint Source Problems, Ground Water Management Issues, and Ground Water Protection

The success of the NPS management, ground water management, and aquifer recharge programs has been due in part to the effort put forth in conveying a prevention message to the public. Education initiatives and partnerships with these groups, which include business and industry as well as nonprofit environmental groups, has resulted in a heightened awareness of pollution prevention solutions. The success of these programs relies on a partnership effort with NJDEP and these outside interests. Funding for these initiatives exists through both Federal 319(h) funds and 106-Ground water funds, and through the State Water Supply Bond Fund. OEP is responsible for education and outreach for effective management of nonpoint source pollution to the public. Ongoing activities include providing funding for best management practice demonstration grants, implementing public education programs and research.

6.5. 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. At the time a new well is constructed, a microbiological test and a few chemistry tests are performed; this is likely to be the only water testing ever done. This water quality data is filed with the certification issued by the administrative authority, and it is not maintained by the BSDW in a database.

Although 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 only when there are hazardous contaminants involved. Other 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 divisions of the Site Remediation Program. All private well data received by the BSDW is data managed.

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.

6.6. Depletive Use of Water

Based upon estimates projected by NJDEP in the New Jersey Statewide Water Supply Plan (1996) and Depletive Water Use Report (1994), almost 50% 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.

6.7. Need to Assess the Interrelationship Between Potable Water Withdrawals and Wastewater Discharges

Many streams within the State contain areas where water intakes and wastewater discharges are adjacent 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 his effluent limitations. Emphasis must be placed on beginning the interaction between these two groups, and policies should be drafted to maintain drinking water availability and quality, as well as the appropriate allocation of increased costs to the water supply purveyors and/or the wastewater system operators.

7. EPA Roles and Responsibilities

As part of the FY96 PPA, EPA agreed to perform the following tasks. A summary of the tasks and progress to date is included.

- **Data Validation**: During the course of this Agreement, EPA Region 2 will conduct at least one data review of BSDW monitoring and violation data and will conduct three data reviews of local or county health agencies' monitoring and violation data.

EPA Response: Data verification of BSDW monitoring and evaluation data was performed in September

1996. EPA completed one of the three reviews of local units in September 1996.

- **Comprehensive Performance Evaluations**: Comprehensive Performance Evaluations (CPEs) are detailed evaluations of the treatment and operation of surface water systems. The Region will request that the Office of Drinking Water and Ground Water (OGWDW) and appropriate EPA Cincinnati programs establish a national contract using PWSS set aside funding from States desiring to have the CPEs conducted.

EPA Response: Region 2 will pursue CPE assistance with EPA HQs.

- **Evaluation of Lead Public Education**: EPA Region 2 will either conduct a regional study of the effectiveness of public education under the lead and copper rule, or request the OGWDW conduct such a study. The Division of Science and Research (DSR) has conducted a study evaluating the effectiveness of various materials used in the public education process, and determined that the mandatory EPA language was not effective in communicating the issues.

EPA Response: The Region has reviewed the DSR Study which found that public education under the lead and copper rule works. However, the study made recommendations to enhance public education's overall effectiveness. EPA will support implementation of the Study's recommendations within New Jersey and distribute it to other states in Region 2 and to EPA-HQs.

- **Redefine the Significant Non-Compliance (SNC) Process**: EPA Region 2 and the BSDW will jointly recommend to the OGWDW changes in the SNC process including changes to the SNC definitions, and how SNC lists are created and resolved.

EPA Response: Since the NJDEP personnel responsible for the SNC process have changed, the Region has been requested to explain the process to the new staff. Modifications to the process may than be considered and pursued with OECA.

EPA Region 2 will provide on-site assistance to BSDW to complete any quarterly SNC reports that have more than 100 SNC violations, and determine either through review of previous SNC reports or an on-site review of BSDW records which systems have returned to compliance, before submitting the report to BSDW. EPA will assume responsibility for addressing any remaining target list systems.

In September or early October, Regional staff will travel to New Jersey to explain the process and assist NJDEP in completion of the SNC Report. Systems that are not addressed in a timely manner by NJDEP will be subject to federal enforcement actions.

- **Indicator Study**: EPA Region 2 should support the indicator study, and development of implementation guidance at the national level.

EPA Response: This has become an on-going activity for Region 2. EPA has worked with NJDEP on the Joint Agency Environmental Indicators Team to refine the new indicators, through review and participation in indicator workgroup meetings. EPA support at the national level will continue.

8. Indicators Progress Report

Based on the Key Issues identified in the 1995 Self-Assessment, the Drinking Water Work Group established the following goal for the drinking water programs in New Jersey:

Goal: Every person in New Jersey will have safe drinking water.

In order to meet this goal, seven subgoals were developed. The contaminant specific subgoals were developed based upon knowledge of contaminant occurrence in New Jersey drinking water and on the risk the contaminant poses to human health.

Subgoals

- ♦ All source water in New Jersey used for drinking water will be protected from pollution
- ♦ Every person in New Jersey should drink water that is free of disease-causing organisms
- ♦ Every person in New Jersey should drink water with lead concentrations less than 15 ppb
- ♦ Every person in New Jersey should drink water with nitrate concentrations less than 10 ppb
- ♦ Every person in New Jersey should consume water with mercury concentrations less than 2 ppb
- ♦ The concentrations of VOCs in finished drinking water shall be below the MCLs
- ♦ Every person in New Jersey should drink water that contains the minimum concentration of disinfection byproducts without compromising microbiological safety.

Based on the goal and subgoals, 17 specific milestones (with target dates) or objectives (without target dates) were developed. In order to measure progress towards meeting the milestones and objectives three types of indicators were developed: *pressure-P (or cause) indicators* which describe the reason for the pollution problem, *state-S (ambient condition) indicators* which describe the current ambient conditions, and *response-R indicators* which describe regulatory or societal responses that have been indicated as problems.

The data used to develop these indicators are shown below in a tabular format. The goal and subgoals, milestones and objectives, and indicator data are listed in the order that appears in the FY96 Performance Partnership Agreement.

Goal: Every person in New Jersey will have safe drinking water.

Milestone A: By 2005, 95% of the public water systems will provide water that meets the microbiological drinking water standards.

Performance Measure AS1
Percent of public water systems (populations served) providing drinking water that meets all microbiological drinking water standards throughout the year.

1995	CWS	NCWS	TOTAL
Number of active public water systems	625	4182	4910
Number of systems that sampled for microbiological parameters	622	3817	4439
Percent of systems that sampled for microbiological parameters	99.5%	91.3%	92.3%
Estimated population served by public water systems active in 1995	7.354 M	0.638 M	7.354 M*
Estimated population served by public water systems that sampled	7.353 M	0.493 M	7.353 M*
Estimated percent of population served by public water systems that sampled	99.9%	77%	99.9%*
Number of systems without acute or monthly MCL violations	603	3752	4355
Percent of systems that sampled without acute or monthly MCL violations	97%	98.3%	98.1%
Estimated population served by systems without acute or monthly MCL violations	6.84 M	0.486 M	6.84 M*
Percent of population served by systems without acute or monthly MCL violations	93%	98%	93%*

* Noncommunity water systems do not serve a residential population, therefore totaling the two estimated populations would result in counting people twice.

Goal: Every Person in New Jersey will have safe drinking water.

Milestone B: By 2005, 95% of the public water systems will provide water that meets the New Jersey chemical drinking water standards.

Performance Measure BS2

Percent of Public Water system (populations served) providing drinking water that meets all NJ chemical drinking water standards throughout the year.

Summary of MCL Violations for Community Water Systems in 1995

Safe Drinking Water Act Rule	Number of Systems that Sampled	Number of Systems with MCL Violations*	% of Systems with MCL Violations*	Estimated Population Sampled	Estimated Population with MCL Violations*	Estimated Percent of Population with Violations*
Lead and Copper Rule	473**	44	9.3%	3.621 M	0.183 M	5.1%
Surface Water Treatment Rule	32	4	12.5%	3.605 M	0.028 M	0.8%
Chemical and Radiological **	549	15	2.7%	6.587 M	0.279 M	4.2 %
Total Systems	591	63	10.7%	6.767 M	0.497 M	7.3%

* For the lead and copper rule, an action level exceedance is reported. An action level exceedance determines the treatment requirements that a water system must complete.

** This does not include large systems that violated the lead action level in previous years and are in the process of installing corrosion control treatment.

*** Includes VOC, SOC, nitrate, TTHM, radiological and inorganic chemical violations in 1995.

Summary of MCL Violations for Noncommunity Water Systems in 1995

Safe Drinking Water Act Rule	Number of Systems that Sampled	Number of Systems with MCL Violations*	% of Systems with MCL Violations*	Estimated Population Sampled	Estimated Population with Violations*	Estimated Percent of Population with Violations*
Lead and Copper Rule	691**	171	24.8%	0.183 M	0.034 M	18.6%
Surface Water Treatment Rule	3	1	33.3%	0.0045	0.0009	20%
Chemical ***	1153 (2280)	33 (22)	2.9 % (1.0%)	0.280 M (0.271 M)	0.009 M (0.002 M)	3.2 % (0.7%)
Total Systems	1194	195	16.3%	0.290	0.040 M	13.8%

* For the lead and copper rule, an action level exceedance is reported. An action level exceedance determines the treatment requirements that a water system must complete.
** This does not include large systems that violated the lead action level in previous years and are in the process of installing corrosion control treatment. The lead and copper rule only requires that CWS and NTNC monitor, however any TNC data received has been included.
*** Includes VOC, SOC, nitrate, and inorganic chemical violations in 1995 for NTNC. Nitrate is the only chemical parameter that TNC are required to monitor. The TNC data appear in parentheses.

Goal: Every Person in New Jersey will have safe drinking water.

Milestone C: By 2000, 90% of public water systems will have compliance evaluations that are acceptable.

Indicator CS1
Number and percent of systems inspected (population served) that have acceptable compliance evaluations.

Description	1994	1995
Total number of active CWS	629	625*
Number of CWS inspections (interim and complete)**	622	645***
Number of complete CWS inspections with ratings	298	430
Number of complete CWS inspections with acceptable ratings	210	344
Percent of complete CWS inspections with acceptable ratings	70%	78%
Population served by CWS with acceptable inspections	not available	not available

* During 1995, two community water systems were deleted from the BSDW inventory because of a merger and a reclassification of the water system.
** Ratings are only done for complete CWS inspections.
*** The database tracks inspections on a fiscal year instead of a calendar year. Some CWS may have been inspected twice during the calendar year.

Indicator CR1
***Number of enforcement actions for water systems that have unsatisfactory compliance evaluations*.**

This information is not available in this format at this time. Currently the Enforcement Element only tracks enforcement actions by facility, enforcement action type, and includes a comment field that normally explains what the violations are that initiated the enforcement action. A total number of enforcement action can be reported for any given month or year, however, the database does not link enforcement actions to whether initiated by an “Unacceptable” compliance evaluation inspection or a referral by another agency or individual.

For the year 1995, there were 32 formal enforcement actions issued by the Enforcement Element. Of these 32 actions, 10 were Administrative Orders and Notices of Civil Administrative Penalty Assessment, one was an Administrative Order, one was a Settlement Agreement with Assessment of a Civil Administrative Penalty, and one was an Administrative Penalty Assessment. These types of enforcement actions normally assess penalties for violations that have not been cited in another type of document and normally address violations that would be discovered during routine inspections or by referrals by the Bureau of Safe Drinking Water.

The remaining actions were four Judicial Orders, two Judicial Consent Orders, 12 Settlement Agreements and one Administrative Consent Order. These types of actions usually, but not always, address violations that are ongoing over a long period rather than surface during a routine inspection. For the year 1995, there were 18 formal enforcement actions issued by the Enforcement Element. Of these 18 actions, nine were administrative orders and notices of civil administrative penalty, one was a Settlement Agreement with Assessment of a Civil Administrative Penalty, and one was an Administrative Penalty Assessment.

Indicator CR2
Number of water systems that voluntarily returned to compliance.

This information is currently not available.

Indicator CR3
Number and percent of noncommunity systems inspected in the last five years.

Description	1991-1995
Number of active noncommunity systems, 1991-1995	5826
Number of noncommunity systems inspected, 1991-1995	4528
Percent inspected	78%

Subgoal 1: All source water in New Jersey used for drinking water will be protected from pollution.

Milestone D: By 2005, 50% of all public water systems will have a fully implemented source water protection plan.

Indicator DR1
Number and percent of CWS with well head protection programs/watershed protection plans.

Types of activities	Number of CWS wells	Percent of CWS wells
Total number of public supply wells	2652*	100%
Total number of public supply wells in unconfined aquifers	2086**	77.6%
Total number of CWS wells that have been located using GPS techniques***	1892	71.3%
Number of wellhead protection delineations completed	113	5.4%
Source inventories performed by counties	5 counties	23.8%
Contingency plans	0	0%
Source management plans	0	0%

* This number represents the number of wells in the WHPP inventory. It differs from the number in the BSDW source inventory.
** Only public supply wells in unconfined aquifers will have well head protection delineations.
*** A GPS or Global Positioning System allows for accurate location of wells. The wells are located to an accuracy of +/- 5 meters.

Indicator DR2
Conduct outreach and training activities for counties, municipalities, purveyors and the regulated community

NJDEP has awarded six WHPP demonstration project grants. Funding is through the State's 1981 Water Supply Bond Fund. Awardees are the Township of Readington with the South Branch Watershed Association, Bergen County Health Department, Atlantic County Health Department, Lake Hopatcong Regional Planning Board, Randolph Township, and the Passaic River Coalition. All projects include GPS location and data management requirements, pollution inventory activities, delineations and or modeling and a variety of management initiatives. The projects have an 18 month to 2 year duration.

All data will be added to the existing NJDEP GIS database.

OEP has provided a successful public education and outreach program geared to pollution prevention. These initiatives have focused on the protection of drinking water quality in terms of WHPP as well as the management of nonpoint sources of pollution. The audience varies from local, county, State and Federal entities, the business community to private citizen. Emphasis has been placed on developing information which talks about the connection between surface and ground water, defining a watershed and the need for protection of surface and ground water. This information series is entitled: "Integrated Water Resources Protection Practices". A program for school age children called the Clean Water Rangers was developed to introduce them to nonpoint source pollution, ground water, surface water and pollution prevention. Booklets and membership information has been published.

Indicator DR3
Develop generic guidance and management practices for source management plans.

The generic guidance is under development by the OEP. This guidance will be a component of a watershed management or a regional/county ground water management plan. The generic guidance will have three main components: 1) identifying water resources (surface and ground water), 2) identifying the threats to those water resources, and 3) developing a management plan that reflects regional hydrology/hydrogeology. Public outreach and education is considered a primary management practice for source water protection.

Indicator DR4
Determine which surface water purveyors monitor their source waters, and the availability of the data.

The AWWA Research committee and DSR are working on developing a questionnaire to determine this information.

Indicator DR5
Determine which monitoring stations used by the ambient monitoring networks could be used to determine surface water quality for drinking water intakes.

DSR is designing a research project to examine this issue and the issue of nutrient loadings at potable water intakes.

Subgoal 2: Every person in New Jersey should drink water that is free from disease-causing organisms.

Milestone E: No detectable waterborne disease from the consumption of drinking water.

Indicator EP6
Number of surface water treatment plants without filtration.

Description	CWS	NTNC
Number of surface water treatment plants (actively used)	31	3
Number of surface water treatment plants without filtration	1*	0

* The Surface Water Treatment Rule (SWTR) states that by June 30, 1993, all public water systems that use a surface water source must install filtration. This system is currently in violation of the SWTR.

Indicator EP8
Number of CWS Wells under the Direct Influence of Surface Water

Description	1995
Total number of CWS wells	2399*
Number of CWS supply wells that received final classification as "ground water under the direct influence of surface water"	5**

* This number represents the number of wells in the BSDW source inventory. It differs from the number in the WHPP inventory.
** Wells that are classified as "ground water under the direct influence of surface water" (GWUI) are subject to the more stringent Surface Water Treatment Rule. Systems with wells classified as having GWUI have 18 months from the time they are notified of this classification to install filtration.

Indicator ES1
Number of waterborne disease outbreaks caused by drinking water identified by DOH.

The Centers for Disease Control, a branch of the U.S. Public Health Service, identified a waterborne outbreak in July, 1989. The July 1989 outbreak was at a transient, non-community well at a campsite.[7] Eight persons were reported to have been infected with a pathogen which was not identified.

[7] Herwaldt, B.L., G.F. Craun, S.L. Stokes, and D.D. Juranek. (1992). *Outbreaks of waterborne disease in the United States: 1989-1990*. Journal AWWA 84(4): 129-135.

The cause of the outbreak was noted to be a water treatment deficiency (Herwaldt, et al., 1992). There were no reported waterborne disease outbreaks in 1995.

Indicator ER1
Percent of CWS and NTNC that have disinfection

1995	**CWS**	**NTNC**
Total number of active systems	625	1,072
Number of systems required to disinfect*	341	3
Number of systems with disinfection	446	117
Percent with disinfection	71%	11%

* All community water systems are required to disinfect all drinking water to ensure water is microbiologically safe with the following exceptions: 1) community water systems serving ground water to 100 or fewer dwellings may choose not to disinfect, provided microbiological testing is increased to two biweekly samples/month; 2) community water systems that purchase treated water on a regular basis are not required to disinfect a second time, as long as the water remains microbiologically acceptable.

Indicator ER2
Percent of public water systems serving surface water or groundwater under the direct influence of surface water below the monthly MCL for turbidity and percent of months treatment plants meet their disinfection residual requirements in a year.

Turbidity Measurements at Surface Water Treatment Plants

1995	Number	Number with samples that exceed 0.5 NTU	Number with 5% of samples that exceed 0.5 NTU	Number exceeding 5 NTU
PWS	35*	23	5	0
PWS Monthly Rpts.	415	80	26	0
Samples Taken	117,263**	2,870	---	0

*This includes 32 CWS, 3 NCWS

** The number of samples required at the active surface water treatment plants was 66,795 in 1995.

Disinfection Residual Measurements at Surface Water Treatment Plants

1995	Number	Number of days with disinfection residual less than 0.2 mg/l	"V" greater than 5%
Systems	35	0	1
Months	415	0	2

* Includes 3 NTNC, 3 emergency CWS sources, and 1 groundwater source which is under the direct influence of surface water.

Indicator ER3
Number (percent) of CWS (populations served) without an acute MCL violation in a year and number (percent) of months without an acute MCL violation in a year.

This indicator has been combined with indicator ER4 in order to report the data on one table.

Indicator ER4
Percent of CWS (populations served) without a monthly total coliform MCL violation in a year and percent of months without a monthly total coliform MCL violation in a year.

Indicator ER3 and ER4
Microbiological MCL Compliance at CWS in 1995

1995	Acute	Monthly
Number of active CWS	625	625
Number of CWS that sampled	622	622
Number of CWS that sampled without violations	618 (99.4%)	603 (96.9%)
Estimated population served by systems that sampled	7.353 M	7.353 M
Estimated population served by systems without violations	7.084 M (96.3%)	6.839 M (93.0%)

1995	Acute	Monthly
Number of monthly samples submitted	7,355	7,355
Number of months without a violation	7,351 (99.9%)	7,330 (99.6%)

Indicators ER3 and ER4
Microbiological Monitoring Compliance

1995	CWS	NCWS
Total number of active systems	625	4182
Total number of systems that sampled	622	3817
Percent of systems that sampled	99.5%	91.3%

Indicators ER3 and ER4
Microbiological MCL Compliance at NCWS in 1995

1995	Acute	Monthly
Total number of active systems	4,182	4,182
Total number of systems that sampled	3,817	3,817
Number of NCWS without violations	3,406	3,762
Percent of NCWS that sampled without violations	99.7%	98.3%
Number of quarterly samples submitted	12,771	12,771
Number of quarterly samples without violations	12,758	12,688
Percent of quarterly samples without violations	99.9%	99.4%
Estimated population served that sampled	0.493 M	0.493 M
Estimated population served by systems that sampled without violations	0.492 M	0.484 M
Estimated percent of population served by systems that	99.8%	98.2%

sampled without violations		

Indicator ER5
Percent of noncommunity water systems that take at least 2 total coliform samples a year.

Description	1995
Total number of NCWS	4,182
Total number of NCWS that submitted at least 2 total coliform samples a year	3,504
Percent of NCWS that submitted at least 2 total coliform samples a year	84%

Subgoal 3: Every person in New Jersey should drink water with lead concentrations less than 15 ppb.

Milestone F: In the period from 1992-2000, reduce the number of samples that exceed the lead action level by 50%.

Indicator FP1
Number and percent of systems with corrosive water (assess feasibility)

DSR has contracted with Rutgers University to examine the corrosivity issue for all New Jersey water systems. The project is expected to be completed September, 1997.

Indicator FS1
Number of CWS and NTNC that exceeded the lead action level by type of system

1992-1995	LARGE CWS	MEDIUM CWS	SMALL CWS	NTNC
Systems required to sample	20[1]	210	392	1852
Total number of systems that sampled	22	206	379	1370
Never failed	11	138	296	933
Failed once	4	54	70	338
Failed two or more times	7	14	13	99

[1] Although 20 large CWS were required to sample for lead between 1992 and 1995, one bulk seller water of that serves a large population, sampled voluntarily and one CWS increased in population served, and began sampling for a total of 22 systems.

Indicator FS2
Number of water samples that exceeded 15 ppb
by type of system

LARGE SYSTEMS				
Sample Period	1992	1993	1994	1995
>15 ppb	428	6	17	15
≤15 ppb	654	44	105	69
Total samples	1,082	50	122	84
MEDIUM SYSTEMS				
Sample Period	2/92-1/93	2/93-1/94	2/94-1/95	2/95
>15	1,411	315	201	150
≤15	5,050	1,281	1,204	902
Total samples	6,461	1,596	1,405	1,052
SMALL SYSTEMS				
Sample Period	2/92-1/93	2/93-1/94	2/94-1/95	2/95
>15 ppb	47	365	99	64
≤15 ppb	62	2,733	1,027	805
Total samples	109	3,098	1,106	869
NONCOMMUNITY SYSTEMS				
Sample Period	2/92-1/93	2/93-1/94	2/94-1/95	2/95
>15 ppb	437	1,756	1,375	728
≤15 ppb	625	15,539	13,619	10,223
Total samples	1,062	17,295	14,994	10,951

Distribution of Lead Sampling Results.

Sampling Period	# Samples <0.015 mg/L	# Samples 0.015 mg/L	# Samples 0.0151 - 0.0250 mg/L	# Samples 0.0251 - 0.050 mg/L	# Samples 0.051 - 0.100 mg/L	# Samples >0.100 mg/L
1/92	1,764	24	96	99	31	24
2/92	11,794	69	499	375	207	140
1/93	8,965	39	228	230	126	96
2/93	10,945	54	461	328	129	138
1/94	10,758	54	366	305	174	115
2/94	6,283	13	153	109	65	50
1/95	5,008	19	152	104	72	56
2/95	9,149	22	206	144	78	53

*The sampling period is expressed as either the first half or the second half of the year (1/92 = first half of 1992).

Indicator FR1
Number and percent of systems that have sampled for lead.

At the end of 1995, there were a total of 625 CWS, of those 618 (98.4%) sampled for lead.

Indicator FR2
Number and percent of systems with lead problems that have: a) submitted corrosion control plans, b) installed corrosion control.

This information is not available in this format at this time.

Indicator FR3
Number of systems that have replaced lead service lines, and/or water mains.

Five CWS have replaced or are in the process of replacing lead service lines/water mains.

Indicator FR4
Number of enforcement actions on systems that have not complied with the lead/copper rule.

The data is not available in this form at this time.

Indicator FR5
***Number of systems required to conduct public education that have complied*.**

Since the lead and copper rule took effect in 1992, 112 CWS and 195 NTNC have been required to conduct public education. The number that complied is not available at this time.

Subgoal 4: Every Person in New Jersey should drink water with nitrate concentrations less than 10 ppm.

Milestone G: Reduce the number of POEs with nitrate concentrations above the MCL in 1993 by 50% by the year 2005.

Indicator GP1
Number and percent of CWS wells located in susceptible aquifers.

Susceptibility Ranking for CWS	1993-1995	Percent
Low	441 wells	21.4%
Medium	247 wells	12.0%
High	777 wells	37.4%
Unranked	598 wells	28.0%
TOTAL	2,063 wells	100%

Susceptibility Ranking for NTNC	1993-1995	Percent
Low	590 wells	49%
Medium	327 wells	27%
High	237 wells	20%
Unranked	49 wells	4%
TOTAL	1,204 wells	100%

Indicator GR1
Number and percent of CWS and NTNC that have sampled for nitrate.

Indicators GR1 and GS1 are presented in one table below.

Indicator GS1
Number and percent of CWS and populations served, and NTNC with nitrate concentrations greater than 10 ppm.

Indicators GR1 and GS1 - Results of nitrate sampling at CWS

YEAR	1993	1994	1995
Number of active systems	NA	NA	561
Number of systems that sampled for nitrate	545	517	510
Percent of systems that sampled for nitrate	---	---	92.9%
Number of systems with nitrate greater than 10 ppm	3	2	3
Percent of systems with nitrate greater than 10 ppm	0.6%	0.6%	0.6%
Populations served by systems with nitrate greater than 10 ppm	1,188	120	175
Number of systems with nitrate greater than or equal to 5 ppm	58	52	58
Percent of systems with nitrate greater than 5 ppm	10.8%	10.2%	11.7%

Indicators GR1 and GSI - Results of nitrate sampling at NTNC

YEAR	1993	1994	1995
Number of active systems	1,270	1,167	1,072
Number of systems that sampled for nitrate	1,110	999	958
Percent of systems that sampled for nitrate	87.4%	85.6%	89.4%
Number of systems with nitrate greater than 10 ppm	41	16	13
Percent of systems with nitrate greater than 10 ppm	3.7%	1.6%	1.4%
Number of systems with nitrate greater than or equal to 5 ppm	107	105	101
Percent of systems with nitrate greater than 5 ppm	9.6%	10.5%	10.5%

Indicators GR1 and GSI - Results of nitrate sampling at TNC

YEAR	1993	1994	1995
Number of active systems	3,492	3,256	3,110
Number of systems that sampled for nitrate	2,592	2,500	2,275
Percent of systems that sampled for nitrate	74.2%	76.8%	73.2%
Number of systems with nitrate greater than 10 ppm	41	39	27
Percentage of systems with nitrate less than 10 ppm	1.6%	1.6%	1.2%
Number of systems with nitrate greater than 5 ppm	249	237	245
Percent of systems with nitrate greater than 5 ppm	9.6%	9.5%	10.8%

Indicator GS2
*Number and percent of CWS POEs with nitrate concentrations greater than 10 ppm.**

YEAR	1993	1994	1995
Number of POEs that were active	NA	NA	1340**
Number of POEs that sampled for nitrate	1282	1127	1172
Percent of POEs that sampled for nitrate	NA	NA	87.5%
Number of POEs with nitrate greater than 10 ppm	4	2	3
Percent of POEs with nitrate greater than 10 ppm	0.3%	0.2%	0.3%
Number of POEs with nitrate equal to or greater than 5 ppm	83	71	96
Percent of POEs with nitrate greater than 5 ppm	6.5%	6.3%	8.2%

* This analysis could not be performed for NTNC because of the current source inventory database structure.
** Estimated number of POEs based on number of active POEs on April 30, 1996.

Indicator GR2
Number of enforcement actions on systems that have not sampled for nitrate

This data is not currently available in this format at this time.

Indicator GR3
Number of systems impacted by nitrate: a) systems that have installed treatment for nitrate, b) systems that have switched source water due to nitrate, and c) systems that have connected to CWS due to nitrate.

This data is not tracked by BSDW or the local county health department and is not currently available.

Subgoal 5: Every person in New Jersey should consume water with mercury concentrations less than 2 ppb.

Milestone I: Determine the extent of mercury contamination in New Jersey private wells by the year 2005.

This subgoal and milestone are related to activities not subject to EPA oversight. No indicators will be reported for this subgoal at this time.

Subgoal 6: The concentrations of VOCs in finished drinking water shall be below the MCLs

Milestone J: No public water system will have levels of VOCs greater than their MCLs by 2005.

Indicator JS1

Number and percent of CWS and populations served, and NTNC with concentrations of VOCs greater than the MCL and with detectable concentrations of VOCs less than the MCLs.

Indicator JS1 - Occurrence of 22 Regulated VOCs at CWS, 1993-1995

VOC Concentrations 1993-1995	Number of Systems	Percent of Systems	Estimated Population Impacted
Systems required to sample	591*	90% of all CWS	6.507 M
Systems that sampled for VOCs	551 (93%)	--	6.500 M
Systems with no detectable VOCs	411	75%	3.007 M
Systems with VOCs detected at less than or equal to the New Jersey MCLs	94	17%	1.698 M
Systems with VOCs detected at concentrations greater than the New Jersey MCLs	46	8%	1.795 M

*There were 656 community water systems active 1993-1995. Only those systems using their own sources of water were required to collect VOC samples, according to federal regulations. This excludes systems that bulk purchase water. Some systems that bulk purchase water submitted test results, but the results were not included in the analyses.

Indicator JS1 - Occurrence of 22 Regulated VOCs at NTNC, 1993-1995

VOC Concentration 1993-1995	Number of Systems	Percent of Systems
Systems required to sample	1270	--
Sampled for VOCs	1015	80%
System where no VOCs were detected	815	80%
Systems where VOCs were detected at concentrations less than or equal to the New Jersey MCLs	131	13%
Systems where VOCs were detected at concentrations greater than the New Jersey MCLs	69	6.8%

Indicator JS2
Number and percent of POEs with concentrations of VOCs greater than the New Jersey MCLs and with detectable concentrations of VOCs less than the MCLs

VOC Concentration	Number of POEs	Percent of POEs
Total number of POEs that are required to sample	1390*	-
Total number of POEs that sampled	1343	97% of systems
POEs where no VOCs were detected	1092	81 %
POEs where VOCs were detected at concentrations less than or equal to the New Jersey MCLs	184	14 %
POEs where VOCs were detected at concentrations greater than the New Jersey MCLs	80	5.9 %

* Estimated number of POEs based on 656 active community water systems, 1993-1995.

Indicator JR1
Number of : a) CWS, NTNC that have installed treatment for VOCs, b) CWS, NTNC that have switched to alternate water sources, and c) number of wells taken out of service due to

VOC contamination.

This data is not currently available in this format.

Indicator JR2

Number and percent of CWS and NTNC that have taken at least one VOC sample in the period from 1993-1995.

These numbers are listed in the tables under indicators JS1 and JS2.

Indicator JR3

Number of enforcement actions taken for systems that did not meet the New Jersey statutory one year compliance period for remediation.

This data is not currently available in this format.

Subgoal 7: Every person in New Jersey should drink water that contains the minimum concentrations of disinfection byproducts without compromising microbiological safety.

Milestone L: Reduce the running annual average TTHM concentrations to 80 ppb in surface water systems by the year 2000.

Indicator LS1

Number and percent of surface water systems and population served with an average Total Trihalomethane (TTHM) concentration greater than 80 ppb.

Community Water Systems that use Surface Waters	1995
Number of surface water systems	30
Number of surface water systems required to sample*	23
Number of surface water systems that sampled for TTHM	26
Number of surface water systems with an average TTHM concentration greater than 100 ppb	1**
Number of surface water systems with an annual average TTHM concentration greater than 80 ppb	4
Percent of surface water systems with an annual average TTHM greater than 80 ppb	15.4%
Population served by surface water systems with an annual average TTHM concentration greater than 80 ppb	562,939
Estimated percent of population served by surface water systems that have sampled for TTHMs with annual average greater than 80 ppb.	7.6%

* Federal regulations require community water systems serving more than 10,000 people and that adds a disinfectant to the water, must monitor for TTHMs regardless of whether they are a surface or ground water system.

** This surface water system serves less than 10,000 people and is not required to sample for TTHMs. The average TTHM concentration from 1996 and 1997 was reduced to 54.7 ppb, a decrease that is attributable to chances in the sources of water.

Indicator LR1

Number of systems that have: a) altered disinfection practices or other treatment practices in response to elevated TTHM concentrations, b) number of systems that have conducted pilot studies in response to elevated TTHM concentrations.

This data is not currently available in this format.

VII. LAND & NATURAL RESOURCES SELF-ASSESSMENT

GLOSSARY

BMPs Best Management Practices
CAFRA Coastal Area Facilities Review Act
CMP Comprehensive Management Plan (refers to Pinelands CMP)
DSR Division of Science and Research
DOT Department of Transportation (New Jersey DOT)
NJDEP New Jersey Department of Environmental Protection
NPS Non-point Source
OSP Office of State Planning

1. Background

1.1. Rationale

The format of this section of the document is distinct from the other media self-assessments. Land and Natural Resources are unique and distinct from the other categories of resources, such as Air and Water. Most regulatory and conservation programs are the result of ever-increasing pressure and competition for the use of natural resources. In the case of air and water, the majority of citizens agree that these resources should be available and free from pollution. Conversely, the pressure and competition for the use of land and natural resources are in many cases diametrically opposed and mutually exclusive. For example, a developer's view of highest and best use of a large tract of forested land may be somewhat different from the view of a land conservancy group. In addition, unlike the other resources and related NJDEP programs in the self-assessment process, very little or no EPA funding is provided to the Programs discussed under Land and Natural Resources. Finally, these resources are often regulated by several layers of government at the same time, including the local municipality, county, State and Federal governments. Therefore, as the NEPPS process is phased in for non-EPA funded programs, the only NJDEP Natural and Historic Resources program included in a formal program assessment sense is the Green Acres program. Other Natural and Historic Resources programs are identified within the context of land and natural resources, but in this iteration, they are not assessed in any formal way. Based on these factors, the format of this section has been altered to allow a more logical discussion of these resources.

1.2. Land and Natural Resources Background

New Jersey’s topography ranges from mountainous highland to sandy plain, with wide differences in soil, geology, and climate across the State. It has a blend of northern and southern plant and animal communities because of its latitude and position on the Atlantic coast. The state also has many areas of great scenic beauty - lakes, rivers, streams, and varied open space - forests, hills, meadows, coastal areas, and wetlands.

Although only approximately 20 percent of the State's land area is in farming and agriculture, it plays a large role in the State's economy. However, the number of acres in active farming in 1995 is only half what it was 45 years ago. For the past 45 years, housing and commerce in the State have been deconcentrating, leaving the cities and metropolitan areas for greenfields in what used to be rural areas. From 1970 to 1995, urban counties associated with New York Metropolitan Region lost more than 300,000 jobs while the outer suburban ring gained two million. Eighty percent of the 1.7 million housing units built since 1970 were constructed in the region's outer ring, as residents sought affordable housing, lower taxes, and escape from the problems of cities and suburbs. The Regional Plan Association determined that two generations of decentralized growth have increased the region's developed land by 60% in 30 years despite only a 13% increase in population. Continuing ex-urban development at a rate of more than 30,000 acres a year threatens large areas of open land at the region's outer edge, more than 50 miles from Manhattan.

In addition to consuming vast areas of open land, the rings of deconcentrated suburbs have created a legacy of disinvestment in the State's historic urban areas, as exemplified by the thousands of acres of brownfields sites. These old industrial sites are both an unused resource of industrial land and, left unremediated, a source of contamination.

2. Description of Land & Natural Resources Programs

Overview of Land Management Institutional Scheme

For the most part, control of land use is the prerogative of each of New Jersey's 567 municipalities, each of which may plan and zone within its own borders. The authority to do this emanates from the Municipal Land Use Law.

Under the County and Regional Planning and Enabling Act, county planning boards have the legal authority to review local applications to ensure that they are consistent with the county's stormwater control and transportation plans, and their approval is required for certain development and subdivision applications. County master plans are not binding on municipalities.

State agencies are involved in day-to-day land use issues primarily through their regulatory (NJDEP), transportation (DOT), and planning functions (OSP, Treasury). The State Development and Redevelopment Plan, adopted pursuant to the State Planning Act of 1985, establishes policies and goals for land use patterns throughout New Jersey. A primary means of implementing the State Plan is requiring state agencies to follow it as, for example, they determine where to invest state funds in capitol projects. Local governments are not compelled to follow the Plan, but they will be rewarded for doing so (e.g., through grant awards).

2.1. Land Use Regulation Program

The Land Use Regulation Program operates under the following authorities:

Wetlands Act of 1970
Coastal Area Facilities Review Act (CAFRA)
Waterfront Development Law (1914)
Freshwater Wetlands Protection Act (FWPA)
Flood Hazard Area Control Act (Stream Encroachment)
Public Trust Doctrine
Federal Coastal Zone Management Act (Federal Consistency Determination)
Federal Clean Water Act, Sec. 401 (Water Quality Certification)

In addition to implementing the permitting requirements of the Coastal Zone Management Program described in Section 2.3, it also administers the following statewide resource protection programs.

Freshwater Wetlands Protection Act
Enacted in 1987 with the intent to preserve the purity and integrity of freshwater wetlands from random, unnecessary or undesirable alteration or disturbance, the FWPA (N.J.S.A. 13:9B-1 et.seq.) seeks to protect the State's inland waterways and freshwater wetlands. NJDEP has since assumed administration of the Federal Clean Water Act, Sec. 404 wetlands permit jurisdiction, and now a permit is required for most activities proposed within the delineated boundaries of a freshwater wetland and, where applicable, an associated transition area (buffer) surrounding it. Examples of such regulated activities include dredging, excavation or removal of soil, drainage or disturbance of water levels or the water table, filling or discharge of any materials, the placement of pilings or other obstructions, or the destruction of plant life. Currently, permissible activities in freshwater wetlands are undertaken following the granting of either individual or statewide general permits.

Stream Encroachment
An area subject to inundation by flood waters is known as a floodplain or flood hazard area. Activities within a floodplain for which a stream encroachment permit is required include, but are not limited to, man-made alterations, construction, development and fill. These permits are issued under the authority of the New Jersey Flood Hazard Area Control Act and the Flood Hazard Area regulations, in order to safeguard the public from flooding, to minimize the potential for losses to public and private property, and to minimize the degradation of in-stream water quality from both point and non-point sources.

Tidelands Conveyances
Lands currently or historically flowed by the tides are held in public ownership by the State for navigation

and recreational uses such as bathing, surfing and fishing, and are commonly known as riparian lands or tidelands. These areas are found in rivers, bays, lagoons, wetlands and along the oceanfront. In addition to other regulatory requirements, those proposing to develop or otherwise impact upon tidelands must first receive a grant, lease or license from the New Jersey Tidelands Resource Council.

2.2. Green Acres Program

The Green Acres Program seeks to enhance the quality of life for existing and future residents of the State by preserving the open space essential for natural and cultural resources protection, providing public recreation opportunities, maintaining the state's landscape diversity, and developing the facilities required to provide public recreation opportunities. The Green Acres Program funds state open space acquisition and recreation facility development, provides financial assistance for county and municipal acquisition and development projects in the form of low interest loans and 25% incentive grants for environmentally significant acquisitions and projects serving urban needs. In addition, the Green Acres Program funds grants for nonprofit conservation groups for open space acquisition and provides technical assistance in support of open space preservation and recreation development.

2.3. Regional Plans/Special Area Protection Programs

2.3.1. Coastal Zone Management Program

New Jersey's coastal management program guides development along the State's 1,792 miles of tidal coastline, including 126 miles of ocean front. This program regulates and manages land and land use, tidal wetlands, navigation channels, and navigational markers. The goal of this program is to meet the demand for additional residential, industrial and commercial facilities while preserving and protecting natural resources. Authority for the coastal management programs comes from the following laws:

-Coastal Area Facility Review Act of 1973 (CAFRA)
-Wetlands Act of 1970
-Waterfront Development Act of 1914

<u>National Estuary Program</u>

The National Estuary Program, established by Congress under the Water Quality Act of 1987, recognized the special need to protect an important but endangered resource, our nation's estuaries. Through this program, the Environmental Protection Agency identifies estuaries of National significance threatened by pollution, development, or overuse, and promotes the preparation of comprehensive management plans to ensure their ecological integrity.

Currently, New Jersey is a participant in three estuary programs; the New York/New Jersey Harbor Estuary, (with New York State), the Delaware Estuary (with the states of Pennsylvania and Delaware) and the Barnegat Bay Estuary.

Shore Protection Master Plan

The New Jersey Shore Protection Master Plan, first prepared in 1981, was developed by NJDEP as a requirement by the New Jersey Legislature for the expenditure of Shore Protection Bond Funds. The plan was used to direct expenditures in shore protection. Subsequently, bond funds have been supplemented by yearly appropriation, averaging $15 million annually. Recent public surveys seeking feedback concerning improvement to New Jersey's coastal program suggested updating the 1981 Shore Protection Master Plan.

National Estuarine Research Reserve

Estuarine Reserves are areas designated by the National Oceanic and Atmospheric Administration for long-term research, education and interpretation through a cooperative federal-state effort. The main objectives of the research is to help improve management of estuarine resources and to educate the public. The reserve designation is non-regulatory and does not affect or restrict traditional use (fishing, hunting, boating, etc.) of the reserve site. New Jersey currently is in the process of designating a reserve located at the confluence of the Mullica River and Great Bay.

2.3.2. Pinelands Comprehensive Management Plan (CMP)

The Pinelands National Reserve is a unique approach to regional land management and natural resources preservation. In the 1970s, development pressures threatened the exceptional features of the region, including extensive forests of pine, oak and cedar, abundant wetlands, and a 17-trillion gallon aquifer containing some of the highest quality drinking water in the world.

In 1978, Congress established the Pinelands National Reserve covering 1.1 million acres (23% of the State's land area). The legislation required New Jersey to establish a local and State partnership to manage land use, and to establish a regional planning commission to develop a plan to protect the area. In 1979, New Jersey enacted the Pinelands Protection Act which authorized a 15-member commission to devise a Comprehensive Management Plan for the region and to oversee its implementation.

The Act established a 337,000 acre inner Preservation Area District which is to remain largely in its natural state through strict regulation of development. The CMP, adopted in 1980, directs projected growth to the remaining portion of the Pinelands, called the Protection Area. The CMP divides the Protection Area into several land use management areas - forests, agricultural production, regional growth, rural development, Pinelands towns and villages, and military and federal institutions. The CMP sets land use regulations to control the impact of growth on the area's environmental resources.

2.3.3. Hackensack Meadowlands Development Plan

The 1969 Hackensack Meadowlands Reclamation and Development Act established the Hackensack Meadowlands Development Commission (HMDC) with independent administrative, planning and control of development in the Meadowlands District. The Act marked the first time the State government took an active role in control of land use. It instituted regional planning for 32 square miles of the Jersey meadows, which incorporated parts of 14 municipalities in Hudson and Bergen Counties. The HMDC was charged to:

- create a master plan for the region to provide for orderly development with a mix of commercial, industrial, recreational and open space,

- develop programs to restore and protect the natural resources of the area, and

- provide for disposal of solid waste from the communities that were currently dumping there.

The HMDC developed a master plan and implemented zoning regulations to guide and control implementation of the land use plan. The Act also established a municipal committee composed of mayors in the Meadowlands municipalities to provide a forum for local governments.

2.4. State Development and Redevelopment Plan

The State Development and Redevelopment Plan, adopted in 1992 pursuant to the State Planning Act of 1985, established a policy of directing growth to parts of the State that have available capacity in water, sewer and transportation infrastructure, generally the areas in the New York and Philadelphia metropolitan areas. The State Plan also maintains a map of the State classified by the presence or absence of water and sewer infrastructure and by the presence of environmentally sensitive areas and farming areas. State agencies are required by Executive Order to incorporate the State Plan in their own plans and activities (e.g., determining where to invest state funds in capital projects) and to report annually on how they are implementing the Plan. County and municipal governments are not required to follow the Plan, but there are incentives for doing so.

3. Stakeholder Involvement

Successful implementation of public policy depends on agency credibility with citizens and stakeholders. Research shows that this credibility is built on three factors: 1) early two-way dialogue with stakeholders; 2) information that is understandable and responsive to local needs; and 3) some form of citizen involvement in the overall management process.

In keeping with this philosophy, a stakeholders workshop was held April 30 on the NEPPS process. Five breakout sessions focusing on five areas of environmental management were held - one of which was Land and Natural Resources. More than 30 representatives from various Land and Natural Resources interests throughout the state attended the workshop.

Since the FY96 Self-Assessment process did not include Land and Natural Resources as a distinct subject area, the participants in this breakout session had no prior set of issues from which to work. Therefore, participants were presented a proposed key issues outline and asked to respond and determine goals for this area of environmental management in order to complete an internal self assessment of NJDEP programs dealing with these issues. Issues ran the gamut from wetlands loss, habitat fragmentation, threatened and endangered species, exotic species, and old growth forests to state natural lands trust, water supply management areas, beaches and sand dunes, cultural/historic landmarks and uses, redevelopment of environmentally damaged lands, and the role of the State Development and Redevelopment Plan in the process. A brainstorming session followed from which the following three key objectives emerged:

1. Maintain and restore an assemblage of organisms and their habitat that contribute to the ecological diversity, stability, and aesthetic appeal of the state;

2. Enhance the quality of life for existing and future residents of New Jersey by preserving open space essential for natural and cultural resource protection, provision of public recreation opportunities, maintenance of the state's landscape diversity, and development of the facilities required to provide needed recreation opportunities, and;

3. Protect the health, safety and welfare of the people who reside, work and visit in floodplain and coastal areas.

From these objectives an overarching goal was developed: **maintain, enhance and restore functioning ecosystems and sustainable economies**, in recognition of the interdependence of people and nature, adding there is a need to understand the relationship between these two entities.

Since the initial stakeholder meeting, the NJDEP Land and Natural Work Group has been meeting on a bi-weekly basis conducting the Self-Assessment contained herein.

On Tuesday, October 8, 1996 the Land and Natural Resources Work Group held its second stakeholders meeting. The purpose of this meeting was to get feedback on the draft Land and Natural Resources section of Self-Assessment document. In addition, the Work Group presented a draft example of an indicator for one subgoal dealing with open space. The half day session yielded the following major points:

1. Ecosystem Approach - Integration Principle (Beyond an Issue - an organizing principle)

2. Urban/Suburban/Rural Quality of Life as a category with brownfields and other issues specific to each type of area identified.

3. Sustainable Communities - replace sustainable economies with sustainable communities. This helps

establish a main street focus - can look at the State Plan and NJDEP regulations and determine how they impact these areas.

In addition to areas of consensus, several concerns were raised by the stakeholders. These concerns were focused not only on the way the NJDEP interacts with other government agencies, but how NJDEP coordinates its responsibilities in managing land between these other agencies and NJDEP. Stakeholders felt that an important part of the NEPPS process must be centered on how to interact and coordinate land use management with other agencies. Additionally, the PPA must not be a document that puts restrictions on human activity but establishes a balance between environmental protection and human activity. This would include how to look at risks and benefits. Two programs are crucial to achieve this end - Education/Communication and Research. The document should reflect how to integrate these into each of the issues in order to establish goals and milestones and have measurable results.

As a result of this input, a new key issue area was identified and integrated into the Land and Natural Resource Self-Assessment - Urban, Suburban, Rural Quality of Life. This issue will be examined and developed as the NEPPS process continues. Additionally, it was suggested that the Self-Assessment reflect an Ecosystem Approach to environmental management. This has been incorporated into the Cross -Cutting section of the NEPPS document and considered as an overarching principle or approach for the entire process.

4. Key Environmental Issues

This section identifies key Land and Natural Resources issues which either are, could be, or should be addressed by state programs. These issues are divided into four categories: Ecosystem Integrity; Ecosystem Biodiversity; Open Space/Recreation/Historic Resources; and Brownfields.

4.1. Ecosystem Integrity

4.1.1. Wetlands

Wetlands are areas that are inundated or saturated long enough or often enough to support hydrophytic vegetation. Wetlands include marshes, swamps, meadows, bogs, or other low land areas and provide for the purification and recharge of surface and groundwater, flood and storm damage protection, soil erosion control and provide critical habitat for fish and wildlife. Due to the historic loss of wetlands in New Jersey and given the public benefits derived from the natural functions of wetlands, their continued protection is necessary to ensure that these areas are capable of providing their critical functions, where pressures for agricultural, commercial and residential development define the pace and pattern of land use.

4.1.2. Headwaters and Riparian Corridors

Headwaters and riparian corridors are critical for source water protection, surface and groundwater quality, flood control, habitat for fish and wildlife, and maintenance of the genetic diversity of native species. They consist of stream channels, associated wetlands, uplands, flood plains, and forested areas. Headwaters and riparian corridors also contribute open space for recreational and aesthetic uses. As a result these resources should be managed on a watershed basis.

4.1.3. Coastal Resources and Flood-Prone Areas

Flood prone areas, coastal high hazard areas, beaches, dunes and bluffs all share two common features: 1) the critical function of buffering adjacent areas from flooding or coastal hazard events, and 2) they are aesthetically and recreationally appealing and therefore quite valuable. The loss of such areas to development in New Jersey has impacted flood control and the stability and natural maintenance of the New Jersey shore, threatens public safety and important wildlife habitat, and results in adverse economic impacts.

The New Jersey shore is an essential part of the State's economy. Public access to New Jersey beaches for recreational purposes is desirable and required for any beaches obtaining state funds for shore protection purposes. It is subject to coastal storms, ocean tides and currents which direct tremendous energy to beaches and barrier islands creating constantly moving and morphologically changing shorelines. The barrier islands and vegetated primary dunes of the shore protect human communities from storm damage and tide and ocean current hydrodynamics and provide habitat for a diversity of other species critical to the food chain.

Extensive destruction of dunes has taken place in this century along much of the coast. This disruption of the natural processes of the beach and dune system has led to severe erosion of some beach areas, jeopardized the safety of existing structures on and behind the remaining dunes and upland of the beaches, increased the need to manage development in shorefront areas no longer protected by dunes, interfered with the sand balance that is so essential for recreational beaches and coastal resort economy, necessitated increased public expenditures by citizens of the entire state for shore protection structures and programs, and increased the likelihood of major losses of life and property from flooding and storm surges.

4.1.4. Soil Erosion

Soil erosion from agricultural practices, construction sites and stream banks during peak flows is a significant problem in New Jersey. Soil erosion adversely affects crop production (by reducing soil organic matter); water quality (through sedimentation); habitat quality (in-stream as well as loss in the soil matrix that sustains terrestrial vegetation); and air quality (through increased particulate dispersion).

4.1.5. Soil Contamination

Atmospheric deposition of soil contaminants from mobile and nonmobile sources, as well as deposition of soil contaminants through pesticide and fertilizer application from golf course, agricultural, and landscaping practices occurs throughout New Jersey. Results of a 1993 NJDEP study indicated a general trend of increasing soil contamination with increasing human activity. Contaminants in soil affect ground and surface water quality as well as air quality (through particulate dispersion). Soil contaminants can affect humans via direct particulate inhalation, direct ingestion or dermal routes, and indirectly via ingestion of contaminated agricultural products. Likewise, vegetative and animal species can be affected through direct and indirect soil contaminant uptake.

4.1.6 Forest Fragmentation

The loss of large contiguous forest tracts in New Jersey impacts the ability of the forest to protect surface and groundwater, moderate climate, and provide critical habitat for fish and wildlife. Although more than half of New Jersey's land area has tree cover, according to a 1992 report, approximately 26% of that land area is in developed areas. The U.S. Forest Service has found that only 1% of the land area in the Highlands consists of forest patches larger than 5,000 acres while 75% of the land area is in forest patches less than 50 acres. Forest losses for the counties in the Highlands are predicted to be 20 to 60% in the next 25 years, primarily because of the increased residential uses.

Some regulatory protection is provided to forests though the Freshwater Wetlands Act (wetland, and wetland buffers), and the Coastal Areal Facility Review Act. In addition, there is strategic acquisition through the Green Acres Program, but additional tools and more comprehensive strategies are needed, such as public/private partnerships and voluntary conservation easements.

4.1.7. Patterns of Land Development

Current patterns of land development are threatening New Jersey’s natural resources because of inefficient patterns of land development with respect to natural and social resources. Regulations are predominantly resource-based and have resulted in a piecemeal approach to land management; the focus should be directed toward comprehensive land management approaches.

In the past 30 years, a new pattern of land use has swept the region, involving the construction of massive campus style commercial and industrial facilities and sprawling residential suburbs. From 1970 to 1995, urban counties in the New York Metropolitan Region lost more than 300,000 jobs while the outer suburban ring gained two million. Eighty percent of the 1.7 million housing units built since 1970 were constructed in the region's outer ring, as resident's sought affordable housing, lower taxes, and escape from the problems of cities and suburbs. But these rings of deconcentrated suburbs consume vast areas of open land and shatter traditional patterns of community. The Regional Plan Association determined that two generations of decentralized growth have drastically increased the region's urban land by 60% in 30 years despite only a 13% increase in population. Continuing exurban development at a rate of more than 30,000 acres a year threatens large areas of open space at the region's outer edge, more than 50 miles from Manhattan.

4.2. Ecosystem Biodiversity

4.2.1. Threatened and Endangered Species Status

New Jersey contains a landscape high in biodiversity with approximately 2,600 known plant species, 335 known resident vertebrate species, and countless invertebrate species; however, over 600 of the known plant species (23%); 128 of the known vertebrate species (38%); 183 of the known invertebrates; and 38 natural communities are classified as either rare or endangered in New Jersey. Species are the basic units of biodiversity. Their loss influences the ecological complexes in which organisms naturally occur: the interactions between one another, as well as their interactions with their surroundings. Loss of biodiversity translates to losses in sources of food, medicine, fiber, building materials, pest control, bioremediation organisms, as well as loss of recreational and aesthetic values.

4.2.2. Exotic Species Status

Invasive, non-indigenous species (such as purple loofestrife, European starlings, English sparrows, gypsy moths and the woolly adelgid) impact and threaten New Jersey’s natural resources by out-competing native species or directly affecting native species. Invasions of such exotic species can result in loss of habitat, degraded water quality, degraded air quality and loss of recreational, aesthetic or property values.

4.2.3. Toxics in Biota

Some consumable aquatic species, both marine and freshwater, have exceeded human health consumption criteria for dioxin, PCBs, chlordane and mercury in New Jersey. These contaminants may also have direct adverse effects on these aquatic biota. Contaminants have also been documented in terrestrial species in New Jersey.

4.2.4. Critical Wildlife Habitats

Development pressures continue to threaten New Jersey’s critical wildlife habitats. These habitats serve an essential role in maintaining wildlife, particularly in wintering, breeding, and migratory functions.

4.2.5. Ecosystem Approaches

Current fragmented approaches to land and natural resource management do not provide a mechanism to preserve ecosystem integrity statewide.

4.3. Open Space

The preservation and protection of open space with associated recreational opportunities is a critical habitat protection and quality of life issue in New Jersey. The integration of these goals with ecosystem management is of equal importance.

As New Jersey approaches a new century, it finds its open space and outdoor recreation estate growing, user demands increasing and changing, the costs of management, system's operations and maintenance escalating and open land disappearing at an alarming rate. The State Development and Redevelopment Plan has identified open space and outdoor recreation as critical components of the infrastructure that supports the quality of life in the State. The key issue is how best to meet the changing needs of New Jersey's residents and visitors for preserved open space and associated recreation in the context of growing demands, budget limitations and the continued loss of open space.

The major division on this issue is between public and private land. For public lands the issues are the identification of critical and threatened open space and resources. Once identified, a determination must be made as to whether acquisition is appropriate. These criteria include whether the land acquisition is for public access, significant resource protection or management purposes; acquisition in a timely manner; and the development and maintenance of compatible recreational facilities. The issue for private land is again the identification of critical and threatened open space and resources. However, the challenge is to identify appropriate mechanisms to encourage other preservation schemes in lieu of public fee simple acquisition. All of these issues are dependent on the determination of funding.

4.4. Brownfields

There are abandoned, neglected, and contaminated properties in New Jersey that could be restored to productive uses which would, in turn, protect existing natural resources and stimulate economic growth.

4.5. Urban/Suburban/Rural Quality of Life

This new key issue has been added as a result of input by stakeholders at the October 8 Land and Natural Resource meeting. This section will explore the unique features of quality of life as they relate to each type environ. Over the coming months, this key issue will be developed with input from stakeholders.

5. Program Strengths

This section highlights successful program approaches to specific Land and Natural Resources issues.

5.1. Brownfields

In November of 1996, the voters of New Jersey approved an amendment to the Constitution to dedicate funding, on an annual basis, for the cleanup of hazardous waste sites. The constitutional amendment dedicates 4% of the revenues collected under the Corporate Business Tax. Of the money, one-half is dedicated to hazardous waste cleanups. The remainder of the dedicated funds are to be used for underground storage tank upgrades and cleanups and water quality related projects.

5.2. Wetlands

In 1993, EPA acknowledged NJDEP'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. Upon assumption, all exemptions based upon municipal approvals which would allow work in wetlands were deemed null and void.

NJDEP data demonstrate that between July 1, 1988 and December 31, 1993, annual wetlands losses were approximately 75% less per year than historically permitted under the federal program. Between July 1, 1998, the effective date of the Freshwater Wetlands Protection Act, and December 1993, the issuance of individual permits resulted in impacts to 164 acres of wetlands. Mitigation data collected over this same time period show that 171 acres of creation and 40.75 acres of restoration were required to compensate for approved individual permit wetland impacts. Section 404 data for New Jersey showed the creation of 823 acres of freshwater wetlands and the restoration of an additional 808 acres.

5.3. Headwaters & Riparian Corridors

Various programs address stream corridors. These include: wetlands and floodplain management programs, land preservation programs, stormwater management programs, soil erosion programs, 6217 Coastal NPS Program, 319 NPS demo projects, watershed management, and other best management practices (BMPs) for agricultural/forestry activities.

There are enforcement provisions of the Flood Hazard Area Control Act which should act as incentives for preventing noncompliance with the regulations.

Land preservation programs also provide for headwater and riparian corridor protection by preventing degradation on conserved lands. These NJDEP programs include: State Parks and Forests, State Wildlife Management Areas, Green Acres Program, and the Natural Lands Trust.

Non-NJDEP Special Protection Areas also assist in protecting riparian corridors. Buffers between development and waterways are required in the Hackensack Meadowlands through the auspices of the Hackensack Meadowlands Development Commission zoning regulations. Growth restriction within the land use management areas designated by the Pinelands Comprehensive Management Plan assists in preserving impacts to streams in some areas of the Pinelands. The stream corridors including the 18 streams and associated tributaries that enter the Delaware and Raritan Canal State Park are protected under regulations that prohibit construction of major projects within the corridors including buffer zones to the streams. Development within 1,000 feet of the canal is also regulated.

Wild and Scenic River designation (state or federal) institutes river management plans that provide for additional protection of headwaters and riparian corridors. Designation as a wild and scenic river increases public consciousness of the value of such a resource by elevating waterways to a high status including promotion of a waterway for ecotourism purposes. Such promotion would provide local incentive for resource preservation and perhaps, some restoration. If federal status is designated, then federal assistance in management plan development can be gained through the National Park Service.

The New Jersey Water Pollution Control Act and the Flood Hazard Area Control Act authorize NJDEP to establish regulations for stormwater from new and existing development, make available grants to local government to assist in developing local stormwater plans, and establish a mechanism for watershed coordination of stormwater management. The Statewide Stormwater Permitting Program addresses open containers and exposed materials at industrial sites, using Best Management Practices (instead of effluent limits) to minimize impacts of non-point source runoff from such sources. Outreach and education is used to assist industrial facilities in developing pollution prevention and source reduction plans through the Basic Industrial Stormwater General Permit. In addition, local soil conservation districts administer a Construction General Permit program which also uses BMPs to control runoff from construction activities disturbing five or more acres and some mining activities.

The Soil Erosion and Sediment Control Act provides a mechanism to also reduce impacts on riparian corridors. Soil conservation districts are required to control soil erosion and sedimentation from non-agricultural land-disturbing activities, unless provided for by local municipalities. Soil conservation districts develop soil conservation plans, conduct soil surveys, formulate regulations for lands in their districts and review soil erosion and sediment control plans submitted by developers with land use applications.

In addition, the NJDEP Bureau of Forest Management has developed a comprehensive manual and guidance outlining Best Management Practices for implementing forest management in New Jersey to minimize soil erosion, protect water quality by preventing non-point source pollution, as well as enhance fish and wildlife habitat and improve recreational opportunities. An integral part of the forestry BMPs is wetland protection while practicing forestry activities.

Other Best Management Practices include non-NJDEP guidelines, such as agricultural management practices (AMPs), that prescribe appropriate vegetative buffers between farm fields and adjacent streams, developed by Rutgers University. These guidelines assist in preventing non-point source runoff into riparian corridors.

5.4. Coastal Resources and Flood-Prone Areas

Our penchant for living and recreating in close proximity to the shore and other water bodies substantially increases the risks of injury and damage caused by the onslaught of tides, waves, coastal storms and flooding. It also presents an undue strain on vitally sensitive natural features -- such as flood plains, stream and river corridors, coastal bluffs and dunes -- which serve a multitude of functions including the buffering of inland areas during storm events, absorption of flood waters and the provision of critical wildlife habitat. The regulation of land use activities, including various types of development and construction, within New Jersey's designated coastal zone serve to direct potentially harmful impacts away from sensitive shore features and critical wildlife habitat. At the same time, prohibiting or discouraging such activities within flood and coastal high hazard areas also provides safety to those living and recreating in these areas. The result is a minimization in the alteration and disruption of natural shore and riparian processes and features, thereby reducing impacts to life and property and the associated economic impacts.

5.5. Soils

New Jersey has conducted a statewide survey of soil contaminants and constituents from a variety of soil types and textures in urban, suburban, and rural sites that were, in general, not impacted by industry or point sources. Soil analyses included metals, chlorinated pesticides, PAHs, PCBs, chlorinated herbicides, and organophosphate pesticides. When compared with the current literature, the New Jersey data were consistent with other studies of contaminant background levels.

NJDEP's Division of Science and Research (DSR) conducted a pilot study from 1992-1994 on trace levels of mercury in New Jersey lakes and precipitation, which included near shore soil samples for environmental mercury. DSR is currently managing a study to characterize ambient levels of selected metals and PAHs in the urban Piedmont region of New Jersey. These data will be helpful for determining regional ambient levels to guide site remediation in the urban Piedmont region of the State.

5.6. Toxics in Biota

Periodically, NJDEP's Office of Natural Resource Damage Assessment (ONRDA) will facilitate tissue analysis for fish, shellfish and waterfowl in cases where natural resources have been exposed to spills of oil and/or hazardous substances. These analyses may be conducted by NJDEP's Division of Fish, Game and Wildlife, or through the auspices of another ONRDA partner, such as the National Oceanic and Atmospheric Administration (NOAA).

NJDEP’s Office of Fish and Wildlife Health and Forensics maintains data on bacteria, toxicology, and pathology of fish and wildlife in New Jersey to ascertain cause of death and track disease occurrence.

NJDEP’s Endangered and Nongame Species Program has participated in a joint study with the US Fish and Wildlife Service to obtain plasma from Delaware Bay eaglets to ascertain levels of mercury, DDD, DDE, and PCBs.

On an as-needed basis, NJDEP’s Pesticide Control Program (PCP) also collects tissue samples from aquatic and terrestrial species including fish, geese, bees, and other wildlife to ascertain if pesticides were the cause of morbidity and mortality in such specimens. The PCP will also facilitate tissue analysis of such specimens when requested to do so by NJDEP’s Division of Fish, Game and Wildlife. In addition, PCP will collect and facilitate tissue analysis from vegetative species such as bushes and weeds to address suspected improper exposure to lawn chemicals.

In addition, an interagency task force, the Toxic in Biota Committee has been in existence for a number of years. The committee consists of representatives from the Departments of Health and Senior Services, Agriculture and Environmental Protection. Committee members review the results of research, specifically, fish tissue analyses and make recommendations for fish consumption advisories for recreational anglers. Since its formation, the committee has proposed several statewide advisories including advisories on several species of marine fish and two species of fresh water fish. The contaminants of concern for the public health advisories for marine fish include dioxin, PCB or Chlordane. For fresh water species, the contaminant of concern is mercury.

5.7. Green Acres Program

The Green Acres Program enjoys strong public support. Starting in 1961, with the approval of the first Green Acres Bond issue, New Jersey's citizens have steadfastly supported the Green Acres Program by approving a total of nine bond issues (the last in November 1995) that provide a total of $1.42 billion for conservation and recreation purposes. As a result the State, through the Green Acres Program, has acquired or assisted counties, municipalities, and nonprofit conservation groups to acquire or initiate purchase of 347,827 acres of open space for public conservation and recreation purposes. This has more than doubled the supply of public open space available prior to 1961. It has also funded over 750 recreation development projects and 100 state park and wildlife management area development projects.

The Green Acres Program maintains a strong public outreach program. Each year, in addition to the numerous speaking engagements and seminars, the program organizes and conducts a series of workshops for the Public Trust Program. In addition, the program spends significant staff time providing technical expertise to local governments and non profit groups.

5.8. Programs and Projects That Address General Ecosystem Protection

There are numerous programs and projects that address overall ecosystem protection in New Jersey. The State Development and Redevelopment Plan (the State Plan) has been a significant factor in creating a holistic, ecosystem approach to integrating natural resource protection with sustainable economies. The State Plan promotes the revitalization of urban centers and other areas that have existing capacity to support growth, the repair of existing infrastructure over new construction, and directs future growth in the ex-urban areas of the State into compact, mixed-use centers. The assessment of the impact of the State Plan estimated that 130,000 fewer acres of currently vacant or agricultural land would be consumed by development in accordance with the State Plan over development in accordance with the trend at that time (1992). The State Plan also incorporates significant environmental goals and policies (which have been cross-accepted by the State's counties and municipalities) and promotes regional and other forms of multi-jurisdictional planning. Municipalities, where much of the power to determine how land is developed and redeveloped sits, have begun to adopt State Plan policies in increasing numbers.

Although the fragmentation of land use planning through home rule has been listed as a limitation, it may also be a strength to the degree that municipalities do their land use planning based on information and recommendations of local Environmental Commissions (as authorized by the Municipal Land Use Law).

Preserving and protecting ecosystems in New Jersey requires not only the integration of natural resource management programs with natural resource assessment, but, also, public recognition of the value of natural resources. Part of this recognition is that humans are members of a vast interrelated web of resources and that whatever our interactions with land and natural resources, we ultimately are affected by these interactions as a species. In New Jersey, there are a number of programs that address natural resource assessment and management, and many from an ecosystem level.

Preservation of the Pinelands as a National Reserve, through development and implementations of a management plan that balances human needs with the needs of other species in the Pinelands ecosystem, is a testament to our recognition of the value of this unique resource.

New Jersey has three ecosystems that have been designated as estuaries of national significance: Barnegat Bay Estuary; Delaware Estuary; and New York-New Jersey Harbor Estuary. As such, these ecosystems are formally included in the National Estuary Program and the management plans for these systems are in various phases of development and implementation. Science and technical research to assess these ecosystems is fully integrated with management of these resources. Much of the research to assess these ecosystems was initially guided and supported through NJDEP's DSR. NJDEP's Office of Environmental Planning continues to guide and manage these ecosystem programs.

NJDEP's DSR has been integral in forming the New Jersey Ecological Research Partnership: a consortium of organizations representing government; academia; non-profits; and businesses to promote the use and development of scientific data for decision making with respect to New Jersey ecosystems. In the past year, the partnership has held three place-based regional symposia on New Jersey ecosystems (Pinelands and Highlands ecosystems) to identify extant data; data needs and priorities; and applications of research to decision making. Through these symposia, the partnership is expanding its base and building parts of a New Jersey Ecological Information Network.

NJDEP's Bureau of Geographic Information Systems contains various ecosystem-related data layers with statewide coverages. These data layers include shellfish areas, ecoregions, water quality classifications, land use, wetlands, open space, floodways, flood plains, special management areas, infrastructure, soils, and other resources.

NJDEP's Office of Natural Lands Management and Bureau of Geographic Information Systems are working in conjunction with the U.S. Fish and Wildlife Service on the GAP Analysis project to examine biodiversity through geographic display of vertebrate and plant species in concert with land use. GAP Analysis is a national project that attempts to identify whether or not managed lands are maintaining species diversity and preventing species from becoming threatened or endangered.

NJDEP's Division of Parks and Forestry, in conjunction with the U.S. Forest Service, is conducting a vegetation-soils association mapping project, known as Ecomap, statewide. This project will enable one, for example, to identify expected vegetation in an area based upon soils type. Such information may be useful for identifying parcels of land for preservation or restoration projects.

NJDEP's Division of Parks and Forestry administers state-owned land holdings of approximately 300,000 acres including state parks, state forests, natural lands and historic sites. The Bureau of Forest Health monitors forest health, participates in urban and community forestry, oversees a forest tree nursery, and inspects private forest land operations. Along with the Division of Parks and Forestry, DSR is supporting research on Atlantic white cedar regeneration to address the decline of this species in the New Jersey Pinelands and develop management strategies.

The NJDEP Office of Natural Lands Management (ONLM) administers a number of programs that coincide with its mission of natural resource protection through habitat management. New Jersey maintains over 40 state-designated Natural Areas (32,000 acres) to preserve and protect lands that support endangered and threatened plants and animals, significant ecosystems, and important wildlife habitats. ONLM administers the Natural Lands Trust, Open Lands Management Program, Trails Program, and Wild and Scenic River Program. Each of these programs is successful at natural resource protection. ONLM also sponsors research on endangered plant species in the State. Research results are to be incorporated into the Natural Heritage Database, as well as in developing the Endangered Plant Species List.

The Natural Heritage Database is developed through ONLM's Natural Heritage Program. The Natural Heritage Database is an inventory of rare plants and animal species and representative natural communities in New Jersey, tracking over 1,000 species and more than 50 natural communities. This Natural Heritage Program interfaces with the Endangered and Nongame Species Program (ENSP) in the Division of Fish, Game and Wildlife to integrate ENSP animal data into the Natural Heritage Database.

NJDEP's Endangered and Nongame Species Program (ENSP) directs a number of research, survey, and management activities that address its mission of actively conserving the state's biological diversity by maintaining and enhancing endangered and nongame wildlife populations within healthy functioning ecosystems.

The Landscape Project is ENSP's statewide effort to maximize protection for rare species in five contiguous, biologically diverse natural habitats and public lands using principles of landscape ecology. The five regions are: Delaware Bay; Pinelands; Highlands and Ridge and Valley; Atlantic Coastal; and Philadelphia-New York Urban Corridor. By determining priority species and producing precise maps of critical habitat, the ENSP will furnish regulatory and land management agencies with tools to develop cooperative integrated protection systems. The Landscape Project has conducted numerous priority species surveys.

Public recognition of the value of New Jersey's vast biological diversity is enhanced by the ENSP public outreach program, which includes its "Conserve Wildlife" license plate sales and Watchable Wildlife Project (including an ecoregion guide by Landscape Project Region featuring 70 of New Jersey's best wildlife viewing areas).

In addition to the ENSP, NJDEP's Division of Fish, Game and Wildlife (DFGW) is responsible for the protection and management of New Jersey's fish and wildlife resources through Wildlife Management Areas. This includes maintaining the Notable Information on New Jersey Animals (NINJA) data base which is a central repository of data on New Jersey's fresh water and terrestrial wildlife resources. DFGW also maintains data on deer herd health and habitat loss; shell fisheries data on clams, invertebrates, polychaetes, and mollusks; and marine fish and invertebrates, including an ocean stock assessment.

Restoration projects for contaminated natural resources are initiated through NJDEP's Office of Natural Resource Damage Assessment. NJDEP works with various federal agencies (including EPA and NOAA) to assess resource damage in economic terms from releases or threatened releases to resources managed or owned by the State.

6. Program Limitations

This section encompasses program limitations, data gaps and recommendations for Land and

Natural Resources programs.

6.1. Land Planning

The proximate cause of many of the key land and natural resource issues facing New Jersey now is its inefficient pattern of land development. That pattern of land development is a function of many things, but most prominent among them are the lack of meaningful regional or large scale resource (e.g., watershed) based planning.

For the most part, control of land use is the prerogative of the state's 567 municipalities, each of which is authorized by the Municipal Land Use Law to plan and zone within its own borders. Municipalities are the only entities that carry out detailed land use planning within the State. Under the County and Regional Planning Enabling Act, county planning boards have the authority to review certain local applications to ensure that they are consistent with the county's stormwater control and transportation plans, and their approval is required for certain development and subdivision applications. County master plans are not binding on municipalities.

Neither the Environmental Commissions authorized for counties and municipalities by State law, nor the Natural Resource Inventories, which the Environmental Commissions are expected to develop as aids to land use planning decision-making, have been fully exploited. More than a third of New Jersey municipalities do not even have Environmental Commissions, and very few Natural Resource Inventories include the maps or cross-references that would be required for them to serve as good aids to planning. At a minimum, Natural Resource Inventories should have common conventions for data and mapping to facilitate looking at the parts of a resource that cross political boundaries and true regional planning efforts. Ideally, every municipality would have an Environmental Commission and they would be charged to make environmental planning recommendations to planning and zoning offices.

It is also an observed phenomena that the availability of sewage infrastructure has resulted in increased development within an area, particularly since the density of development can be significantly greater where centralized sewerage facilities are available. Certainly, development in areas in which sewage infrastructure currently exists represents the lowest cost option for developers; thus, in-fill of available lots in these areas has occurred to a large extent.

In recognition of the development pressures that providing centralized sewerage facilities within an area can lead to, sewage infrastructure projects that pursue financing under the Wastewater Treatment Financing Program are required to assess the areal extent of environmentally critical areas within the project's service area, including wetlands, floodplains and agriculture. Total capacity of the proposed system is limited to that needed to serve existing needs and to serve areas that are not within these identified critical areas. As a condition of financing, project sponsors must agree to allow connection of development in environmentally critical areas only after approval by NJDEP. Additionally, review of any project pursuing financing includes assessment of impacts on environmental resources (water quality, natural resources, including plants and animals), and cultural resources, assessment of alternatives (elimination or reduction of direct and indirect adverse impacts), assessment of conformance with the State Implementation Plan for air quality, and assessment of immediate and long-term (20 year) water supply impacts. Additional improvements to planning and implementation of wastewater, water supply, stormwater/nonpoint source management infrastructure is expected through watershed management and improvements to the Wastewater Management Planning Rules.

6.2. General Ecosystem Protection

Although New Jersey has many "place-based" ecosystem level projects underway, NJDEP has conducted an internal assessment of data gaps and recommendations related to ecosystem assessment and management. Some of these gaps and ideas are cited below.

A systematic catalogue of extant biotic and abiotic data for New Jersey ecosystems is needed so that scientists, decision makers, land managers, business and industry, students, and other perspective users have information and in some cases, access to place-based data for the State. Relevant data for land use decisions may, in fact, exist but may not be available through readily accessible sources. Persons or organizations in search of data often do not know where to find such information or whether or not they have access to such data. These data can be very important in developing environmental indicators for New Jersey ecosystems, and further, once assessed, will form the basis for identifying other critical needs. The New Jersey Ecological Research Partnership would like to work toward developing such an Internet-based Ecological Information Network that could serve as a New Jersey link to the National Information Infrastructure.

Through the May 1995 New Jersey Ecological Research Partnership symposium on the New Jersey Pinelands, the following data gaps for the Pinelands ecosystem were identified: determination and development of appropriate indicators of habitat loss; scientific collaboration on impacts of water withdrawals from the Kirkwood-Cohansey aquifer including economic impact analysis; basic Pinelands species ecology research; research on effects of exotic species on the Pinelands ecosystem; and landscape ecology data to address issues such as forest succession, fire, and nutrients.

Through the April and June 1996 New Jersey Ecological Research symposia on the Highlands ecosystem, the identified data gaps for the Highlands ecosystem include: habitat needs of Highlands fauna; cumulative impacts of forest fragmentation on flora and fauna; community/ecosystem levels of fragmentation impacts on processes such as disturbance, succession, exotic species invasion, disease transmission, and nutrient cycling; fiscal impact analysis including water resource valuation, land use transfer, and conservation and development; water resources data at the municipal scale for watershed based management of water supply and water quality; and fate and transport of ground water and ground water pollutants in Highlands geological formations.

Other data needs would be ecological assessments that link exposure data statewide with ecological effects. Although seemingly difficult, it might be possible to ascertain applied pesticide amounts from the Pesticide Control Program and link them to potential effects in various species of wildlife.

Another important gap in our knowledge is the link between contaminated site cleanup and restoration projects and the impacts to ecosystem organisms and processes. Revisits to contaminated sites that are restored or cleaned up in relation to reference sites might be useful for measuring the success of such programs with respect to ecological health.

Also of interest is research that examines the field of alternative landscape practices in New Jersey and the potential for such practices to increase habitat; conserve biodiversity; reduce noxious non-indigenous species invasions; reduce human and organism exposure to pesticides and fertilizers; conserve water resources; and achieve pollution prevention by mitigating the use of synthetic materials and preventing releases (including non-point source runoff and associated eutrophication).

6.3. Brownfields

Prospective purchaser liability: Many sites have instituted non-permanent remedies in the cleanup and have institutional and engineering controls on site. There is uncertainty for potential purchasers of such sites as to future liability if an engineering control fails and additional cleanup or remediation is required. There is pending legislation to address this particular limitation.

6.4. Wetlands

A large percentage of New Jersey's wetlands have been destroyed or rendered incapable of performing their vital functions, including purification and recharge of surface and groundwater, flood and storm damage protection, soil erosion control, and provision of critical habitat for fish and wildlife. Recognition of these historic losses figured prominently in the enactment of policy endeavors aimed at staving off continuing losses from the State's remaining wetlands base. Wetlands are protected under two state statutes in New Jersey: the Wetlands Act of 1970 and the Freshwater Wetlands Protection Act (FWPA). Under the Wetlands Act of 1970, permits are issued after an alternatives review is successfully completed and mitigation is required for the losses allowed. New Jersey is one of only two states nationally to have assumed permitting authority under Sec. 404 of the Federal Clean Water Act. The FWPA allows for the authorization of activities under two permitting programs -- General and Individual Permits. General permits are issued for categories of activities that have undergone Environmental Assessment and for which determinations have been made that such activities result in minimal individual or cumulative impacts. Staff review is required to determine that proposed activities conform with the acreage disturbance limitations and other applicable requirements for each respective general permit. If a proposed activity does not qualify for issuance of a General permit, an Individual permit would then be required. Since General permits have been determined to pose only minimal individual and cumulative adverse environmental impacts, just one of the 23 Statewide General Permits (#4 for hazardous site remediation) requires compensatory mitigation.

The Individual permit program covers regulated activities which are not authorized under the General Permit program or are not otherwise exempt for the Freshwater Wetlands Protection Act. Under this program an alternatives analysis is required, and compensatory mitigation is a condition of issued permits.

Mitigation: The issuance of Individual Permits requires compensatory mitigation, generally at a ratio of two acres created for each acre destroyed lost or disturbed. This ratio emanates from the Federal Clean Water Act and is required because of the documented lack of success nationally in duplicating through creation the quality and function of naturally occurring wetlands. Information contained in issued Individual Permits would indicate that there has been a gain in wetland acreage (approximately 50 acres), which suggests that permitted impacts have largely been offset under the FWPA. However, less than half of the mitigation projects have been constructed; and for wetlands mitigation projects actually constructed, little research has been done to document their success in replacing the values and functions of the wetlands lost or disturbed.

Based on the data collected from the first five years of implementation of the FWPA, unmitigated losses of wetlands acreage under issued Statewide General permits were approximately 79 acres per year. While the initial finding of minimal individual or cumulative impacts were made for most of these permits (General Permits 6 and 7 were mandated by the Act), a more comprehensive assessment of cumulative permitted wetland losses should be undertaken. There also needs to be additional discussion as to whether wetlands losses due to general permits should be considered in a "no net loss" policy -- the overarching national wetlands goal and the proposed goal for New Jersey.

Full evaluation to determine the success of compensatory mitigation requirements is not currently being done by NJDEP or by the Federal agencies engaged in wetlands management, because there is not an agreed upon methodology for measuring the "success" of mitigation. While the importance of successful mitigation efforts is widely recognized, as in other states that have wetlands regulatory programs, a determination of what constitutes adequate resources necessary to support a comprehensive mitigation program have yet to be quantified. In particular, resources are needed to monitor approved mitigation sites, to evaluate site construction, and to provide professional guidance to meet project goals. Furthermore, successful mitigation efforts require follow-up research to determine the effectiveness of mitigated wetlands in replacing the functions and values of those lost or degraded. Consequently, NJDEP recently applied for a $300,000 grant from EPA in order to assess the feasibility of utilizing the Hydro-Geomorphic Method (HGM) to assess the qualitative value and function of wetlands. At the same time, it is recommended that greater emphasis be placed on mitigation banking options rather than creation, restoration or enhancement for small wetland disturbances. Such flexibility would allow for ease of the regulatory process for the permittee while conserving NJDEP resources in monitoring such circumstances.

Wetland Preservation: Currently, there is no State dedicated fund for the express purpose of purchasing freshwater wetlands. In addition, no incentive programs exist for wetlands protection on a municipal level through the transfer of development rights or other innovative land use management mechanisms.

6.5. Headwaters and Riparian Corridors

Although there is some protection for headwaters and riparian corridors through NJDEP land use regulatory programs, Special Protection Area regulations, and through NJDEP and non-NJDEP land preservation programs, these programs are fragmented. Headwaters and corridors that are not in wetlands, on preserved properties, or are not affected by activities regulated under the Flood Hazard Act, Stormwater Management Act, or Soil Erosion and Sediment Control Act, may not be protected in any consistent way under the current fragmented scheme. For example, those headwaters and riparian corridors that do not have associated wetlands and buffer areas, such as the rocky areas of northern New Jersey, are not protected by the wetlands regulations that restrict certain types of activities. Non-point source protection, such as buffer zone requirements for non-wetland areas, vary by local authority. Best management practices or agricultural management practices apply to a range of activities, but in most instances they are voluntary. Consistent regulation based on watershed planning is necessary to protect stream corridors because what happens within the entire drainage area affects stream bank health.

Not all near-stream vegetation is currently afforded regulatory protection. In addition, New Jersey does not have a uniform buffer width for surface waters. On sites which have non-wetland stream corridors or headwaters, the cutting of vegetation without the physical disturbances of land does not constitute development, and no permit is required if the activity is not associated with a project which would otherwise require a permit under the Flood Hazard Area Control Act.

The Freshwater Wetlands Protection Act does not apply to construction under the jurisdiction of the Pinelands Commission or the Hackensack Meadowlands Development Commission. Therefore, stream corridors in those jurisdictions may be subject to different levels of protection or restoration requirements.

Activities permitted under stream encroachment and wetlands regulations do not prevent alteration of riparian corridors. Permits issued by NJDEP continue to allow for development in flood hazard areas and shore flood areas. Such activities may allow cumulative impacts to occur. It is not clear what the success of mitigation projects has been with respect to habitat restoration, streambank stabilization, flood control, aquifer recharge, improved thermal conditions, or increased aesthetic values.

6.6. Coastal Resources and Flood-Prone Areas

The coastal management program is not equipped to address incompatible land use patterns and development that occurred prior to the enactment of statutes and coastal zone management program implementation. Additionally, there has been some resistance to State regulatory authority in cases where applicants are willing to assume increased risk by building to code at increased personal cost. Realistically, however, this proliferation of human habitation and the placement of valuable property in harms way tends to increase the potential for repeated, catastrophic loss to both life and property, the latter of which is ultimately compensated for by taxpayers.

Construction during the past century has resulted in wide-scale engineering stabilization (bulkheads, jetties, groins, seawalls, etc.), which, in many cases, interrupts natural littoral processes and contributes to the destructive forces of surf and tide, thereby exacerbating erosion. Ironically, alterations to natural shore features and littoral drift patterns accentuate the perceived need for further and more advanced engineering approaches and technologies.

6.7. Soil

Unlike other environmental media, NJDEP does not have a soils program. Soils are addressed by the New Jersey Department of Agriculture, the Federal Natural Resources Conservation Service, and its respective state programs with a primary focus on agricultural practices and agricultural lands. Soils, however, occur on all land types and, within the purview of NJDEP, soils are addressed through a fragmented series of programs: site remediation for cleanups, buffer zone requirements in wetlands areas, and stream encroachment regulations.

Except for the current study in the urban Piedmont region, NJDEP does not have a statewide characterization of ambient soil contaminant levels for physiographic provinces by land use category. Trend analyses for New Jersey soils have not been conducted by NJDEP. Such analyses would assist NJDEP in ascertaining links between air deposition and soil contaminant levels from point and nonpoint sources.

6.8. Green Acres

The single greatest limitation in reaching the goals outlined in the State Comprehensive Open Space and Recreation Plan is a stable dedicated source of funding. A stable source of funding would allow greater long term planning, a source of in lieu tax payments, provide predictable funding for the operation and maintenance of the lands acquired and the facilities developed and reduce the debt service associated with the sale of bonds.

The critical areas identified by the State Comprehensive Open Space and Recreation Plan include the State's urban centers, preservation of agricultural, the Highlands, Skylands, Pinelands, and Delaware Bay Shore areas.

Due to the current system, NJDEP has been forced to prioritize its selection of open space acquisitions in order to maximize the value of the parcels acquired based on the staff resources expended. Staff expertise is needed to make greater use of the Geographic Information System for planning and auditing.

The amount of paper work associated with the administration of the Green Acres program slows the rate of acquisition and development projects. The Program is currently working with NJDEP's Office of Financial Management and the Department of Treasury in a Process Team to examine ways to streamline paper work and eliminate unnecessary requirements.

7. New Approaches

7.1. Pollution Prevention

Pollution prevention efforts are an inherent component of land and natural resources management. Pollution prevention is a cost effective alternative to cleanup and treatment because it addresses pollution before it occurs. Efforts target many levels ranging from planning and financing to permitting and compliance, including non-regulated and non-point sources of pollution.

Education is a primary pollution prevention mechanism which is cost effective but requires time for demonstration of effectiveness. NJDEP has focused the majority of its non-point source and ground water efforts at public education, outreach and training of stakeholders from the general public, to small businesses and industry and local officials. Specific programs include the Non-point Source Management, Well Head Protection, Aquifer Recharge Protection and Watershed Management programs. These programs are an integral part of NJDEP's planning activities. Crucial to pollution prevention in the planning context is the need for sound land use planning decisions and their incorporation to local zoning. For example, the Office of Environmental Planning has, through the Well Head Protection Program, focused effort in education of local officials on the relationship between sensitive resources such as drinking water supply wells, aquifer recharge areas and wetlands and existing and proposed land use in the effort to protect these resources. Many of the counties are utilizing GIS resources to map these relationships through pollution source (both point and non-point source) inventories and data collection.

NJDEP's regulatory programs approach pollution prevention from a somewhat different perspective. Permit limits are established to protect the uses of receiving water bodies to insure that existing and future residential, commercial and industrial growth that occurs does not degrade the environment. Permitting efforts include not just the actual efforts to regulate discharges to surface and ground water but also safe drinking water and water allocation permitting, sewer connection permits, sewer ban program, sludge management and pretreatment and technical assistance programs. There are a variety of environmental assessment activities which look at the relation of infrastructure decisions to potential for cumulative and secondary impacts.

Construction of needed facilities and stormwater/non-point source loan financing involve another type of pollution prevention through the identification of needed projects and environmental assessment associated with their construction. Stormwater/non-point source projects have been added to the priority system this year.

Compliance assistance activities are another level of pollution prevention as well as public outreach. In this forum, NJDEP can provide assistance to permittees as well as concerned stakeholders requiring information.

7.2. Ecosystem Integrity

The ecosystem approach is a method for sustaining or restoring natural systems and their functions and values. It is applied within a geographic framework defined primarily by ecological boundaries. The ecosystem approach recognizes the interrelationship between natural systems and healthy, sustainable economies. It is a common sense way for public and private managers to carry out their mandates with greater efficiency. The approach emphasizes:

- ensuring that all relevant and identifiable ecological and economic consequences (long-term as well as short-term) are considered,
- improving coordination among state agencies,
- forming partnerships between federal, state and local governments, land owners, and other stakeholders,
- carrying out federal and state responsibilities more efficiently and cost-effectively,
- using the best science,
- improving information and data management, and
- adjusting management direction as new information becomes available.

NOTE: As a direct result of stakeholder feedback, the ecosystem approach was determined to be a guiding principle for the entire NEPPS process. Section 3.A. in Cross Cutting Issues/Programs has been amended to include this principle.

7.3. Secondary and Cumulative Impacts

The Council on Environmental Quality defines cumulative impacts in the 1969 national Environmental Policy Act as "...the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (Sec. 1508.7)"

Research has identified five broad types of cumulative and secondary impacts. Those which are simply additive (e.g., the “nibbling up” effect), those which involve more than a single type of environmental resource (whereas, the management and regulatory framework has been highly segmented by medium), synergistic impacts where "the total effect of an interaction between two or more agents is greater than the sum of the effects," impacts that cross jurisdictional boundaries, and catalytic or secondary impacts which are brought about another (regulated) activity of which the classic example is induced development.

Six categories of obstacles to incorporating secondary and cumulative impacts in decision making have been identified by other state programs, such as the Virginia Coastal Resources Management Program. But the key is overcoming those obstacles and the first step in doing that is to recognize that cumulative impacts exist. The next step is to address that existence through identification of what those impacts are and to what degree the resource is being affected. Tools to accomplish this include modeling, monitoring, consolidation (of impacts, reviews, programs) and coordination (of programs, reviews). By adopting this approach, many of the identified obstacles may be overcome.

The problem of cumulative and secondary impacts can be addressed through the implementation of several projects within NJDEP. These projects include the Watershed Strategy (addressing the cross boundary impacts), the Non-point Source Pollution Strategy (addressing cumulative or catalytic impacts), TMDLs (will address the science needed to make decisions), facility-wide permitting and enforcement provides the opportunity to address cross or multi-media issues.

7.4. Vertical Integration

The lack of vertically-integrated intergovernmental structure in New Jersey hampers our ability to develop or implement growth management policies. Unlike some states, New Jersey does not have a sub-state system of multi-county planning agencies. The 567 municipalities in the State have individual planning and zoning authority, some counties have limited planning and no zoning authority. Exceptions to this vertically-integrated structure are the Pinelands Commission and the Hackensack Meadowlands Development Commission which were created under special legislation.

7.5. Integration of Natural and Engineered Systems

Part of the reason sprawl threatens natural resources in New Jersey is that development has traditionally meant wholesale replacement of natural systems with engineered systems (e.g., sewers and sewage treatment systems, paving, light and air requirements of building codes, water supply and stormwater management systems). These engineered systems are almost always far simpler than the pre-existing systems. They operate at shorter time scales and smaller geographic scales. They do not have the intricate feedback mechanisms and tolerance for change or tolerance for a wider variety of conditions that the natural systems usually do. The natural system that remains is not as complex or effective. When natural systems are replaced with engineered systems, we often end up having to manage two systems instead of one, e.g., the engineered stormwater runoff system and controlling flooding in the formerly natural drainage system.

Incorporating natural systems in engineered systems means such things as maximizing the use of soil for stormwater management, building day lighting, natural ventilation and passive solar heating and collection techniques into building and community design, and enhancing the ability of rivers and streams to function as part of the flood control system. By doing so, we can make both systems work harder, we can maximize their joint capacity to function, fine tune the engineered systems and use natural systems to increase the capacity of the hybrid systems. By doing so, we will build both more capacity and much broader tolerance for change.

For example, preserving the 100-year flood plain in its entirety would still permit the banks of rivers and streams to function as part of the open space system and the bicycle and pedestrian transportation network, thus reducing heat island effects and air pollution, while the vegetated buffer of the flood plain contributed to better water quality.

7.6. Environs

The New Jersey State Development and Redevelopment Plan (State Plan) defines Environs as "the areas outside the Community Development Boundaries of Centers". This generally includes all of the lands between designated Centers in Planning Areas 3, 4 and 5, as well as the undeveloped portions of Planning Area 2. Unlike Centers and Planning Areas, Environs are not designated in the State Plan. They are described to provide policy guidance for decisions regarding potential development or conservation.

The Environs is a concept that encompasses a diversity of conditions, and throughout New Jersey it varies in form and function. In some parts of the State, the Environs are predominantly agricultural or undeveloped. Active farmland and woodlands, whether deed restricted or not, provide both residents and visitors with productive economic activity, beneficial ratables, and visually pleasing environments. Natural features, such as rivers and lakes, ridgelines and forests, may form a desired community of plants and animals, as well as a limit to the extension of infrastructure. In other parts of the State, the Environs may currently have limited development, such as scattered housing, retail, office space or warehousing. In some counties, the Environs are already considerably developed with a variety of low intensity uses, such as larger lot housing and private educational facilities. In the highway corridors, the Environs may even include highway-orientated facilities such as rest stops and large warehousing and distribution centers.

The Environs are the preferred areas for the protection of large contiguous areas, including the preservation of farmland and other open spaces. The policy objectives for Planning Areas 3, 4 and 5 call for the protection of the Environs from development occurring in Centers. Here, Environs should be primarily open land and form large contiguous areas of undisturbed lands or farmland. Strategies for the Environs include density transfer into Centers, purchasing easements, restricting the extension of capital facilities and adopting ordinances that limit development.

The Environs can take the form of Greenbelts, surrounding Centers or Greenways, or connecting Centers. The Environs may also include partially developed areas that can be redeveloped or retrofitted into Centers. Greenbelts, open space under cultivation maintained in a natural state or with low intensity, or land intensive uses, such as cemeteries or golf courses, should be established to mark the outer edge of Centers and Community Development Boundaries. Greenbelts can also include lands for active or passive recreation.

The State Plan encourages new growth in existing or planned (new) Centers that would otherwise locate in the Environs, provided it does not exceed the carrying capacity of natural systems. Existing development in the Environs, if sufficiently concentrated, may offer opportunities for redesign into Centers. New development that cannot be transferred to Centers should be sensitive to the prevailing local conditions and should not compromise local character.

VIII. SITE REMEDIATION SELF-ASSESSMENT

GLOSSARY

CEA	Classification Exception Area
CERCLA	Comprehensive Environmental Response, Compensation & Liability Act
DGW	Discharge to Ground Water
EPA/USEPA	United States Environmental Protection Agency
ER	Emergency Response
GWQS	Ground Water Quality Standards
IEC	Immediate Environmental Concern
ISRA	Industrial Site Recovery Act
MOA	Memorandum of Agreement
NEPPS	National Environmental Performance Partnership System
NFA	No Further Action
NJDEP	New Jersey Department of Environmental Protection
NJPDES	New Jersey Pollutant Discharge Elimination System
RCRA	Resource Conservation and Recovery Act
RPS	Remedial Priority Score
S-1070	Public Law 1993, c. 139, or N.J.S.A. 58:10B-12 and N.J.S.A. 13:1K-9
SCC	Soil Cleanup Criteria
SRP	Site Remediation Program
UST	Underground Storage Tank

1. Background

As part of the national effort to revitalize environmental protection, 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). This innovative state-federal partnership is designed to strengthen protection of public health and the environment through enhanced application of the principle of management for environmental results. The Site Remediation Program (SRP) has taken NEPPS one step further by developing environmental goals and indicators for all of its elements rather than just the programs for which EPA grant monies are received (RCRA Corrective Action and Underground Storage Tanks). This will accomplish the Commissioner's goal of moving NJDEP to indicator based planning and reporting.

1.1. Site Remediation Program Mission

The SRP mission is to mitigate human health and environmental impacts from improperly discharged hazardous substances and pollutants and restore such contaminated sites as necessary to ensure protection of human health and the environment (NJDEPE, Jan 1994).

1.2. Site Remediation in New Jersey

New Jersey has a history of being the most densely populated State in the Nation and of relying on an industrial economic base to support this population. This has resulted in a close proximity between residential and industrial land uses and a concern by New Jersey residents that contaminated industrial sites are remediated. NJDEP has responded to these concerns with programs that have been used as models for other states and the federal government. Many sites in New Jersey were created by the disposal of industrial wastes in a manner that was consistent with the laws existing at the time and predating the protective requirements of our current hazardous waste regulations.

The SRP maintains a "Comprehensive Site List" database which contains information on approximately 24,000 sites in New Jersey (as of January 1997). Of this inventory, 35% (8463) are known contaminated sites, 59% (14,195) require no further remedial activities, and 6% (1582) need further investigation to determine the presence of contamination. The known contaminated sites can be further subdivided into the following types of cases:

- 3262 (36%) Underground Storage Tank cases
- 972 (11%) Industrial Site Recovery Act cases
- 113 (1%) National Priorities List (Superfund) cases
- 4765 (52%) Other cases (Voluntary cleanups, State lead enforcement cases)

Cleanup and compliance at these sites is achieved by NJDEP, responsible parties and others, such as local government agencies and developers, by following a number of innovative and dynamic laws and regulations. A primary goal of the SRP is to help private parties proceed through the cleanup process in a timely, consistent manner.

2. Description of the Site Remediation Program

The SRP is responsible for the investigation and remediation of sites where soil, ground water, surface water and air have been contaminated by improperly discharged hazardous substances and pollutants.

The SRP conducts these activities directly with the use of public funds or indirectly, through the oversight of other parties conducting remedial activities. The SRP is implemented under a number of state environmental statutes including the Industrial Site Recovery Act (ISRA N.J.S.A. 13:1K-6 et seq.), the Underground Storage of Hazardous Substances Act (UST N.J.S.A. 58:10A-21), the Spill Compensation and Control Act (N.J.S.A. 58:10-23.11 et seq.), as well as the Water Pollution Control Act (N.J.S.A. 58:10A-1 et seq.), the Clean Air Act and the Solid Waste Management Act (N.J.S.A. 13:1E-1 et seq.).

Many organizational aspects of the SRP relate directly to legislative direction such as the formation of the Bureau of Underground Storage Tanks and the ISRA program. However, regardless of the organizational structure of the SRP, the primary goal is consistent: potentially contaminated sites are identified and prioritized, the sources of contamination are identified and contamination is remediated which results in exposure being eliminated or reduced to acceptable levels. When sites have been remediated, the SRP determines that no further action is necessary and the site is considered safe for a designated activity.

In addition, the SRP has developed several programmatic goals to provide direction for its remediation efforts.

2.1. Prioritization of Remediation Based on Risk

The remediation of sites is conducted in order of their risk to human health and the environment. Publicly funded cleanups are done based on the "worst first" principle, except where public policy dictates otherwise (e.g., remediation of State owned facilities). Resources are also allocated to obtain privately funded remediation based on a "worst first" basis. This ensures that the sites posing the greatest risk to the State's population and environment are being remediated before sites posing less relative risk.

To accomplish this goal, the SRP continually strives to identify the universe of contaminated sites. This universe includes currently known and suspected sites contaminated with hazardous substances, regulated underground storage tank sites, industrial establishments subject to ISRA, non-operating landfills, junkyards, sites contaminated with radioactive materials, RCRA facilities subject to corrective action, and industrial septic systems and Class IV injection wells where contamination has been identified.

2.2. Prevention of Additional Impacts from Contaminated Sites

The SRP prevents or mitigates adverse impacts from contaminated sites on any individual or ecosystem. This includes taking measures to prevent the migration of contaminated ground water, providing alternative water supplies where contamination has occurred or is likely to occur, eliminating the potential for, or responding to, chemical fires or explosions, responding to discharges of hazardous substances and taking the necessary steps to prevent the public from coming into contact with contaminated materials. Furthermore, remedial alternatives are selected that consider short and long term risk and avoid the shifting of contamination to another site or environmental medium.

2.3. Restoration of Contaminated Sites

The SRP conducts remedial activities to prevent degradation of the environment, and where possible, restore contaminated sites to allow for their intended beneficial use. Preference is given to permanent remedies that result in the destruction of the contamination. Decisions concerning the remediation of contaminated media including whether to treat on-site, reuse, or treat or dispose of off-site, are made by NJDEP in conjunction with any responsible parties. Appropriate coordination with permitting programs occurs prior to any remedial decision requiring a permit. The SRP continues to work closely with the permitting programs to develop necessary regulations to streamline the permitting process for remedial activities.

2.4. Those Responsible for the Contamination Should Pay the Cost of Remediation

The SRP maximizes the utilization of responsible party funds by operating under an "enforce first" principle. This approach entails offering responsible parties the opportunity to conduct any necessary remediation activities under NJDEP oversight at a contaminated site. The amount of time provided for a responsible party to respond depends on the nature of the remediation needed and the risks posed by the site. In emergency situations the SRP does not seek a responsible party if one is not immediately apparent. If a responsible party is unwilling, unable or cannot be located, the SRP utilizes public funds to mitigate the emergency. The SRP's preference is to use Federal funds in lieu of State funds. However, in no case is an immediate environmental concern allowed to continue while waiting for federal or responsible party action. If a responsible party fails to conduct the remedial activities, and public funds are utilized, the SRP makes every effort to recover those funds from the responsible party.

2.5. Promote Voluntary Evaluation/Remediation of Contaminated Sites

The redevelopment of urban areas and the economic growth of the State is contingent, in part, upon addressing contamination that exists at sites proposed for development or expansion. Many of these sites are relatively low in priority in terms of risks to human health or the environment. In order to assist this voluntary effort, NJDEP has established the Hazardous Discharge Site Remediation Fund and Grant Program to assist qualifying municipalities to petition for grants and low interest loans to conduct preliminary investigations and site assessments. However, other factors, such as lender, purchaser or tenant requirements, necessitate NJDEP review and approval of remedial activities. The SRP responds to these requests and dedicates the resources necessary to conduct these reviews in a timely and responsive manner. The SRP's costs to conduct this activity are paid for by those requesting the service.

2.6. Provision of Compensation to Impacted Persons

The SRP reviews and provides appropriate claim payments from the New Jersey Spill Compensation Fund to those damaged by a discharge of hazardous substances and claim payments, from the New Jersey Sanitary Landfill Contingency Fund, to those parties damaged by the operation or closure of any sanitary landfill. Payments are made based on availability of the particular funding source.

The SRP is responsible for ranking priorities for future obligations from available public funds to ensure that these funds are used to achieve the goals of the SRP. The highest priorities for Spill Fund monies are for the payment of eligible claims and emergency response actions.

2.7. Efficiency in Operations and Organizational Structure

The SRP continuously improves its operations to provide remedial decisions that result in protection of human health and the environment in the shortest time period possible. Regulations are developed to provide clear and predictable guidance about NJDEP's requirements to those conducting remediation activities. The organization structure, regulations and practices of the SRP are continuously evaluated to ensure maximum effectiveness of the SRP.

3. Stakeholder Involvement

NJDEP's SRP began exploring the use of environmental indicators several years ago as a quality measurement tool to assess the effectiveness and efficiency of the SRP. The SRP sponsored a nationwide workshop titled "Measures of Effectiveness of Hazardous Waste Cleanup Programs" in conjunction with the New Jersey Hazardous Waste Advisory Council. The workshop, held in March 1995, was attended by EPA, various states and other stakeholders in site remediation. In the workshop, the discussions concerning SRP effectiveness revolved around methods of assessing the risk reduction achieved by remediating sites. SRP efficiency involved methods of measuring dollars spent per unit of risk reduced and time spent to achieve remediation.

On April 30, 1996, the SRP participated in the NJDEP/EPA Region 2 sponsored "Management for Environmental Results in New Jersey", a one day workshop to assist in identifying stakeholder interests related to key issues, goals and indicators. Site Remediation participated in a breakout session in conjunction with the Solid and Hazardous Waste Program and there was a great deal of interest expressed regarding site remediation issues. The representatives from industry and local environmental groups were concerned with issues such as cost effectiveness, redevelopment of urban industrial sites (commonly referred to as "Brownfields"), environmental justice, and removing disincentives to site cleanups. It was based on this feedback that SRP's goals were included in the Self-Assessment.

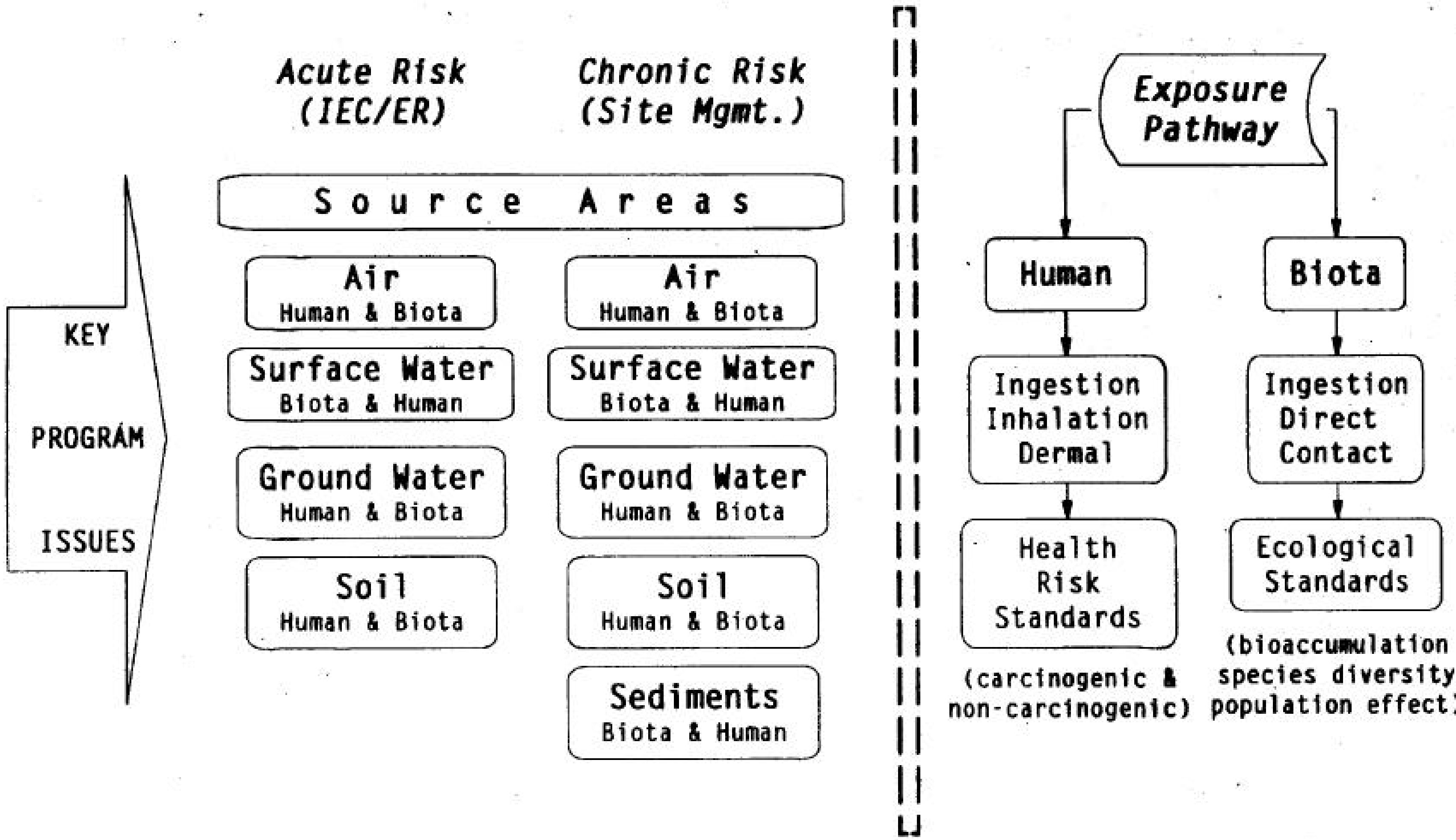
SRP held two additional NEPPS stakeholder meetings - August 14 and September 5 - which included participants from the April 30th meeting with additional representation from the regulated community and concerned environmental groups.

4. Key Environmental Issues

The overarching issue in the SRP is that one or more media at contaminated sites contain levels of contamination which are unacceptable for human and ecological well being. These levels are defined by the Soil Cleanup Criteria, Groundwater Quality Standards (N.J.A.C. 7:9-6) and Surface Water Quality Standards (N.J.A.C. 7:9B). The potential for ecological impacts is evaluated on a case by case basis. In order to evaluate impacts and monitor changes over time, SRP has divided the main issue into environmental subissues which are outlined below.

Broad Issue: Contaminated Sites Impact the Environment

Goal: Eliminate or Reduce the Risk from Known Contaminated Sites



Narrative descriptions of these subissues and a flowchart are provided to further describe this process.

4.1. Acute Environmental Risk

Issue: releases of contaminants in high enough concentrations pose an acute risk to humans and biota. This includes catastrophic releases. Acute risks are usually the result of high levels of the contaminant with shorter exposure timeframes.

4.1.1. Soil

- Contaminated soil poses hazards to humans via ingestion, inhalation or dermal contact.
- Contaminated soil poses hazards to biota via ingestion, inhalation or direct contact.

4.1.2. Ground Water

- Contaminated ground water plumes adversely affect potable use of ground water via ingestion, inhalation or dermal contact. These may be localized or regional impacts.
- Contaminated ground water plumes adversely impact biota through discharges to surface water bodies.

4.1.3. Surface Water and Sediment

- Releases of contaminated surface water runoff, impacts to surface water from contaminated ground water and impacted sediments pose hazards such as reduced species diversity, bioaccumulation, biomagnification and adverse population effects on biota.
- Releases of contaminated surface water runoff, impacts to surface water from contaminated ground water and contaminated sediments adversely impact humans both in terms of potable uses and non-potable uses such as swimming, fishing, etc.

4.1.4. Air

- Particulate and non-particulate contaminant releases to air could cause acute human health hazards including fires and/or explosions.
- Biota may experience acute impacts due to particulate and non-particulate releases.

4.2. Chronic Environmental Risk

Issue: releases of contaminants in high enough concentrations pose chronic toxic effects or chronic risks in humans and biota. Chronic risks are usually the result of low levels of contaminants with an extended exposure timeframe.

4.2.1. Soil

- Contaminated soil poses hazards to humans via ingestion, inhalation or dermal contact.
- Contaminated soil poses hazards to biota via ingestion, inhalation or direct contact.

4.2.2. Ground Water

- Contaminated groundwater plumes adversely affect potable use of ground water via ingestion, inhalation or dermal contact. There may be localized or regional impacts.
- Contaminated groundwater plumes adversely impact biota through discharges to surface water bodies.

4.2.3. Surface Water and Sediment

- Releases of contaminated surface water runoff, impacts to surface water from contaminated ground water and impacted sediments pose hazards such as reduced species diversity, bioaccumulation, biomagnification and adverse population effects on biota.
- Releases of contaminated surface water runoff, impacts to surface water from contaminated ground water and contaminated sediments adversely impact humans both in terms of potable uses and non-potable uses such as swimming, fishing, etc.

4.2.4. Air

- Particulate and non-particulate contaminant releases to air cause chronic health hazards.
- Low level releases of particulates or vapors to the air from contaminated soil could have a chronic negative effect on biota either directly or through the food chain.

4.3. Wastes Remain Ongoing Discharges to the Environment

Source areas of highly contaminated media and chemical waste remain ongoing discharges to the environment. These sources may exist as non-aqueous phase liquids, as free or residual product or as highly contaminated metals residuals. Contaminated sites often contain areas of highly contaminated media, residuals and chemical wastes. These source areas provide a reservoir of pollutants that continue to enter the environment through air, water, and by direct contact. These highly concentrated low solubility materials are an ongoing source of contamination that adversely affects the ground water coming in contact with it. These source areas have the capacity to contaminate millions of gallons of ground and surface water before the source is depleted.

New Jersey's long history of industrial use has resulted in sites at which chemical wastes were deposited by operators following disposal routines recognized today as inappropriate. In many of the urban areas of the State the site histories are an archeological profile of industrial use such as leather tanning, coal gasification, metal finishing, munitions manufacture, chemical processing, etc. Many of these processes resulted in highly concentrated waste materials being deposited on site.

4.4. Cross-Contamination Environmental Impacts

Selected remedial actions can cause secondary, unintentional environmental impacts. Such impacts could include:

- the transfer of treated water to a different watershed than where it was removed;
- changes to watershed balance resulting from potable water source changes;
- changes to normal ground water flow caused by active ground water remediation (i.e., pump and treat systems);
- increased amounts of impervious surfaces causing decreased infiltration and increased runoff;
- potential for cross-media transfer of contaminants; and
- modification of wetland ecosystems/surface water systems caused by remedial activities.

4.5. Description of Issues

4.5.1. Mechanisms of Exposure

Human exposure to contaminants can occur via three basic pathways: by ingestion, by inhalation and by direct skin contact. The importance, presence, or absence of each pathway differs for individual contaminants and media. Furthermore, the effects are divided into acute and chronic toxicity. Acute risks are those that cause an immediate effect in an organism. The effects are visible and can often be traced to a single source with minimal effort. On the other hand, chronic risks are those that cause single or multiple effects over a period of time. In an organism, these risks may not be easily detected. The symptoms are gradual and may go unnoticed for a considerable time after an exposure. This often makes it difficult to determine the exact cause of a visible effect. Additionally, since the relationship between cause and effect is difficult to discern, exposure to chronic risks is likely to occur over a longer period of time.

NJDEP currently has Soil Cleanup Criteria based on chronic toxicity for a number of contaminants. Removing the contaminants from a site or reducing their concentrations to a level below which toxic effects occur will eliminate or decrease negative impacts of human exposure. Since receptors and frequency of exposure differ in sites designated for residential use and those designated for non-residential use, two sets of soil cleanup criteria (residential and non-residential) have been derived by NJDEP and are applied on a case-by-case basis.

Treating contaminants to levels where they are unavailable for ingestion, inhalation or dermal contact will eliminate negative impacts from exposure for as long as the treatment remains effective.

Remedial actions differ in the length of time they remain effective. Permanent remedies that destroy the contaminants would effectuate a lasting solution to the problem. A treatment "stabilizing" metal contaminated soil will, for instance, remain effective for a longer time than a cap which may be damaged in a couple of months. On the other hand, if a cap is properly maintained, it could be an effective method of reducing exposure. Acute effects and the contaminant concentrations are evaluated on a case-by-case basis. When an acute exposure is identified, NJDEP responds through either an emergency response (ER) action or as an Immediate Environmental Concern (IC) situation involving expedited activities to control/contain the impact or limit exposure.

Often a number of environmental media such as soil, sediments, ground and surface water, and air may be contaminated on any given site. The contaminated media and the potential toxic effects associated with the contaminants and these receptors are addressed by NJDEP by applying soil cleanup criteria for soil based on ingestion, as well as soil cleanup criteria based on impacts to ground water.

The fauna and flora present on site may be exposed to contaminated soils, sediments, surface water ponding/runoff or ground water. To determine that a site is not posing a hazard to biota off-site, surface water runoff and ground water flow off-site to biotic receptors must be evaluated. Sites which could impact ecologically sensitive areas include sites adjacent or near to a surface water body, wetlands, Pine Barrens, etc.

The problems arising from biota exposed to contaminants include not only detrimental effects to the species' population in question, but through bioaccumulation and loss of species diversity and balance to other species as well.

4.6. Media-Specific Issues

4.6.1. Soil Contamination

Soil may become contaminated through direct discharges. On many sites, holding areas such as drum storage pads or underground tanks experience accidental spills and leakages. Spills also may occur during the transfer and usage of these materials. In some cases, prior permitted disposal practices such as on site waste lagoons and landfills have contaminated surrounding soils. On many sites, especially those with a long industrial history, contaminated fill (perhaps legal at the time) was used to regrade the site. Certain agricultural practices such as herbicide and pesticide use have left the soil with heavy residues of certain regulated contaminants. The presence of radiological agents may also pose acute or chronic exposure risks. Soil contamination may also result from diffuse anthropogenic sources such as automobile exhaust, industrial smoke stacks and residential furnace emissions and wide-spread pesticide application.

The contaminated soil in and of itself affects biota in various ways. Contaminated soil, blown about as dust, may be inadvertently ingested, inhaled, or enter the body via dermal absorption. In areas where vehicular traffic is heavy, this condition is further aggravated. Since there is often a long time lag between initial exposure and noticeable effects, prolonged exposure may continue while toxic effects on the body have already begun.

Contaminated soil may also act as a source of contamination to other media. On many sites it is the first medium to be affected, and very often, because the soil on a site is affected, other media become contaminated. This may be due to the mobility of the contaminant in the soil, or to its chemistry (it may be soluble in water) or because it is physically relocated (as in movement to a surface water body after rainfall).

4.6.2. Surface Water and Sediment Contamination

Surface water and sediment can become contaminated by the direct discharge of hazardous substances and pollutants into water bodies via spills or indirectly through runoff of surface contamination, or the subsurface migration of contaminants via ground water. Acute impacts from spills include killing of fish, waterfowl and other aquatic species. Other acute impacts that affect people include impacted potable water intakes, effects on recreational uses and the ingestion of contaminated biota.

The discharge of contaminants from contaminated sites can have long term effects on ambient sediment and water quality. Of primary concern are contaminants that are bioaccumulative and contaminants that adhere to particles and are resistant to degradation. Reduced species diversity, bioaccumulation and transfer of contaminants up the food chain and other adverse effects on plant and animal populations are additional impacts that contaminated surface water and sediments may have on the environment.

Historically, impacts from known contaminated sites on surface water have been difficult to evaluate and remediate. Investigations are often complicated by the presence of multiple upstream sources. Remediation of surface water contamination is costly and often results in the release of contaminated sediment downstream. The current focus of surface water remediation is the elimination and control of contaminant sources.

4.6.3. Ground Water Contamination

Sources of ground water contamination include spills, leaks, past permitted discharges or any other discharges to the lands of the State that make their way into the ground water. This includes both contaminants dissolved in the ground water, as well as non-aqueous phase liquids found in the subsurface.

Contaminated ground water can pose several types of risks to human health. The most prevalent of these is through the ingestion of these contaminants via drinking water, either supplied by a public supply or individual domestic well. Other risks associated with contaminated ground water are direct contact with the contaminants through ground water use (such as bathing) and through the volatilization of chemicals into the ambient air (such as showering).

In addition, contaminated ground water can result in impacts to other media, such as surface water or air and in some cases soil. Contaminated ground water, both dissolved and non-aqueous phase liquids, discharging to surface water bodies can have detrimental impacts to the quality of the surface water body.

Ground water contaminated with volatile compounds, such as gasoline, can also contaminate the air through volatilization. These contaminants can cause both acute and chronic problems, particularly in enclosed spaces such as basements. High levels of contamination can cause explosive hazards, whereas lower levels can cause health problems over a long period of time.

In some situations, most commonly where non-aqueous phase liquid is present, contaminated ground water can cause contamination of previously uncontaminated soil as it migrates with the ground water.

4.6.4. Air Contamination

The majority of acute air problems involve leaking underground storage tanks causing free product to float on the ground water table and along subsurface utilities to confined spaces where people can be exposed. Confined spaces often include manholes and other utility structures, and basements of homes, offices and other buildings. Environmental emergencies can occur during the course of normal industrial activity, such as production, transportation and the disposal of hazardous substances, or as a result of explosions and fires at active or abandoned facilities. Spills, explosions and fires can result in significant releases of hazardous substances into the air. Air emissions can also occur from known contaminated sites and landfills under static conditions, and during remediation of sites when contaminated media are removed, transported or treated. The cumulative effect on ambient air quality from contaminated sites is unknown.

5. Program Strengths

5.1. Develop Clear, Consistent & Predictable Regulations for Conducting Remediation

5.1.1. Technical Requirements for Site Remediation

This rule (N.J.A.C. 7:26E) establishes the minimum technical requirements which form the basis of NJDEP's review of the remediation of any contaminated site in New Jersey, including, without limitation, those sites and activities subject to: the Industrial Site Recovery Act, the New Jersey Underground Storage of Hazardous Substances Act, the Spill Compensation and Control Act, the Solid

Waste Management Act, and the Water Pollution Control Act. By detailing the steps a responsible party must follow to investigate and evaluate a site, the regulated community is provided with a level of comfort that their activities will meet NJDEP approval.

5.1.2. Procedures for Department Oversight of Contaminated Sites

This rule (N.J.A.C. 7:26C) identifies the documents available for a person who participates in the remediation of a contaminated site or the assessment and investigation of a potentially contaminated site under NJDEP oversight. The rule presents the procedures to determine the applicable oversight document for a particular site, and also permits a person to assess or investigate a potentially contaminated site "at risk" without NJDEP's oversight. By establishing procedures used to obtain NJDEP's approval for a site's compliance with applicable remediation standards, the regulated community is provided with a level of comfort that their activities will meet departmental approval.

5.2. Known Contaminated Sites in New Jersey

A printed annual report (available quarterly on disk) is available to the public that contains a listing of sites in the State where contamination of soil or ground water is confirmed, and where remediation is either currently underway or pending. The public can obtain information about a particular site or a group of sites and can also determine the appropriate department contact for any site.

5.3. Remedial Priority System

In December 1996, NJDEP adopted the Remedial Priority System (RPS) Rule (N.J.A.C. 7:26F). This rule sets out a system that will be used by NJDEP to rank sites pending remediation to determine the order in which these sites will be remediated based on relative risk posed by site contamination. A list of the scored sites will be published annually. The RPS Rule provides a consistent and systematic approach to the prioritization of known contaminated sites. Expenditure of public funds at sites where a responsible party has failed or is unable to conduct remedial measures will be made based on the new priority system.

5.4. Cleanup Criteria

5.4.1. Ground Water Quality Standards

In February 1993, NJDEP finalized the New Jersey Ground Water Quality Standards, N.J.A.C. 7:9-6. These regulations establish ground water classifications and their designated uses; numeric and narrative standards for ground water pollutants; and are the basis for protection of ambient ground water quality, for setting numerical limits on discharges to ground water, and standards for ground water remedial actions.

Class I-A and I-PL are waters of special ecological significance. Class II-A are waters that are existing or potential sources for potable water. Class II-B areas can only be established through a rule modification. Class II-B is reserved for areas of widespread contamination that would be technologically impracticable to restore to drinking water quality and which must meet certain criteria regarding potable use now and within the next 25 years. Class III-A and III-B are waters not suitable for potable use due to natural hydrologic characteristics or natural water quality.

These regulations gave SRP the framework needed to establish ground water remedial decision-making policies and guidance for permitting of discharges to the ground that are part of remedial actions.

5.4.2. Soil Cleanup Criteria

The SRP has established Soil Cleanup Criteria (SCC) for most of the common contaminants of concern in site remediation work. The criteria are the primary basis for soil remedial decisions regarding direct contact concerns for both unsaturated and saturated soils. However, site-specific conditions are then factored into the overall remedial decision making process. SCC are also the basis for source control decisions for soil in the unsaturated zone. SCC were developed using standard data bases, exposure assumptions, and modeling approaches which are generally consistent with EPA recommendations and guidance.

Public Law 1993, c. 139 (commonly known and referred to herein as S-1070) amended and supplemented several acts related to the remediation of contaminated sites. The Additional Remediation Provisions section of S-1070, specifically the section entitled "Adoption of Minimum Remediation Standards," requires the NJDEP to adopt soil remediation standards based on recommendations that are to be made by an Environment Advisory Task Force. The statute then states that until these recommendations are available, NJDEP should determine soil remedial standards on a case-by-case basis (i.e., SCC) in accordance with EPA guidance and regulations.

5.4.3. Surface Water Quality Standards

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 surface waters. Designated uses reflect current and intended uses of the State's surface waters. 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.

Criteria are used to evaluate and achieve attainment of these designated uses. 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 numeric criteria for specific pollutants.

These regulations give SRP the framework needed to make remedial decisions and to ensure the quality of the State's surface water are protected.

5.5. Guidance Documents

The following is a brief listing of the guidance documents developed and prepared by the SRP available to the public and regulated community to assist in performing site remediation work.

5.5.1. Classification Exception Area

The Classification Exception Area (CEA) guidance document provides assistance to SRP staff and the regulated community in implementing provisions of the Ground Water Quality Standards (GWQS). Pursuant to these standards, NJDEP must set a CEA in areas where the GWQS will not be met due to pollution caused by human activity within a contaminated site. The GWQS require that the duration and extent of the CEA be determined before approval.

5.5.2. Field Sampling Procedures Manual

The Field Sampling Procedures Manual describes, in detail, the field sampling protocols for all media accepted by NJDEP for site investigations and monitoring activities. The intent of this guidance document is to provide consistent, fair and predictable guidance for those parties involved in the sampling of sites. It is also the intent of this document to increase the efficiency of data review, both for the responsible parties and the in NJDEP. As this is a rapidly changing field, this document is to be updated as new sampling techniques improve or as new methods are developed.

5.5.3. Field Analysis Manual

The Field Analysis Manual describes several state-of-the-art field analytical techniques used in the remediation of contaminated sites. These methods can be used for the initial contaminant delineation and to bias sampling locations for further laboratory analysis. This manual was developed in an effort to expedite site characterization and contaminant delineation and as a means of improving the quality of field data. Once again, this manual was developed to ensure fair, technically consistent and predictable requirements for all parties dealing with site remediation.

5.5.4. Alternative Ground Water Sampling Manual

In light of recent changes in ground water sampling techniques, NJDEP has developed the Alternate Ground Water Sampling Techniques Guide. This document provides guidance on the applicability and use of several state-of-the-art ground water sampling techniques, in lieu of installing traditional ground water monitoring wells at all sites. By allowing the use of these methods, ground water samples can be taken more rapidly, thereby reducing costs without jeopardizing the quality of the investigation.

5.5.5. Document for the Remediation of Contaminated Soils

This document is intended as a guidance document for responsible parties. It was mandated by S-1070, section 38, which states that the "guidance document shall include a description of remedial actions NJDEP determines are effective in remediating soil contamination to the residential or non-residential soil remediation standards and that should be considered by a person performing soil remediation."

The June 1996 document details four basic options in dealing with contaminated soils: excavation, soil treatment technologies, soil reuse (which replaced NJDEP's Management of Excavated Soils Guidance Document) and capping. The guide is meant as a starting point when considering what should be done with contaminated soils.

5.6. Case Management Strategy

There are many different authorities under which NJDEP operates to prevent, regulate and remediate pollution or contamination. These include the regulation of discharges to the air, surface water and ground water. There are also a variety of tools which address the mitigation of hazardous wastes/substances. These authorities provide the tools necessary to regulate hazardous waste facilities, to compel responsible parties to cleanup hazardous contamination, and to assure proper funding to allow NJDEP to cleanup sites where responsible parties cannot be identified or cannot or will not take timely and appropriate action. By developing a cohesive strategy, duplicate and inefficient actions will be minimized in achieving comprehensive and consistent management actions.

Through the Case Management Strategy, several key remedial programs can be identified as potential leads including the Division of Publicly Funded Site Remediation, Division of Responsible Party Site Remediation, cooperating County Environmental Health Agencies and local agencies. All will be conducting project management pertaining to the appropriate level of site complexity. The case management responsibilities will vary by the remedial level of a particular case. As the complexity of the case increases, the need for non-lead and technical support in the form of the case management team also increases.

5.7. Outreach Programs

NJDEP conducts numerous training and outreach events throughout the year to assist the regulated community and environmental stakeholders with the sometimes complex issues surrounding the SRP. The SRP assists these individuals through a variety of initiatives. Back to Basics and Beyond the Basics are annual programs to aid responsible parties and consultants in understanding the remediation process and NJDEP requirements for conducting a proper investigation of a property. Other events include topical courses describing new initiatives (e.g., classification exception areas, technical requirements) and innovative/alternative treatment case studies and updates and general guidance such as Homeowner Assistance Guidelines for removing underground storage tanks.

5.8. Voluntary Cleanup Program

NJDEP has already identified over 600 major contaminated sites that need to be cleaned up over the next several years and thousands of other sites in need of limited cleanup. The potential number of contaminated sites that will need to be addressed is in the tens of thousands. NJDEP has the responsibility to ensure that the investigation and cleanup of such sites is protective of human health and the environment and is accomplished in a timely manner.

Through the Voluntary Cleanup Program, responsible parties, developers, local officials or individuals may work with NJDEP to remediate a contaminated site. Under this program, a party conducting the cleanup enters into a nonbinding agreement, a Memorandum of Agreement (MOA), with NJDEP to establish the scope and schedule of remedial activities. These actions may involve a basic preliminary assessment and site investigation to determine if contamination exists at a site or if all remedial actions necessary to clean up the site to appropriate environmental standards have been completed. The MOA may be terminated at any time. To date, over 3,500 non-priority sites have been remediated and 2,000 are currently undergoing remedial activities. This program provides much needed flexibility to private parties to conduct remediations on their own schedule. Previously, such work was performed under Administrative Consent Orders that included time lines and stipulated penalties if work was not completed as scheduled, or under no control document whatsoever. SRP has been using the MOAs since late 1993, except for immediate environmental concern cases. Furthermore, properties subject to the state Industrial Site Recovery Act, which requires certain businesses to ensure their property is cleaned up prior to sale or change in ownership, are now being handled with MOAs. Many ISRA sites are reused, but these cleanups are not considered voluntary.

5.9. Brownfields Initiative

Cleaning up New Jersey’s “brownfield” sites is a reality today. At these vacant or under used contaminated sites, it is easier and faster than ever before to affect successful reuse. Ensuring that appropriate environmental safeguards are taken at industrial and commercial locations while economic redevelopment occurs has resulted in the rebirth of many previously contaminated properties and surrounding neighborhoods. Stimulating economic growth while protecting the environment and returning abandoned, neglected and contaminated properties to viable, productive landscapes is the goal New

Jersey seeks to attain. Addressing the reuse and redevelopment of brownfields across the United States is fast becoming a national priority. Clearly, with a more than century-old industrial legacy, New Jersey's cities are prime candidates for a brownfields revival. The SRP has been focusing its efforts on "recycling" former industrial and commercial facilities and land abandoned because of potential contamination. A primary objective is to help private parties through the cleanup process in a timely and consistent manner and to provide the certainty needed to quantify costs and make economic decisions. To aid in this endeavor, the SRP oversees the Hazardous Discharge Site Remediation Loan and Grant Program. This program enables qualifying municipalities to apply for grants and low interest loans to conduct preliminary investigations and site assessments.

Several legislative initiatives are being proposed at the state level to facilitate remediation of these sites. These proposals address four major policy areas (technical, legal liability, financial and institutional) concerning the remedial activities conducted on these sites. Many brownfields remain vacant and/or underutilized because of economic and other factors beyond the control of NJDEP. However, many of these sites can be made economically viable just by eliminating certain impediments and by offering some incentives for their remediation.

5.10. Risk-Based Corrective Action

New Jersey currently applies a risk-based decision making process at sites where discharges of hazardous substances have occurred. Once an evaluation of the site has been completed pursuant to the Technical Regulations, which includes an evaluation of the current and future use of the site in question and a receptor evaluation completed, a decision on the remedial alternative can be made based on the risk associated with the site. This process give NJDEP the flexibility to ensure that the most appropriate remedial alternative for a site is implemented. Those sites with the greatest risk to human health and the environment may require an active system, whereas in an area with few receptors, NJDEP may allow a more long term solution, such as natural remediation.

5.11. Technical Staff and Managers

NJDEP staff and managers are recognized by EPA, responsible parties, consultants, and other state agencies for comprising one of the leading environmental agencies in the country. Technical staff and managers in SRP are very experienced and knowledgeable and for the most part are very dedicated to doing their best. SRP also has access to other NJDEP staff who are an excellent resource for technical and scientific information, training, and assistance.

5.12. Superfund Program

Since the inception of the Superfund Program (CERCLA) in 1980, 116 sites have been placed on the National Priorities List for Superfund cleanups in New Jersey. Eleven sites have been deleted or are proposed for deletion, and eight sites have had remedial construction activities completed and are in long term maintenance to ensure effectiveness of the cleanup; this results in a total of 113 NPL sites presently under the purview of SRP. Currently, NJDEP and EPA use public funds to address 52 of these sites and oversee privately funded cleanup efforts at 55 additional sites. New Jersey's aggressive site investigation and Superfund listing effort has resulted in obtaining over $1.1 billion in federal funds which represents an $11.92 return from the federal government on every state dollar authorized.

5.13. Emergency Response & Communications Center

The SRP maintains the NJDEP's 24-hour, seven day per week communication center. Operators are available for receiving all telephone notifications of discharges of hazardous substances, notification of air releases, illegal hunting activities, all statutorily required notifications and various sundry environmental problems. The center also maintains a statewide radio network used for all NJDEP law enforcement functions, emergency response actions, and programmatic field communications.

The SRP maintains a 24-hour, seven day a week cadre of responders trained to manage emergencies involving discharges of hazardous substances and pollutants to all media, and assists local and county emergency response efforts as requested. SRP provides NJDEP with an emergency coordinator, and in this capacity can respond to large scale emergencies involving fires, explosions, marine transportation accidents and any other environmental emergencies.

5.14. Permitting Issues

The time frames have significantly improved for issuing all the different permits that may be needed in the course of remedial work. For New Jersey Pollutant Discharge Elimination System (NJPDES) Discharge to Ground Water (DGW) permits, guidance and boiler plate language were developed to make permit issuance easier and the DGW permits are now issued by the case or site manager. The NJPDES rules were modified to allow many DGWs through permit by rule, on-scene coordinator authority, or general permits. The modification also allowed SRP to terminate many old DGW permits that were no longer consistent with SRP's chosen role for this class of permits. SRP's coordination and communications with other permit programs and improvements in those programs has greatly decreased the time for issuance of wetlands, coastal and air permits needed for site remediation. Development and use of technology-based discharge limits has allowed faster issuance of Discharge to Surface Water permits. In addition, all case managers have the ability to utilize on-scene coordinator authority for discharges to surface water.

5.15. Finality

When a party completes remedial activities at a site in accordance with NJDEP's Technical Regulations or when further cleanup work is not required, a "No Further Action" letter is issued. NJDEP may only compel additional remediation at a site that has received a "No Further Action" status if a cleanup standard that was applied at the site has decreased by more than a factor of ten.

6. Program Limitations

6.1. Lack of Promulgated Risk-Based Ecological Cleanup Standards

When the SCC were developed, they utilized human exposure models and guidelines. However, the mission of the NJDEP is to protect the environment, not only human health. Currently, ecological risk is evaluated on a case-by-case basis in accordance with EPA guidance and regulations.

SRP staff are evaluating sites for potential ecological receptors. All sites must undergo this evaluation using a phased approach. The first part of this phased approach is a baseline evaluation. More comprehensive ecological assessments will be required if any one of the following conditions apply:

- contaminants of ecological concern exist on-site;
- a designated natural resource exists on or adjacent to the site; or
- potential contaminant migration pathways to a "designated natural resource" exist or impact to a "designated natural resource is apparent through observation.

Pursuant to S-1070, section 37, an "Environmental Advisory Task Force" was to be created to establish/make recommendations on ecological standards. This task force has yet to recommend any risk-based ecological cleanup standards.

6.2. Superfund Reauthorization

The federal funding dilemma involving the Superfund program remains a problem for NJDEP. The funding mechanism used for remedial activities at Superfund sites lapsed in December 1995. This tax has not been revived and many of New Jersey's cleanup projects that were ready to begin did not receive funding last year. The limited Superfund monies available were distributed to as many sites as possible, based on a national prioritization system implemented in Federal Fiscal Year 1996. Funding for 11 sites in New Jersey was delayed last year, however four sites did eventually get funded by the end of Federal Fiscal Year 1996. This funding situation is expected to continue during Federal Fiscal Year 1997, with remedial activities being prioritized until full funding becomes available. Adequate funds still exist for cleanup actions begun prior to the funding problem and for investigation and design projects at numerous New Jersey Superfund sites.

Debate continues regarding new cleanup initiatives proposed by President Clinton and the most appropriate method to handle funding requests prior to the anticipated reauthorization of the Superfund program. The NJDEP looks forward to being involved in the national debate, and is encouraged that Governor Whitman, as Chair of the Natural Resources Committee of the National Governors

Association, will be involved in the issue as well. The current liability structure, remedy selection, cleanup standards and state-federal roles remain the primary focus of proposed improvements. Reform discussions underway must move to a final conclusion to enable improvements to be realized and funds to be made available to enable site cleanups to continue. New Jersey has been very successful in obtaining Superfund dollars and putting them towards actual cleanups in the past. Reauthorization of this federal program remains a key legislative issue.

6.3. Homeowner Storage Tanks

The number of reported discharges from small residential tanks has been increasing in recent years. Because operation and maintenance of these tanks are not regulated by NJDEP, leaks often go undetected for long periods of time. Discharges of petroleum products are regulated under the Spill Act and homeowners are faced with costly remedial actions from tank releases. Many homeowners are simply not able to pay the costs of remediation. Insurance policies may not cover any or all of the remedial costs.

Recent developments have been made toward resolution of this issue. In November of 1996 the voters of the state of New Jersey approved an amendment to the State Constitution to dedicate 4% of the money annually collected under the Corporate Business Tax for the cleanup of hazardous waste sites. A portion of these funds can be used to give loans and grants to eligible owners and operators for the upgrade or closure of underground storage tanks or for remediation of discharges therefrom.

6.4. Enforcement Strategy

The SRP is involved with cases at which historical discharges of chemicals and disposal of wastes occurred. Even with an effective enforcement program, there are currently operating facilities at which materials handling results in accidental discharges. It is environmentally beneficial and cost effective to prevent releases from operating facilities, and SRP is encouraged that NJDEP priorities are directed to this effort. However, discharges can still occur. Delays in remedial responses to discharges can result in a tremendous increase in the eventual clean-up costs by allowing contaminants to reach ground water and migrate offsite. It is important that the SRP work closely with the Enforcement program to ensure remedial responses to environmental releases are undertaken as soon as possible. It is also imperative that NJDEP continue to improve the effectiveness of programs designed to prevent pollution and minimize impact to the environment from releases.

6.5. Non-traditional Discharges

The SRP encounters contamination that is attributable to releases from sources other than historical industrial disposal activities. This contamination requires remediation to meet human health based exposure numbers, however, there are difficulties assigning discharge responsibility and compelling site investigation and cleanup. These non-traditional discharges include:

- diffuse anthropogenic pollution (e.g. car exhaust, pesticide application)
- historic fill
- landfills and dumps not currently regulated
- agricultural pesticide residues
- dredged materials
- building interiors (conversion from industrial to residential)

Successfully managing sites that exhibit contamination from these sources requires development of new and innovative strategies to deal with them. These sites will not score high in relation to other contaminated sites to qualify for publicly funded remediation (CERCLA or state equivalents). The presence of contaminants at these sites can also impact the ability to issue no further action determinations at sites addressed by responsible parties.

Progress in addressing these non-traditional discharge sites has been made in several fronts. Technical issues regarding the identification of historic fill and diffuse anthropogenic pollution are included in the recently adopted revisions to the Technical Requirements for Site Remediation (N.J.A.C. 7:26E). Furthermore, for historic fill, direction of acceptable remedial action is also provided in this rule. Issues related to historic agricultural pesticide contamination are being addressed and recommendations will be drafted by the Historic Pesticide Task Force, consisting of external stakeholders and the Assistant Commissioner for the SRP.

6.6. Unknown Source Cases

In the past, contaminated wells were identified by various NJDEP programs. In many of these cases, no responsible parties were readily apparent to pursue for cost recovery or to compel initiation of remedial actions. NJDEP's response was to provide alternate water supplies, such as extensions of water lines, or the installation of point-of-entry treatment systems, and the designation of the area as contaminated through either a Ground Water Impact Area, Well Restriction Area, or similar public notification. Departmental reorganizations and consolidations resulted in all of these cases being transferred into SRP without a funding mechanism to drive ongoing sampling. SRP has recently begun utilizing EPA Preliminary Assessment/Site Investigation grant monies in an attempt to identify responsible parties for these cases. This effort has been hampered by the length of time that has passed and the number of these historic cases. There is additional concern that monitoring of existing Ground Water Impact Areas and Well Restriction Areas is not funded by any existing program.

6.7. NFA Letters

The SRP issues "No Further Action" (NFA) letters when a party has completed remedial activities or when no further cleanup work is required. These letters may contain conditions for the NFA which allow finality for the case, but are necessary for protection of human health and the environment, given the site specific characteristics. Auditing the status of these conditions requires tracking and periodic re-examination of the site. The SRP is taking the first steps to address this issue. In regards to tracking, the different types of NFA conditions have been defined for classification and inclusion in existing databases. Mapping of the various classification exception areas, declarations of environmental restriction, off-site ground water contaminants, and other conditions has the potential of providing valuable information for planning purposes, pollution prevention and protection of non-affected resources. An initiative to evaluate the efficacy of conditional remedial actions has also been recently implemented. This program will consist of monitoring of the long term outcome of a classification exception area or declaration of environmental restriction. When fully underway, this effort will enable NJDEP to ensure that periodic maintenance needed for the continued functioning of an engineering control is occurring, thereby ensuring the protectiveness and efficacy of the engineering control.

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IX. SOLID AND HAZARDOUS WASTE MANAGEMENT SELF-ASSESSMENT

GLOSSARY

C&D Construction and Demolition (Waste)
CEHA County Environmental Health Act
CESQG Conditionally Exempt Small Quantity Generator
HHW Household Hazardous Waste
HPV High Priority Violation
HSWA Hazardous and Solid Waste Amendments (to RCRA)
HW Hazardous Waste
LQG Large Quantity Generator
O and D Origin/Disposal (Form)
RCRA Resource Conservation and Recovery Act
RMW Regulated Medical Waste
SQG Small Quantity Generator
SWF Solid Waste Facility
SWMA Solid Waste Management Act
TSDF Treatment, Storage or Disposal Facility
UW Universal Waste

1. Background

1.1. Solid and Hazardous Waste Management Overview

Solid and hazardous waste management regulation in New Jersey is a comprehensive government of the registration, operation, maintenance and closure of solid and hazardous waste facilities; the registration, operation and maintenance of solid and hazardous waste transportation vehicles; the registration of certain solid and hazardous waste generators; the administration of a comprehensive county/state solid waste planning process; the designation of intra district and interdistrict solid waste flows which specify the geographic areas to be served by solid waste facilities; the criteria for siting new major commercial hazardous waste facilities; the disclosure and integrity review of solid and hazardous waste facilities and transporters; the economic regulation of the solid waste transportation and disposal industry; and the implementation of various statutory loan programs to finance construction and operation of environmentally sound resource recovery facilities and sanitary landfills, and the creation or expansion of legitimate commercial recycling businesses.

New Jersey has regulated the handling of solid and hazardous waste since 1970 pursuant to the Solid Waste Management Act (SWMA), N.J.S.A. 13:1E-1, et seq. and the numerous amendments enacted thereto. Solid waste management regulations direct not only environmental controls for waste management practices, but also planning and financing of facilities and systems for waste reduction, recycling, beneficial use, resource recovery, destruction and disposal, as well as economic regulation and integrity review of the entities involved.

Due to a series of legal decisions regarding "flow control," the framework of New Jersey's comprehensive solid waste management system built over the past 27 years is vulnerable to and already experiencing significant change. In May 1994, the U.S. Supreme Court ruled the flow control system in Clarkstown, New York to be unconstitutional and violative of the Commerce Clause of the Constitution in "Carbone v. Clarkstown". Further, this case required application of a "Strict Scrutiny Test" in matters of flow control, as opposed to the more traditional "Balancing Test" applied in previous State and Federal legal proceedings where New Jersey's system had been historically upheld. When the Strict Scrutiny Test was applied to New Jersey in the "Atlantic Coast Demolition and Recycling" case, the system was ruled unconstitutional in July 1996. However, the Third Circuit provided for a two year transition period from the date of the last appeal to a modified statewide system of solid waste management. As of May 1997, both the courts' ruling on the constitutionality of the system, and the extended two year timeframe for transition, were under appeal with the Appellate Division[8].

Not withstanding these appeals, New Jersey's solid waste program has already been significantly

[8]On November 10, 1997, the U. S. Supreme Court denied New Jersey's petition for Certiorari in the Atlantic Coast Demolition and Recycling case. This effectively results in the deregulation of solid waste disposal patterns for municipalities and commercial establishments for the first time in 15 years in the State of New Jersey. State administrative agencies (Environmental Protection, Community Affairs, Treasury and the Attorney General's Office) have worked with counties and authorities since the May 1, 1997 Appellate Court ruling upheld a July 1996 Federal Court ruling which declared New Jersey's flow control system unconstitutional. In light of the decision, revised county plans will coordinate the provisions under which solid waste will be disposed, which range from complete deregulation to continued flow control following the administration of revised nondescriminatory bid procedures. This process will likely take a year or more to unfold and the impact to the effectiveness of stated environmental indicators will be assessed along the way and modified as necessary.

impacted. In an interim decision in the Atlantic Coast Demolition and Recycling case, the District Court entered a preliminary injunction against flow control for construction and demolition debris in late 1995. As a result, the movement of C&D debris became "free market" (with the exception of in-state weighing requirements) as of late January 1996. Further, several components of the New Jersey Solid Waste Management Act dealing with financial assistance programs sunset in 1996 and 1997. The Resource Recovery Investment Tax, Importation Tax and Recycling Tax programs have all expired, which may further impact the historical levels of public support for integrated solid waste management programs. Finally, based on the 1996 District Court decision in Waste Management v. Shinn, et al, New Jersey's long-standing goal of disposal "self-sufficiency" was ruled facially discriminatory and an unconstitutional burden on interstate commerce.

Taken together, the above legal and administrative events have created an uncertain regulatory situation for the administration of New Jersey's solid waste management program. Various bills have been introduced by the State Legislature to identify the next generation management framework which are under active discussion and debate. The exact timeframe for transition also remains outstanding and under consideration in Federal Court which further complicates future planning and goal-setting. As a result, the various components of NJDEP's Self-Assessment document and Environmental Indicators Appendix have been developed based upon the system which remains in place at this time. However, it must be recognized that significant changes to the system are ongoing and may require revised indicators and milestones as the transition process continues.

Hazardous waste management regulations parallel the Federal hazardous waste regulations which were mandated by the Resource Conservation and Recovery Act of 1976 (RCRA), as amended by the 1984 Hazardous and Solid Waste Amendments (HSWA), 42 U.S.C.A. §§6901 et seq., and provide for the identification of wastes classified as hazardous, the registration of hazardous waste generators, transporters and treatment, storage and disposal facilities, the establishment of a cradle-to-grave manifest tracking system for all hazardous waste shipments, as well as environmental controls on hazardous waste management facilities.

1.2. Solid and Hazardous Waste Monitoring

The monitoring of solid and hazardous waste management activities in New Jersey is achieved through numerous registration, reporting, and recordkeeping systems, including:

Registrations

All solid waste transporters and facilities require registration with the NJDEP.

All regulated medical waste handlers (generators, transporters, collection facilities, and intermediate handlers) require registration with the NJDEP.

All hazardous waste handlers (generators, transporters, and facilities) require registration with the EPA and the NJDEP.

Reporting

Each solid waste facility must submit monthly reports and recycling centers must submit annual reports of operations. Sanitary landfills must also submit annual topographic surveys and reports indicating the total volume of landfill space filled.

Each regulated medical waste handler must submit annual reports of operations.

Each hazardous waste generator and facility must submit biennial reports of operations. Each scrap metal shredding facility must submit biannual recycling tonnage reports.

Each solid waste facility must submit monthly reports on waste and recyclables handled.

Each county and municipality also participates in the submission of recycling tonnage reports on an annual basis.

Recordkeeping

Each solid waste shipment must be recorded on an Origin/Disposal (O and D) form, retained by the destination facility.

Each regulated medical waste shipment must be accompanied by a tracking form, retained by the receiving facility.

Each hazardous waste shipment must be accompanied by a manifest, with copies provided to NJDEP by both the generator and the facility.

All solid waste facilities and recycling centers, medical waste facilities and hazardous waste facilities are required to maintain operating logs on site.

The NJDEP maintains several mainframe and PC databases to track the monitoring information, as well as the NJDEP's enforcement actions. Hazardous waste information, except for manifests, are entered into EPA mainframe databases.

1.3. Solid and Hazardous Waste Management Regulation

1.3.1. Solid Waste Subject to Flow Control

Solid waste subject to flow control consists of the following classifications:

Type 10-Municipal Waste - household waste from private residences, commercial waste which originates in wholesale, retail or service establishments, such as, restaurants, stores, markets, theaters, hotels and warehouses, and institutional waste originating in schools, hospitals, research institutions and public buildings.

Type 13-Bulky Waste - large items of waste material, such as appliances and furniture. Discarded automobiles, trucks, and trailers and large vehicle parts and tires are included under this category.

Type 23-Vegetative Waste - waste materials from farms, plant nurseries and greenhouses that are produced from the raising of plants. This waste includes such crop residues as plant stalks, hulls, leaves, and tree wastes processed through a wood chipper. Also included are non-crop residues such as leaves, grass clippings, tree parts, shrubbery and garden wastes.

Type 25-Animal and Food Processing Waste - processing waste materials generated in canneries, slaughterhouses, packing plants, or similar industries. Also included are dead animals.

Type 27-Dry Industrial Waste - waste materials resulting from manufacturing, industrial and research and development processes and operations which are non-hazardous. Also included are nonhazardous chemical waste and asbestos and asbestos-containing waste.

The above wastes are directed via the county solid waste management plans to designated landfills, transfer stations or incinerators within the district covered by the plan, in other counties through formal “interdistrict agreements”, or to out-of-state landfills under NJDEP approved contracts. All of these facilities require solid waste facility permits from the NJDEP. Transfer stations will typically also function as Material Recovery Facilities, whereby recyclable materials are sorted out of the waste stream.

1.3.2. Solid Waste Exempt from Flow Control

Solid waste exempt from flow control consists of the following:

Source Separated Waste - Source separated components of the classifications of solid waste subject to flow control are exempt from flow control. These components include recyclable material identified by a solid waste management district plan as a "mandatory" recyclable. Typically, these include the Class A recyclable materials such as glass and aluminum beverage containers, newsprint and other paper grades, corrugated, and various plastics, as well as additional recyclable components of type 10 and type 23 wastes. Recycling centers handling these types of materials are exempt from NJDEP oversight, but are incorporated within district solid waste plans. Other source separated wastes which are exempt from waste flow control include the Class B recyclable materials such as concrete, asphalt, brick, block, roofing scrap, wood, trees, tree parts, brush, yard trimmings, tires and petroleum contaminated soil. Recycling centers handling these types materials are subject to NJDEP approvals. The NJDEP has recently adopted new rules to reclassify source separated yard trimmings, source separated food waste and source separated vegetative food waste as Class C recyclable materials to encourage the expansion of recycling activities and further reduce the amount of solid waste disposed of in the State. This subjects the facilities which compost these source separated wastes to a simpler recycling center approval process, similar to the Class B recycling centers.

Beneficial Use - Beneficial use is the use or reuse of a material, which would otherwise be classified as solid waste, as landfill cover, aggregate substitute, fuel substitute or fill material. The use or reuse of a material in a manufacturing process to make a product or as an effective substitute for a commercial product is also beneficial use. The NJDEP has recently adopted new rules that provide that beneficial use of a material shall not include or be defined as recycling or constitute disposal. The new rules categorically approve for beneficial use, and require no future approval or authorization for use or reuse, materials such as glass used as a substitute for aggregate in asphalt or concrete, tire chips used as aggregate for road base materials and asphalt, whole tires or tire chips used for energy recovery, on site reuse of soils that contain contaminants at levels below site cleanup levels established by NJDEP, contaminated soil decontaminated to the satisfaction of the NJDEP, solid waste approved by the NJDEP used as cover material or other landfill design and management component, coal combustion bottom ash used to make roofing shingles or bituminous asphalt products, coal combustion fly ash used to make light-weight block or aggregate, coal combustion fly or bottom ash used as cement or aggregate substitute in concrete, cement or asphalt products. The new rules also provide that other materials can be considered for beneficial use approval on a case-by-case basis.

Construction and Demolition (C&D) Waste (Type 13C) - Construction and demolition (C&D) waste is waste building material and rubble resulting from construction, remodeling, repair and demolition operations on houses, commercial buildings, pavements and other structures, and includes treated and untreated wood scrap; tree parts, tree stumps and brush; concrete, asphalt, bricks, blocks and other masonry; plaster and wallboard; roofing materials; corrugated cardboard and miscellaneous paper; ferrous and non-ferrous metal; non-asbestos building insulation; plastic scrap; dirt; carpets and padding; glass (windows and doors); and other miscellaneous materials, but not other solid waste types. C&D waste has been excluded from flow control by a court order and rule adoption by NJDEP, and may be taken to any permitted in-State or out-of-State disposal facility, although the latter requires that the waste first be taken to the designated district facility for the county of origin for weighing and inspection prior to its transport out-of-State. C&D waste is always a waste, unless it meets court mandated exemption criteria. C&D waste remains subject to recordkeeping via O and D forms. The NJDEP monitors C&D waste management principally through enforcement inspections.

1.3.3. Regulated Medical Waste (RMW)

Regulated medical waste consists of cultures and stocks of infectious agents, pathological wastes, human blood and blood products, sharps, animal wastes, and isolation wastes which have a potential to cause disease. These are regulated as a special category of solid waste to ensure that they are properly packaged and labeled and delivered to authorized RMW facilities, to be destroyed or treated to eliminate their potential to cause disease, prior to their disposal. The NJDEP requires registration of all RMW handlers (generators, transporters, intermediate handlers, collection facilities and destination facilities) and the cradle-to-grave tracking of RMW through a manifest system similar to that for hazardous waste, although the NJDEP does not receive copies. The NJDEP and the Department of Health and Senior Services monitor RMW management principally through enforcement inspections and field review of logs and records, although RMW handlers are required to submit annual reports of RMW activities.

1.3.4. Hazardous Waste (HW)

Hazardous waste is any solid waste specifically listed as such by the EPA or NJDEP, or which exhibits one or more of the characteristics of ignitability, corrosivity, reactivity or toxicity as defined by regulations, and which has not been specifically excluded from hazardous waste regulation. The EPA requires registration of all handlers of regulated HW (generators, transporters and treatment, storage or disposal facilities (TSDFs)), cradle-to-grave tracking of each HW shipment through a manifest system, and biennial reporting of HW management activities by all generators and TSDFs. TSDFs are subject to rigorous design, operation and permit requirements, and all generators and TSDFs are required to implement waste minimization plans. The NJDEP requires generators and TSDFs to submit a copy of each HW manifest initiated or received.

State law requires that any new major commercial TSDF first obtain site approval from the Hazardous Waste Facilities Siting Commission and imposes strict criteria for such site approval, and also imposed special requirements for any expansion of an existing major commercial TSDF to more than 50% greater than its capacity at the time of statute enactment. The NJDEP monitors HW management through comprehensive enforcement inspections, TSDF permitting and compliance review, and reviews of manifests, annual/biennial and other reports.

1.3.5. Household Hazardous Waste (HHW) and Conditionally Exempt Small Quantity Generator (CESQG) Waste

Household Hazardous Waste (HHW) and Conditionally Exempt Small Quantity Generator (CESQG) Waste are wastes which are hazardous by nature but which have been excluded from regulation under the hazardous waste rules due to practical limitations, and therefore would typically be disposed of with regular solid waste. HHW is hazardous waste generated by a household or other residential entity, and CESQG waste is hazardous waste generated by a business or institution whose total hazardous waste generation falls below minimal thresholds. The NJDEP encourages the segregation and removal of such inherently hazardous wastes from the regular solid waste flow to keep these wastes out of solid waste landfills and incinerators where they could pose environmental risks, and to steer these wastes towards recycling, treatment or disposal at permitted hazardous waste facilities. Such segregation and removal is accomplished through periodic county-run HHW and/or CESQG special collection days, permanent HHW/CESQG collection centers and waste screening requirements specified in solid waste management facility permits. All 21 counties in New Jersey currently conduct some form of HHW collection program annually.

1.3.6. Universal Waste (UW)

Universal waste is waste generated by a wide variety of types of establishments (including, for example, households, retail and commercial businesses, office complexes, small businesses, government organizations, as well as large industrial facilities) which exhibits, or contains a component which exhibits, one or more characteristics of hazardous waste. Specifically included are batteries, thermostats and spent or recalled pesticides, and potentially included are mercury lamps, mercury switches, all pesticides, cathode ray tubes, circuit boards and oil-based paints. The NJDEP recently adopted rules regulating UW as a special category of recyclable materials, outside of the full requirements of the hazardous waste rules, to further recycling efforts and facilitate its removal from MSW landfills and incinerators. The NJDEP requires registration of large quantity UW handlers and maintenance of records of waste shipments by both the UW generators and destination facilities. Destination facilities for UW are presently subject to the requirements for hazardous waste facilities, but the NJDEP is considering new rules under which facilities that recycle UW would require approvals as Class D recycling centers, and would be subject to annual recycling tonnage reporting, as would be the transporters that deliver the UW to the recycling centers . The NJDEP will monitor UW management primarily through enforcement inspections.

1.3.7. Used Oil

Used oil is any oil that has been refined from crude oil, or any synthetic oil, that has been used and as a result of such use, storage, or handling is contaminated by physical impurities. The NJDEP recently reclassified hazardous waste oil as "used oil" and now regulates it as a Class D recyclable material. The new rules presume used oil will be recycled and allow used oil that is recycled to be managed outside of the hazardous waste system provided it is properly managed. The new rules address the potential hazards associated with the improper storage and handling of used oil by establishing reasonable standards applicable to used oil generators, transporters, processors, re-refiners, marketers and burners. The NJDEP believes that the new rules will increase the amount of used oil that is recycled, particularly as generated from households, and will help prevent used oil from being disposed of on the ground or dumped into storm water or sewer systems. Used oil processing facilities require approvals as Class D recycling centers. The NJDEP will monitor used oil management primarily through enforcement inspections.

2. Description of Solid and Hazardous Waste Management Programs

2.1. Partners in Solid Waste Planning and Implementation

County Government - The Solid Waste Management Act vests primary solid waste planning responsibility with each county and the Hackensack Meadowlands District, designated by the act as solid waste management districts. Under the act, each district has the power, singly or jointly with one or more other districts, to develop and implement a comprehensive solid waste management plan which meets the needs of every municipality located within the district.

NJDEP - Although the districts are responsible for planning their respective solid waste systems, the SWMA provides that the State, specifically NJDEP, is responsible for reviewing and approving county plans to ensure planning consistency with statewide goals and objectives. Each of the 22 districts presently have approved plans, however some districts still rely on out-of-State disposal for some portion of their waste. The NJDEP had put all districts on notice that they must end this practice by December 31, 1999 through its adopted Statewide Solid Waste Management Plan. However, in the 1996 Waste Management v. Shinn, et al case, the concept of self-sufficiency was ruled facially discriminatory and an unconstitutional burden on interstate commerce. The SWMA also provides for the State to intercede and amend a plan if it is found deficient.

Private Sector - While by statute solid waste planning is primarily a county/State function, the role of the private sector is critical to the ongoing provision of reliable and efficient collection and disposal services. The majority of solid waste collection activities are performed by private companies, as are many other functions including the curbside collection of recyclables, ownership and operation of recycling centers, transfer stations, materials recovery facilities, landfills and incinerators and the management of operations at many publicly owned facilities. In the ongoing solid waste planning process, counties must evaluate existing services and infrastructure available from the private sector prior to implementing new programs. In many cases, best management practice may involve the integration of existing operations within the county solid waste system as opposed to building new, capital-intensive projects. Finally, where existing infrastructure is inadequate to meet long-term management needs, counties should carefully evaluate private sector capabilities to construct and operate new facilities or provide services prior to moving forward with public sector initiatives.

2.2. Solid and Hazardous Waste Facility Permitting

The responsibility for reviewing and approving solid and hazardous waste facilities resides in the

Office of Permitting of the DSHW.

Solid Waste Facilities - Solid waste facilities (SWFs) subject to permit requirements include sanitary landfills, resource recovery and smaller scale incinerators, transfer stations, materials recovery facilities and compost facilities. Permit application review includes evaluation of environmental impact analyses, engineering designs and operational plans. Sanitary Landfills also require closure and post closure care plans and NJPDES ground water discharge permits.

Recycling Centers - Recycling centers subject to approval requirements include those that process source separated Class B, Class C or Class D recyclable materials. Approval application review includes evaluation of site plans, operating procedures and end-market analyses. Although recycling centers that process Class A recyclable materials are not subject to NJDEP approval requirements, they are subject to operational requirements regarding storage and disposal of residues and compliance with other environmental regulations, and are required to be included in the district solid waste management plan.

Hazardous Waste Facilities - Hazardous waste facilities subject to permit requirements include storage, treatment or disposal in containers, tanks, surface impoundments, incinerators, landfills, piles, land application facilities or other miscellaneous units. Permit application review includes evaluation of engineering designs and operating plans and environmental impact analyses if applicable. Land disposal facilities (surface impoundments, landfills, land application) also require post closure care plans and NJPDES ground water discharge permits.

2.3. Solid and Hazardous Waste Compliance and Enforcement

The responsibility of solid and hazardous waste enforcement lies in the Solid & Hazardous Waste Compliance and Enforcement Element.

Hazardous Waste Compliance and Enforcement - The Bureau of Hazardous Waste Compliance and Enforcement is responsible for monitoring and assuring compliance with the hazardous waste management regulations. The Bureau is divided into five sections. The Northern region encompasses the counties of Sussex, Warren, Passaic, Morris, Hunterdon, and Somerset. The Metro region contains the counties of Union, Essex, Hudson, and Bergen. The Central region contains the counties of Middlesex, Monmouth, Mercer, Ocean, and Burlington. The Southern region contains the counties of Camden, Gloucester, Atlantic, Salem, Cumberland, and Cape May. The Transportation Oversight Unit covers transportation activities throughout the state.

Inspections are conducted at each type of hazardous waste handler (generators, transporters, and Treatment, Storage or Disposal Facilities (TSDFs)) to ensure compliance with both Federal and State hazardous waste laws, regulations and permits. The frequency of inspection is dependent upon the type of hazardous waste handler and the quantity of hazardous waste handled during a calendar year.

Generators of hazardous waste are divided into three categories: Large, Small and Conditionally Exempt. A large quantity generator (LQG) is one that generates 2,200 pounds of hazardous waste or spill cleanup debris containing hazardous waste or 2.2 pounds of acutely hazardous waste in one calendar month or accumulates 13,200 pounds or more of hazardous waste on site. Based on 1994 manifest data, there were 683 large quantity generators located throughout the State. The largest number of LQGs are located in the Metro region, particularly in the counties of Union, and Essex. LQGs are inspected every other year.

Small quantity generators (SQGs) are those that generate more than 220 and less than 2,200 pounds of hazardous waste or spill cleanup debris containing hazardous waste in one calendar month; or at any time accumulate more than 2,200 pounds but less than 13,200 pounds of hazardous waste on-site. Based on 1994 manifest data, there were 1,366 SQGs located throughout the State. SQGs are scheduled for inspection no more than once every three years.

Conditionally Exempt small quantity generators (CESQGs) are those that in any one calendar month generate 220 pounds or less of hazardous waste or spill cleanup debris containing hazardous waste or 2.2 pounds or less of acutely hazardous waste; and accumulate no more than 2,200 pounds of hazardous waste on site. There are several thousand CESQGs located throughout the State. These generators are inspected on a less frequent or as needed basis.

Treatment, Storage or Disposal facilities (TSDFs) are divided into three types: Major commercial, Non-major commercial and other TSDFs. Major commercial facilities are those that accept hazardous waste from off-site for treatment, storage or disposal and have a capacity for 250,000 gallons or more of hazardous waste on-site. As of October, 1996 there were eight such facilities in the state with the Southern region containing five of the eight. State statute mandates that these facilities be inspected once each week. As in the case of Major commercial facilities, Non-major commercial facilities also accept hazardous waste from off site for storage or treatment. However, non-major facilities are those with less than 250,000 gallons capacity. As of October 1996, there were 15 of these facilities located in the State with the Central region containing seven. Non-major facilities are inspected every other week, once per month, or once each quarter, depending on the amount of waste handled at each facility. As of October 1996, there were 48 other TSDFs that treat or store hazardous waste generated on-site in the state. These facilities are scheduled for inspection every other year.

As of October 1996, there were 116 Transportation facilities located within the State. Transporters of hazardous waste are those that collect hazardous waste from generators and transport the waste to permitted TSDFs. The facilities are inspected once every three years. The hazardous waste transportation vehicles owned and operated by the facilities are also routinely inspected during road side checks held in conjunction with members of the State Police.

The numbers of the different categories of hazardous waste handlers are subject to change, not only due to changes in the hazardous waste generation and management practices of the handlers, but also due to the rule changes adopted on October 21, 1996. Through these rule changes the NJDEP repealed the majority of the State's own hazardous waste rules and adopted-by-reference the Federal hazardous waste regulations as they existed on July 1, 1993. The rule changes alter the definition of hazardous waste, the listings of hazardous wastes, and the exclusions and exemptions afforded to specific waste streams and management practices.

During the inspection of each type of hazardous waste handler a detailed compliance inspection is conducted to determine compliance with hazardous waste regulations. In addition, an overview of Air Pollution, Water Pollution, Solid Waste and other state and federal regulations is conducted through the use of a multimedia checklist. Violations detected in a medium other than hazardous waste are referred to the enforcement unit monitoring compliance for that particular medium. In FY'96, the NJDEP performed 3,247 inspections of hazardous waste handlers, and initiated 39 formal enforcement actions, usually through the issuance of administrative orders and penalty assessments. By comparison, in FY'94, the NJDEP performed about the same number of inspections, 3,194, and initiated 99 formal enforcement actions. There are a couple of reasons for the decrease in formal enforcement actions. The timeframes for the inspections and the formal enforcement actions do not necessarily correlate; over time this effect would be minimized. The NJDEP is making greater use of tools other than penalties, such as Alternate Dispute Resolution, grace periods and welcome wagon, to achieve compliance. However, the primary reason is that the NJDEP is finding less violations that warrant formal enforcement actions, which would appear to indicate that compliance is improving.

Potential violations of the hazardous waste regulations are divided into three classifications: High Priority Violations (HPVs), Class I and Class II. HPVs are the most serious type of violations, usually presenting a substantial risk of harm to human health and natural resources, and will almost always result in the assessment of a penalty. The amount of an administrative penalty that is assessed in a specific case is determined by the NJDEP in accordance with the criteria and procedure established in the hazardous waste management regulations. Class I violations are less serious types of violations, but may warrant the commencement of formal enforcement action and the assessment of a penalty, depending upon the circumstances. Class II violations are comparatively minor types of violations and do not ordinarily result in the assessment of penalties.

Inspection and enforcement information is presently tracked in five separate databases with extremely limited capability to generate reports or perform trend analyses. The data used to determine the number of inspections and enforcement actions has to be manually calculated, making basic data reporting tasks very labor intensive. It is therefore not practical to manually cross-tabulate the number of inspections, enforcement actions and other data with each type of waste handler, industry sector or other data points to identify possible statistical associations. In FY'97, the hazardous waste program will be consolidating the five databases to one, converting to a data management system that will enable users to retrieve and manipulate data more easily. However, improvements in the nature of the data collected and tracked will be necessary to effectively target our resources.

Solid Waste Compliance and Enforcement - Solid Waste Compliance and Enforcement inspects permitted SWFs, including landfills, major resource recovery plants, small scale incinerators, transfer stations, and compost sites, and approved Class B, C and D recycling centers. The frequencies of these inspections are contained in the solid waste regulations and are reflective of the magnitude and complexity of the operation. The purpose of these inspections is not only to correct violations but also to prevent future violations. Solid Waste Compliance and Enforcement also conducts investigations of solid waste transporters, waste flow, unauthorized activities and responds to complaints.

Dependent upon the amount of tonnage received and processed, inspections are conducted weekly, bi-monthly, monthly, or quarterly at permitted solid waste facilities. Compost and recycling facilities are also inspected on a quarterly basis. However, inspections at facilities and illegal disposal sites may be increased to an as needed basis, particularly when there is a history of non-compliance.

Solid Waste Compliance and Enforcement conducts investigations into illegal disposal activities at commercial and non-commercial entities. Solid Waste Compliance and Enforcement is the only Bureau that maintains a daily duty officer to receive and log complaints from Trenton Dispatch, the regulated community, or the general public. Complaints are then logged, and dispersed to investigators within the Bureau, or depending on type of complaint, referred to CEHA agents in the designated county.

2.4. Prevention Activities

Source reduction strategies, seeking reduction of waste toxicity, volume and weight and increased product durability and recyclability, are important components of the integrated solid waste management hierarchy. The NJDEP solid waste program implements the New Jersey Dry Cell Battery Management Act, which prohibits the disposal of nickel/cadmium batteries in the normal solid waste stream, and requires manufacturers of mercuric oxide batteries and rechargeable batteries to collect and recycle or properly dispose of the used batteries that were produced or sold by them in the State. The program also promotes the New Jersey Toxic Packaging Reduction Management Act, which is aimed at reducing the cadmium, lead, mercury and hexavalent chromium content of consumer products sold in the State, and the "Grass: Cut It and Leave It" program, which encourages the public to leave their grass clippings on their lawns instead of adding them to the solid waste stream. The NJDEP hazardous waste program seeks source reduction through the waste minimization plans required of each hazardous waste generator and facility, and the compliance assistance offered by the compliance and enforcement personnel.

New Jersey has one of the most extensive solid waste recycling programs in the nation, with over 30 categories of materials recycled, and the recently adopted new recycling regulations addressing vegetative waste composting and the recycling of used oil and universal waste are expected to increase the recycling rates. New Jersey has documented achievement of 61% total waste stream and 44% municipal waste stream recycling rates based on calendar year 1995 statistics. Recycling is a preferred practice for the management of hazardous waste for which the generation cannot be prevented, and the recent adoption-by-reference of the Federal hazardous waste rules should also further encourage recycling through elimination of the regulatory impediments that were present in the old State hazardous waste rules. Both the solid and hazardous waste rules now contain beneficial reuse provisions that allow useable materials that were previously regulated to be managed as commodities, free of the constraints of waste regulations.

Both the solid and hazardous waste programs pursue the prevention of releases of contaminants to ground and surface waters, through state-of-the-art landfill design, secondary containment and integrity testing of waste storage units, and storm water run-on prevention and run-off collection and control features, as well as the minimization of releases to the air through control devices and compliance with state air pollution control regulations.

3. Stakeholder Involvement

Participants at the April 30, 1996 NEPPS Stakeholders Workshop recommended that a primary goal of the solid and hazardous waste management regulation programs should be that there are no new contaminated sites being created by present practices. This recommendation has been incorporated into this assessment as a key environmental issue.

4. Key Environmental Issues

4.1. Prevention of New Contaminated Sites

Inadequate and environmentally unsound practices for the disposal or use of solid and hazardous waste lead to impacts on air and water quality and cause other environmental and human health impacts. Such unsound practices include allowing leachate from dumps and poorly designed landfills to contaminate surface waters and ground waters, discharging storm water which has come in contact with exposed wastes without treatment, land spreading of contaminated materials from faulty waste processing facilities, and disposal of toxic materials in facilities lacking design features to contain such materials. Improperly managed waste may result in expensive and complex corrective action. Protection of health and the environment and conservation of valuable material and energy resources should be promoted by expanding improved solid waste management techniques, new and improved methods of collection, separation and recovery of solid waste, and the environmentally safe disposal of non-recoverable residues. The siting, design, construction, operation and closure of solid and hazardous waste facilities must be held to rigorous standards to assure that the facilities serve as a solution to one environmental problem and not as the source of others.

4.2. Minimize Waste Generation and Disposal

Land is too valuable a resource to be needlessly polluted by discarded materials. Minimization of the generation of solid and hazardous waste needs to be expanded through the encouragement of source separation of recyclable and useable materials to keep them out of the waste streams, personal behavior changes and industrial process substitutions to reduce the quantity and hazards of the wastes generated, properly conducted recycling and reuse, and environmentally sound treatment. Prevention of waste should be paramount, and recovery of waste the second resort, with disposal of waste only in the last resort.

4.3. Capacity Assurance

State law mandates the development of a plan which includes an inventory and appraisal of all hazardous waste facilities located within the State, and a determination of the number and type of new major hazardous waste facilities needed to treat, store or dispose of hazardous waste in the State. Federal law requires states to determine in-state capacity shortfalls of responsible hazardous waste facilities, and if a shortfall exists in a national level, then states are required to provide facilities to meet in-state demands or else enter interstate agreements to address capacity shortfalls. State plans developed by the Hazardous Waste Facilities Siting Commission have shown that New Jersey has capacity shortfalls, and exports waste out-of-State to landfills and cement kilns (although importing waste for other treatment methods), while the 1994 Federal Capacity Assurance Plan showed sufficient national capacity for hazardous waste disposal needs. Although waste minimization and pollution prevention measures should drive reduction of hazardous waste generation, the State should continue to assess the need for additional hazardous waste management capacity.

State policy has mandated that New Jersey strive for self-sufficiency in solid waste management capacity as the State has been a net exporter of solid waste since the 1980's. The State has made significant strides in the area of self-sufficiency, as the quantity of solid waste exported has dropped from over four million tons in 1988 to just under two million tons in 1995. Although the minimization of waste generation and the maximization of recycling and reuse are and will continue to receive the primary emphasis of the State's solid waste management program, the State will seek to develop and maintain new and existing solid waste management capacity. The State will also need to maximize the utility of its existing solid waste management facilities, by the development landfill mining technology, whereby previously filled landfill cells are excavated to regenerate their capacity, while the excavated materials are separated to maximize recycling and to minimize the residual waste to be redisposed. The availability of affordable proper waste management capacity is essential to the effort of preventing improper waste management. It must be stressed, however, that the recent legal decisions outlined earlier under “Solid and Hazardous Waste Management Overview" may have significant impacts on the development of new in-state disposal capacity and has already invalidated the state's primary public policy goal of achieving disposal self-sufficiency.

5. Program Strengths

5.1. High Regulatory Compliance

Although the solid and hazardous regulatory programs both arose out of declarations of crises in the industry by the legislative branches of the State and Federal governments, and inherited large universes of grandfathered facilities that lacked critical environmental controls, both programs have seen radical improvements. The original universe of substandard facilities has given way, through old facilities being either upgraded or shutdown, and development of new state-of-the-art facilities, to the current universe where more than 90% of the facilities are operating under permits, in compliance with rigorous design and operational requirements. Additionally, even though extensive and stringent regulations have been imposed on the industry, the rate of compliance has continuously improved, to the current state of very high compliance.

5.2. Improved Waste Management Practices

Significant advances in the recycling, reuse and treatment of solid and hazardous waste have occurred since program inception. Open dumps have been eliminated, and disposal as the primary waste management practice has been substantially reduced. On the solid waste side, over 60% of the total waste stream is now recycled, and a substantial fraction of the remainder is now incinerated in advanced resource recovery facilities, while what continues to be disposed of is placed in secure landfills. The NJDEP is now exploring the potentials for the recycling of its secure landfill capacity, through development of landfill mining technologies. On the hazardous waste side, land disposal has nearly been eliminated in New Jersey, with surface impoundment and land application all terminated, and landfilling substantially reduced. Recycling, treatment and thermal destruction have become the preferred practices, with only the residues of these practices being land disposed.

5.3. Compliance Assistance

Solid and hazardous waste enforcement have instituted assistance programs to enhance regulatory compliance by industry through non-adversarial processes. Solid waste enforcement announces initial facility inspections and uses them to review permit conditions and compliance measurement with the permittee, and conducts inspections jointly with the permit writer on a more frequent basis. When minor violations are observed, solid waste enforcement will work with the violator to correct the problem in order to prevent the situation from becoming a major violation. Only when repeated non-compliance of a minor violation is noted will a written violation be issued. Hazardous waste enforcement visits each newly registered hazardous waste generator shortly after it receives an EPA ID number, to introduce the generator to the enforcement program and provide an information package, to explain the hazardous waste regulations and how they are enforced, to review whether the generator truly needs to be subject to the regulations, and to advise the generator of waste minimization methods that appear appropriate to the generator's specific circumstances.

5.4. District Solid Waste Management Plans

Each of the State's 21 counties and the Hackensack Meadowlands District have been required by the SWMA to develop district solid waste management plans. The plans are developed through a public process that involves a local Solid Waste Advisory Council, a public hearing conducted by the Board of Freeholders, and the approval by the Freeholders of a resolution to adopt the plan. The plan is reviewed by the NJDEP, and if found to be in conformance with statewide plans, is approved by a certification of the Commissioner. The districts were required to develop the plans by the early 1980's, and all districts have had approved plans since 1982. Presently, five districts have resource recovery facilities and 14 have sanitary landfills, while 11 districts utilize out-of-State landfills for part of their waste. Only three counties export all of their solid waste to out-of-state landfills. There are seven Interdistrict Agreements under which one district has agreed to allow all or part of the waste flow of a second district to utilize one of its facilities. As of 1994, 56% of the total solid waste stream in New Jersey was recycled, while 12% was incinerated, 21% was landfilled in-State and 11% was landfilled out-of-State. Currently, in-State sanitary landfills have remaining capacities that range from five to 20 years. More planning will be needed in the future to maximize the capacities and utilization of the existing resource recovery facilities and to develop more state-of-the-art sanitary landfill capacity, including the regeneration of existing landfill capacity through landfill mining technology. However, as noted previously, future capacity planning will be significantly impacted by ongoing changes in the Statewide solid waste system.

5.5. Solid Waste Recycling

New Jersey has steadily increased its recycling tonnages each year, from 0.9 million tons in 1985 (8% of the total solid waste generation) to 8.987 million tons in 1994 (56% of the total solid waste generation). Curbside recycling is now practiced in nearly all of the 567 municipalities of the State. Recycling has been mandatory since 1988. The statewide goal has been to achieve recycling rates of 60% of the total solid waste stream and 50% of the municipal solid waste stream by December 31, 1995. Documented reports from all municipalities reveal that the recycling rates reached 61% of the total solid waste stream and 44% of the municipal solid waste stream in 1995. Based on these figures, the State has modified its recycling goal to 65% of the total waste stream and 50% of the municipal waste stream by the year 2000. Approximately 375 businesses are engaged in processing and manufacturing new goods from the materials recycled in the State. The State provides financial incentives to these businesses, such as low interest loans and loan guarantees, and investment tax credits equal to 50% of the cost of the recycling equipment or vehicles.

5.6. Streamlining of Solid Waste Facility Permitting and Creating Performance Partnership Agreements

The NJDEP recently adopted new regulations to streamline solid waste facility permit procedures, and to offer permitted facilities the option to negotiate 15 year performance partnership agreements in place of standard permit renewal every five years. The performance partnership agreement would entail the applicant's selection of long-term environmental goals and milestones which will reduce the existing environmental and operational impacts of the facility, emissions and discharges from the facility, and achieve Federal, State or solid waste management district pollution prevention goals. Through joint execution of a performance partnership agreement, the permittee and the NJDEP would agree that it replace both the SWF permit renewal process and the SWF compliance monitoring schedule otherwise specified by the regulations, affording a potential significant reduction in fees assessed to the facility. The agreement would include the performance of facility wide benchmark audits and agreement updates every five years, and annual progress reports addressing the goals and milestones.

5.7. New Used Oil and Universal Waste Rules

The recently adopted used oil and universal waste rules, which reclassify certain wastes from hazardous waste to Class D recyclable material regulation, is expected to improve the management of the materials and further recycling efforts. The new rules should lower the costs of managing these waste types to regulated generators and facilities without decreasing the environmental oversight and management. This should assist in increasing the amount of the materials that are properly managed and/or recycled as opposed to illegally disposed of in solid waste facilities. This should also assist in increasing the amount of these materials recycled from households, as opposed to legally disposed of in solid waste facilities.

6. Program Limitations

6.1. Solid Waste System Transition and Regulatory Uncertainty

As noted at the outset of this section, under “Solid and Hazardous Waste Management Overview”, New Jersey’s solid waste management system is undergoing an unprecedented level of transition as a result of major legal decisions and the sunset of historic financial incentive programs which helped support disposal facility development, recycling, public education and other elements of integrated solid waste management. A significant level of regulatory uncertainty exists which will remain over the next several years as a modified system, absent flow control, is designed and implemented. NJDEP is particularly concerned that the existing data management system in place for over a decade will be rendered ineffective by the changes taking place. NJDEP has embarked on a detailed reevaluation of the solid waste data management program to identify potential changes which may be adopted.

However, until a revised system design is finalized by the State Legislature, a completely new reporting program cannot be implemented. The result will be an ongoing need to reevaluate the initial set of solid waste environmental indicators selected to ensure their accuracy and effectiveness.

6.2. Limited Success Changing Personal Behaviors

Solid waste source reduction and recycling require changes in personal behaviors by the general public. Such changes are essential to limit the amount of solid waste disposal capacity needed and consumed in the State. The ability of government to effect source reduction through legislation, or to effect recycling by waste processing, is limited and costly. Consequently, the quantity of solid waste generated, as well as the quantity of recyclables that are landfilled or incinerated, will remain unnecessarily high unless the public minimizes these practices. The NJDEP needs to continue and improve its joint efforts with county and local governments to educate more of the general public as to how they should, and can, better practice source reduction and recycling.

6.3. Lack of Clear Requirements for Exempt Waste Managed at Hazardous Waste Facilities

The NJDEP has permitted, and in some cases encouraged, certain wastes which are either inherently nonhazardous, or else excluded from hazardous waste regulation, to be managed at hazardous waste facilities without clear standards for their management, as they are exempt from hazardous waste regulations. Such wastes include the HHW and CESQG wastes, nonhazardous bulk liquid wastes (Type 72) and certain nonhazardous waste solids. In the case of HHW and CESQG wastes, the NJDEP has encouraged their segregation from the regular solid waste flow, while certain nonhazardous liquids and solids become segregated from the regular solid waste flow by being denied access to solid waste facilities or else redirected by the generators in search of higher disposal standards. Clear standards are needed to guide both the NJDEP and the facilities in assuring proper management of these wastes.

6.4. Need for Greater Emphasis on Hazardous Waste Minimization

Although hazardous waste generators are required to develop and implement hazardous waste minimization plans, the NJDEP has not assigned significant resources to this subject. The greater emphasis within the regulatory programs has been on the practices employed in the management of the hazardous wastes which are generated. In as much as such practices have achieved a high degree of regulatory compliance, the NJDEP should devote greater attention to hazardous waste minimization efforts in the future.

6.5. Differences Between State and Federal Hazardous Waste Regulations

Significant differences between State and Federal hazardous waste regulations have created burdens for both the NJDEP and the regulated community. The differences have developed as a result of several factors, including continued changes to the Federal rules which the State subsequently needs to adopt. NJDEP saw perceived inadequacies of the Federal rules leading the State to adopt more stringent rules, and State legislative mandates beyond those of the Federal government. Often where NJDEP had chosen to be more stringent, the EPA had subsequently amended the Federal rules to also become more stringent, but in ways that intensified the differences between the two sets of rules. This then complicates the effort needed by the NJDEP to pursue Federal-rule equivalency. The NJDEP has recently substantially reduced these differences by an adoption-by-reference of the Federal rules as they existed on July 1, 1993, and plans an adoption-by-reference of the subsequent and future Federal rules in the near future. Adoption-by-reference makes the Federal rules become the State rules, with only those few exceptions where State legislative mandates or NJDEP-perceived environmental benefits justify differences. However, this adoption-by-reference of the July 1, 1993 version of the Federal rules, and the upcoming adoption-by-reference of the subsequent Federal rules, will cause short term new adjustment burdens on both the NJDEP and the regulated community, even as other burdens are relieved.

6.6. Terminated Landfills in Need of Proper Final Closure

Although each landfill which operated after January 1982 is required to have an approved closure plan, a number are deficient in this regard due in part to the lack of adequate funding for closure and post-closure measures. This is especially true for municipalities which have minimal escrow accounts and cannot budget sufficient monies for closure. NJDEP must continue to work with these municipalities to establish alternative funding mechanisms.

It is important to close and monitor these facilities as quickly as possible. In their present state, some can generate leachate which affects ground water quality and produces methane and other gases which, if left unchecked, can adversely affect air quality. Some can also have an adverse impact on the aesthetics of an area and create health and safety hazards for local residents.

Landfills which closed prior to January 1982 are not subject to NJDEP's strict closure regulations. Many, however, are still in need of proper closure. NJDEP will have to devise a method of ranking these older facilities and a mechanism for assuring the closure of these sites so they do not continue to generate adverse environmental impacts.

Potentially, landfill mining/reclamation may provide a way of reducing or eliminating closure costs at some landfills and, thereby, speeding their closure. Additionally, reclaimed land at certain sites could be made available for uses other than landfilling.

6.7. Limitations of Current Data Management

Information submitted to the NJDEP concerning the handling and disposal of waste materials in the State is provided in varying forms. While most of the data is entered on different mainframe and PC-based databases, some are maintained as paper files. Useability of data for monitoring and compliance purposes is thus problematic. Developing more consistent and compatible databases will be paramount for maintaining performance oriented indicators. Current modes of data management in the solid waste program (Origin/Disposal reporting and Recycling Municipal Tonnage Grants reporting) may be severely impacted by the transition to a revised system, absent flow control, and by the sunset of the Recycling Tax which formerly compensated municipalities based on documented recycling tonnage. This is potentially significant as this data is paramount in the monitoring of the related solid waste environmental indicators.

7. Indicator Development

An initial set of goals, milestones and environmental indicators has been selected and is included in the FY97/98 Performance Partnership Agreement. Potential additional environmental indicators still under development include:

* Waste generation rates
* Tons of material avoiding disposal through source reduction
* Tons of material avoiding disposal through recycling
* Percent of waste stream managed at state-of-the-art facilities
* Percent of waste stream managed in-State
* Acreage of land, volume of space lost to waste disposal
* Acreage of land at previous disposal sites restored to productive use
* Percent of initial site inspections finding regulatory compliance
* Pounds of hazardous materials removed from solid waste stream for recycling (universal waste)
* Number of hotline complaints received that result in issuance of an enforcement action
* Ratio of tons of material avoiding disposal per dollars of grants and loans approved
* Waste transport miles per ton processed and/or disposed

8. References

42 USC 6901 et seq., Resource Conservation and Recovery Act of 1976, and subsequent amendments, Congressional Findings

EPA, National Capacity Assessment Report: Capacity Planning Pursuant to CERCLA Section 104© (9), 1994

New Jersey Hazardous Waste Facilities Siting Commission, Hazardous Waste Facilities Plan Updates, 1994 and 1995

N.J.S.A. 13:1E-1 et seq., Solid Waste Management Act (1970), and subsequent amendments, Legislative Findings and Declarations

X. ADDITIONAL OUTREACH

As mentioned under the "Outreach to Date" section, New Jersey has continued to have consultation with key stakeholders. This outreach consisted of:

- mailing to stakeholders of a detailed report on the April 30 Workshop, including additional information on NJDEP's NEPPS work and citation of how Workshop comments by stakeholders affected this effort
- mailing to stakeholders of a public review version of the FY97/98 Performance Partnership Agreement, including a 30 day open comment period prior to the Agreement's finalization
- placing NEPPS-related information on NJDEP's electronic bulletin board, its Web homepage, the Public Access Center, and other locations, and dissemination of this information to stakeholders and the public
- holding separate meetings with stakeholders (including, but not limited to, established advisory groups: e.g., Drinking Water Quality Institute, Clean Water Council, Clean Air Council) who have expressed interest, or should be interested, in a given workgroup's topic:
  --August 6, Water Quality and Drinking Water (separate meetings)
  --August 9, Air Quality
  --August 14, Site Remediation
  --August 21, Hazardous Waste
  --October 8, Land and Natural Resources
  --June 23, Land and Natural Resources
- writing articles to appear in stakeholder publications (e.g., NJ Discharger)

Other outreach, including to the general public, may be attempted to the extent that it does not conflict with NJDEP's and its audiences' ability to consider relevant information, hold informed and deliberative discussions, and incorporate feedback into future Agreements. Two additional expected outreach efforts include focus groups/public meetings to discuss: 1) the draft milestones & potential indicators offered for Land & Natural Resources at their June 23 focus group meeting; and 2) an additional focus group meeting to discuss the information contained in the Water Resources section of the FY97/98 PPA, as well as the Water Resources indicators presented in the Environmental Indicators Appendix to this document. The Land & Natural Resources focus group is scheduled to occur on October 29, 1997. No date has been set yet for the Water Resources meeting.

Regardless of whether such additional outreach occurs, NJDEP is committed to continuing consultation with stakeholders and the public subsequent to the finalization of the FY97/98 Agreement, to ensure widespread awareness of NEPPS and its policy implications, feedback on Agreement implementation, extension of self-assessment to programs not covered under the FY97/98 Agreement, discussion, development and testing of suitable indicators, public education about environmental issues and management, and other activities.

APPENDIX A - NEPPS STAKEHOLDER INVOLVEMENT WORKSHOP AGENDA

MANAGEMENT FOR ENVIRONMENTAL RESULTS IN NEW JERSEY:
IMPLEMENTING THE NATIONAL ENVIRONMENTAL PERFORMANCE PARTNERSHIP SYSTEM
(NEPPS)
An Initial Collaborative Workshop

Co-Sponsored by DEP, EPA Region 2 & DEP's Green & Gold Advisory Task Force

April 30, 1996

Public Hearing Room - NJ Department of Environmental Protection
401 E. State Street, Trenton, NJ

AGENDA

8:00 - 9:00 AM **REGISTRATION**

Morning Moderator: *Michael Catania, Co-Chair, Green & Gold Advisory Task Force*
Executive Director, The Nature Conservancy

9:00 AM **WELCOME AND INTRODUCTION**
Mark Smith, Chief of Staff, DEP
Jeanne Fox, EPA Region II Administrator

9:30 - 11:15 AM **SESSION 1 - NEPPS, ENVIRONMENTAL GOALS & INDICATORS**

9:30 AM **National Environmental Performance Partnership System (NEPPS) Process**
Leslie McGeorge, Director, Division of Science & Research, DEP
Kevin Bricke, Deputy Director, Water Management Division, EPA Region II

9:45 AM **Environmental Goals and Indicators: A. Federal, State and Regional Initiatives;**
B. Key Concepts
Jim Bernard, Project Manager, State Environmental Goals and Indicators Project

10:30 AM **Break**

10:45 AM **Implementation of NEPPS in New Jersey**
Leslie McGeorge, DEP
John Malleck, Chief, Water Quality Management Section, EPA Region II

11:15 AM **Discussion of NEPPS Strategy and Charge to Breakout Sessions**
Mike Catania & James Shissias - Facilitators

11:45 - 2:45 PM **SESSION 2 - DISCUSSION OF KEY ISSUES, GOALS & INDICATORS IN INDIVIDUAL TOPIC AREAS: BREAKOUT SESSIONS WITH FACILITATORS**

Pilot 1996 Areas	New Areas
Water Quality (Public Hearing Room)	Site Remediation/Waste (5th Fl. Lg. Conf. Rm.)
Drinking Water Quality (3rd Fl. Lg. Conf. Rm.)	Land & Natural Resources (6th Fl. Lg. Conf. Rm.)
Air Quality/Radiation (4th Fl. Lg. Conf. Rm.)	

12:30 PM **Lunch in Breakout Rooms**

Afternoon Moderators: *James Shissias, Green & Gold Advisory Task Force*
General Manager, Environmental Affairs, PSE&G

Mark Smith, DEP

3:00 PM **SESSION 3 - REPORTS ON BREAKOUT SESSIONS AND FUTURE OUTREACH PLANS (reconvene in the Public Hearing Room)**

4:15 PM **CLOSING REMARKS AND ADJOURNMENT**
Mark Smith, DEP

APPENDIX B - STATUS OF CORE PERFORMANCE MEASURES

1. Air Program Performance Measures

Performance Measures	New Jersey Response	New Jersey Performance
1.Number of nonattainment areas and areas that reach attainment and other resignation for criteria air pollutant standard (NAAQS).	NJDEP will report attainment/nonattainment status	County of Camden and nine individual cities were reclassified from nonattainment to attainment of the Carbon Monoxide standard. Old nonattainment designations for Total Suspended Particulates were removed. Entire state is attainment for inhalable (PM-10) standard
2.Status of state progress in developing and submitting required SIPs and status of regional office processing of the SIP, including number of approvable inspection/maintenance SIPs submitted and approved.	NJDEP will submit a SIP progress report.	Over the past four years, New Jersey has revised it's State Implementation Plan (SIP) for ozone in response to the requirements of the Clean Air Act Amendments of 1990. In March 1995, the USEPA developed a two phased approach to attain the ozone health standard. In Phase I, the State is required to meet all the Pre-November 1994 mandated measures in the Clean Air Act as well as the Rate of Progress requirements through 1999 (a 24% reductions from 1990 levels), adopt the regional requirements set forth by the OTC and commit to achieve the emission reductions necessary to attain the ozone health standard and address ozone transport. Phase II is a consultative process to address ozone transport throughout the eastern United States. On July 3, 1996 EPA started a sanction clock for the State's failure to submit the Rate of Progress Plan and for failing to submit an enforceable commitment to adopt all measures necessary to attain the health standard and to address transport. See Section 8 of the Self Assessment for more detail.
3.Status of state and local operating permit programs (approved and waiting to be approved) and assistance to tribes in developing programs.	Implementation of Title V is included in the base program.	After several years of negotiations and three rule proposals, the final portion of the operating permit rule was adopted 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

Performance Measures	New Jersey Response	New Jersey Performance
		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. Number of states that establish or implement mobile source environmental education and outreach programs which implement viable consistent and coordinated efforts to raise the public's awareness of the impact of mobile sources on air quality.	Environmental education activities are discussed in the Leadership criteria section.	NJDEP participated in the OTC campaign "Let's Clear the Air" and also developed New Jersey-specific materials to raise the public's awareness of the impact of mobile sources on air quality. These New Jersey materials include posters, palm cards, "Clean Up Your Commute Day" media advertisement, radio and television PSAs, "Let's Clear the Air" video, fact sheets, bus billboards, sun visors, and a guide for municipal officials. NJDEP helped set up and actively participates in the Philadelphia area "Ozone Action Day" program.
5. Progress in implementing the two-phased approach for ozone attainment demonstration.	The two phased approach will be included in the SIP progress report.	See # 2 above.
6.Description of key activities underway with/by states, tribes, and local governments to implement MCT standards and other provisions of Title III, including activities with regulated community, number of permits issued, etc.	Title III delegation has been requested. NJDEP plans to run a series of workshops for the regulated community.	Delegation of the air toxics requirements in Title III was grated on June 17, 1996. The delegation covered 14 source categories. In FY96 Workshops were offered for sources affected by the Petroleum Refinery MACT and the Degreasing and Surface Cleaners MACT. Two workshops on Title III in general were also held.
7. Description of efforts to integrate and promote pollution prevention into program.	Included in Cross-Cutting Issues. Air program participates in development of facility wide permits.	NJDEP is developing a facility-wide permit program. This program, being tested 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

Performance Measures	New Jersey Response	New Jersey Performance
		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 500 major facilities will also be put in a facility-wide permit format.
8.Number of initial certifications of all continuous emissions systems completed (including opt in sources)	Review responsibility is shared between NJDEP and EPA. No official report is planned	
9.Number of Phase II Title IV permits issued.	Review of permit applications will begin in FY96. No official report is planned	

2. Office of Water Performance Measures

Performance Measures	New Jersey Response	NJ Performance
1. Percentage of water systems and (population served) providing drinking water that meets all drinking water standards throughout the year, reported separately for pathogens and chemicals.	NJDEP will report this as an indicator to EPA. See Drinking PA Section 4.1 for additional comments.	**Pathogens** ***CWS*** - 97% of the CWS that sampled for microbiological parameters did not have an acute or monthly MCL violations in 1995. The estimated population served by systems without acute or monthly MCL violations was 6.84 million people. ***NCWS*** - 98.3% of the NCWS that sampled for microbiological parameters did not have an acute or monthly MCL violation in 1995. The estimated population served by systems without acute or monthly MCL violations was 0.48 million people. For additional details see DW Self-Assessment, Section 8, Indicator AS1. **Chemicals** This indicator is not currently available. There are outstanding questions regarding the differing sampling frequencies among chemical contaminant groups that need to be resolved before proceeding with indicator development. See DW Self-Assessment, Section 8, Indicator BS1.
2. Percentage of public water systems that are covered by a fully implemented source water (ground or surface water) protection program.	NJDEP will report this as an indicator to EPA. See Drinking Water Section of PA, Section 4.1 for addition comments.	The number of CWS wellhead protection areas that have been delineated is 113 or 5.4% of the wellhead areas that are going to be delineated. Five counties or 23.8% have completed source inventories. For addition details see DW Self-Assessment, Section 8, Indicator DR1.
3. Percentage of unfiltered water systems (and population served)	NJDEP will report this as an indicator to EPA. See Drinking	Of the 31 CWS surface water supplies, and the three nontransient, noncommunity surface water supplies, only one

Performance Measures	New Jersey Response	NJ Performance
required to install filtration under the Surface Water Treatment Rule that met all requirements by the end of the year.	Water Section of PA, Section 4.1 for addition comments	surface water treatment plant does not have filtration. The population served by this system is 8,000 people. For additional details see DW Self-Assessment, Section 8, Indicator EP6. In 1995, five CWS wells were designated as having "ground water under the influence of surface water", and will have to meet the more stringent surface water regulations. For additional details see DW Self-Assessment, Section 8, Indicator EP8.
4. (a) Percentage of State/Tribal waters that meet designated uses for aquatic life and for recreation; (b) identification of impaired/ threatened waters and the causes/sources of impairment. (305(b) data collection)	NJDEP will report (a) as an indicator. (b) and © will be reported via the State Water Quality Inventory (305(b)) report.	**Aquatic Life Designated Use**: 59.1% of freshwater streams are assessed using benthic macroinvertebrate rapid bioassessment protocol. 35% of assessed waters are not impaired; 52% of assessed waters are partially impaired; 12% of assessed waters are severely impaired. **Recreational Designated Use:** 8.1% of freshwater streams are assessed using fecal coliform. 15.2% of assessed waters are swimmable; 7.6% are partially swimmable; 77% are not swimmable. All waters are classified as threatened. **Sources and causes** of contamination are identified on a statewide basis using chemical/ microbiological monitoring in 8.1% of streams. Causes include nutrient and organic enrichment, dissolved oxygen depletion, thermal discharges. Sources include industrial and municipal effluents and stormwater, runoff from urban, suburban and agricultural land uses. **Reference:** 1994 Statewide Water Quality Inventory Report (305b) and 1997 Self-Assessment.
5. NJPDES Permit status- # and % of permits, including general permits by State/Tribe that are Issued and Current, Issued and Expired or Never Issued. The measure would be reported out by municipal majors, industrial majors, municipal minors,	NJDEP will continue to provide data to PCS.	For all categories, 88% of permits are current. See Attachment on permit status for number and percent of major and minor industrials and municipals, CSO's and federally owned facilities.

Performance Measures	New Jersey Response	NJ Performance
industrial minors as well as CSO and MS4 Municipal Stormwater Permits.		
6. Municipal Support- List by State/ Tribe, State Revolving Fund and Construction Grant cumulative outlays, quarterly against OMB targets. List by State/Tribe, cumulative construction grant administrative completions and closeouts, semiannually, in accordance with State/Tribal strategies.	NJDEP will report Construction Grant and SRF overlays and administrative completions, on a quarterly basis, as an indicator. EPA will report step 3/4 closeouts on a quarterly basis.	See Attachment outlining status by quarter of Construction Grant outlays, SRF outlays, Administrative completions, and Step 3/4 Closeouts.
7. Number of watershed/place-based projects or the percentage of land area covered by place-based projects.	NJDEP will report state-initiated watershed projects in freshwater watersheds in FY96. [9]	Five watershed management projects are currently underway. This includes the Whippany project as well as the NY/NJ Harbor estuary, the Delaware estuary, the Barnegat Bay estuary and the Passaic River Region, which includes the Whippany Watershed. It should be noted that the NY/NJ Harbor estuary and the Delaware estuary projects primarily focus on the tidal reaches of these watersheds, and therefore are not "comprehensive watershed management projects" at this time. These projects are discussed in greater detail in the Water Resources section of the Self-Assessment.
8. Progress in assuming the Section 404 Wetland Program, receiving Corps of Engineers issued General Permit or developing a Section 401 water quality certification program that addresses compliance of Federal 404 permits with State/Tribal water quality standards for wetlands.	NJDEP deferred the Wetlands Program until FY97.	Report not due.

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Performance Measures	New Jersey Response	NJ Performance
9. Progress of each State/Tribe in achieving comprehensive watershed management.	NJDEP will report for freshwater watersheds in FY96. [1]	NJDEP drafted a strategy document for watershed management implementation *"Statewide Watershed Management Framework Document for the State of New Jersey."* A Watershed Steering Committee and Watershed Characterization and Assessment Team were formed to guide strategy document development. NJDEP grouped 96 watersheds into 20 watershed management areas and aggregated these into five water regions. The Whippany River Watershed Pilot Project is in its third of five years. Watershed activities are also underway in four high priority areas: three National Estuary Programs (Barnegat Bay, NY/NJ Harbor Estuary and Delaware Estuary) and the Passiac River Region, which includes the Whippany Watershed. NJDEP is developing water quality based effluent limitations in the NY/NJ Harbor, Delaware Estuary and Whippany watershed. In February 1997, NJDEP filed for adoption of water rules that will facilitate implementation of watershed management. These issues are discussed in greater detail in an Attachment which addresses the State's progress in achieving comprehensive watershed programs.
10. Upgrade specific nonpoint source State/Tribal program elements most in need of improvement.	NJDEP will continue to provide a narrative report that will cover freshwater and tidal/estuarine watersheds.	NJDEP has formed a new NPS Advisory Committee of major agency, public and private-sector stakeholders. The Committee will assist NJDEP in the development of an updated NPS Assessment and Management Program (to be completed by the end of SFY98), the solicitation and selection of NPS implementation project grants and coordination of NPS management with watershed management activities.

Notes:

1 "Comprehensive Watershed Management" means a public process to:

- identify the priority issues in a watershed or watersheds;
- develop an action plan to define necessary actions to resolve the problems (including any appropriate monitoring, modeling, program assessment, policy analysis);
- develop a plan that identifies the action steps, assesses the need for new resources, identifies possible sources of funding and staff,

assigns responsibilities and determines a schedule for implementation;

- implement the action steps (e.g., water quality-based permits, NPS controls, riparian restoration) and;
- following implementation, evaluate the effectiveness of the plans.

5. NJPDES Permit Status

NJPDES PERMIT STATUS AS OF 12/31/96

CATEGORY	Number of Permits Issued	Number of Permits Current	Number of Permits Expired	Percent Current	Percent Expired
Major	104	85	19	82%	18%
Minor	171	48	123	28%	72%
Municipals					
	275	**133**	**142**	**49%**	**51%**
*** Major Industrials**	85	57	29	67%	33%
*** Minor Industrial**	2720	2525	195	93%	7%
	2805	**2582**	**224**	**92%**	**8%**
CSO's	**28**	**28**	**0**	**100%**	**0%**
Federally Owned					
Major	0	0	0	0%	0%
Minor	11	5	6	45%	55%
Unclassified	1	1	0	100%	0%
	12	**6**	**6**	**50%**	**50%**
All Categories	**3120**	**2749**	**372**	**88%**	**12%**

* Approximately 2131 Stormwater Permits are also included.

6. Municipal Support

Pursuant to the provisions of the provisions of the FY96 Performance Partnership Agreement, NJDEP agreed to and has continued work in accordance with the Delegation Agreement, other agreements and the annual state-specific strategy for construction grants completions. In addition, NJDEP committed to and has continued to administer the Wastewater Treatment Financing Program, which includes Federal funds for the State Revolving Fund, in conformance with the provisions of the Operating Agreement and in conformance with the conditions of the Capitalization Grant Awards. Necessary and appropriate actions have been taken to assure the making of construction grant and SRF outlays, and to perform administrative completions in accordance with the agency commitments as included in the Agreement (page 71 of the FY96 Agreement). The Municipal Wastewater Assistance has reported Agency commitments to EPA (included in the “Senior Management Report” on a quarterly basis in conformance with the Office of Water’s Performance Measure number six (page 92 of the FY96 Agreement). NJDEP’s cumulative Agency commitments and actual performance levels for the first three quarters of Federal FY96 are summarized below:

NJDEP	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Construction Grant Oulays	Projected: $2,000,000 Actual: $1,500,000	Projected: $4,000,000 Actual: $5,100,000	Projected: $7,000,000 Actual: $8,700,000	Projected: $10,000,000 Actual: $15,600,000
SRF Outlays	Projected: $11,000,000 Actual: $14,100,000	Projected: $20,000,000 Actual: $24,800,000	Projected: $30,000,000 Actual: $33,500,000	Projected: $36,000,000 Actual: $40,300,000
Administrative Completions	Projected: 0 Actual: 1	Projected: 0 Actual: 1	Projected: 2 Actual: 2	Projected: 4 Actual: 2
USEPA	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Step 3/4 Close Outs	Projected: 0 Actual: 4	Projected: 2 Actual: 8	Projected: 8 Actual: 11	Projected: 18 Actual: 18

9 Progress of New Jersey in achieving comprehensive watershed programs

NJDEP has developed a comprehensive watershed management strategy that includes regulatory and non-regulatory approaches to resource protection on a watershed basis. This strategy is currently reflected in a *Statewide Watershed Management Framework Document For The State of New Jersey* by the Office of Environmental Planning. This document has been provided to EPA after internal NJDEP review. The framework document will also undergo extensive public outreach and review. NJDEP plans to adopt the final watershed management strategy by FY98.

NJDEP has established a Watershed Steering Committee and Watershed Characterization and Assessment Team to guide framework document development. The steering committee is composed of senior managers from relevant programs throughout NJDEP, while the characterization team is composed of staff bringing expertise from parallel NJDEP programs.

For management purposes, NJDEP has grouped New Jersey's 96 watersheds into 20 Watershed Management Areas and aggregated the Watershed Management Areas into five Watershed Management Regions. A draft schedule and budget for watershed management implementation is currently under review by senior NJDEP managers.

NJDEP is in Year Three of the five-year Whippany River watershed pilot project that will assist in development of the comprehensive watershed management process. The Whippany project is a collaborative effort between NJDEP and the Whippany Watershed Partnership, a 75 member advisory group representing regulated community, business, environmental and civic groups, residents, academia, and all levels of government.

In addition to the public advisory group and four working committees, the Whippany project has developed: a characterization report; project strategy and workplan; preliminary water quality and sediment study; technical workplan for in-stream and nonpoint source monitoring and modeling; and a series of public outreach events.

In future, the Whippany project will produce: a watershed assessment; steady-state model and TMDLs for Whippany River; a watershed model; definition of critical issues and elements for a watershed management plan; and ultimately, a watershed management plan.

NJDEP has initiated watershed activities in four high priority areas: the three regions included in the National Estuary Program (Barnegat Bay, Delaware Estuary , and NY/NJ Harbor Estuary) and the Passaic River Region (which includes the Whippany Watershed). NJDEP is in the process of developing water quality based effluent limitations in the Delaware and NY/NJ Harbor estuaries and the Whippany watershed.

In February 1997, NJDEP filed for adoption of water rules that facilitate implementation of watershed-based permitting. The proposed watershed-based permitting process can be used to determine which watersheds or portions thereof require further assessment through assimilative capacity analyses and ultimately will allow NJDEP to establish and allocate water quality based effluent limitations in discharge permits and to facilitate development of Best Management Practices for stormwater and nonpoint sources of pollution.

3. Enforcement & Compliance Assurance Program Performance Measures

For the Program Performance Measures listed below, EPA Region 2 will be responsible for industrial sector reporting.

Performance Measures	New Jersey Response	New Jersey Performance
1. Compliance rates by industry sectors and by media.	Air - Facility-specific compliance information for major sources will be provided through Aerometric Information Retrieval System (AIRS) WQ - NJDEP will continue to supply data to PCS. DW - NJDEP will continue to supply data to FRDS	See discussion of compliance rate, by industry sector, under "Performance Measures" in the Compliance and Enforcement section of the Cross-Cutting Issues/Programs section of this document.
2. Significant noncompliance rates by industry sector and by media.	Air - Facility-specific compliance information for major sources will be provided through AIRS WQ - NJDEP will continue to supply data to PCS. DW - NJDEP will continue to supply data to FRDS	This information is summarized in the AQ, WQ and DW sections of this Self-Assessment. See also the discussion of "Performance Measures" in the Compliance and Enforcement section (section 5) of the Cross-Cutting Issues/Programs section of this document.
3. Number of inspections conducted by the state.	Air - Facility-specific inspection information for major sources will be provided through AIRS WQ - NJDEP will continue to supply data to PCS. DW - NJDEP will continue to	This information is summarized in the AQ, WQ and DW sections of this Self-Assessment. See also the discussion of "Performance Measures" in the Compliance and Enforcement section (section 5) of the Cross-Cutting Issues/Programs section of this document.

Performance Measures	New Jersey Response	New Jersey Performance
	supply data to FRDS	
4. Number of administrative enforcement actions, number of civil judicial, and number of criminal action (a) initiated by each media and (b) concluded for each media.	Air - Facility-specific enforcement information for major sources will be provided through AIRS WQ - NJDEP will continue to supply data to PCS. DW - NJDEP will continue to supply data to FRDS	This information is summarized in the AQ, WQ and DW sections of this Self-Assessment. See also the discussion of “Performance Measures” in the Compliance and Enforcement section (section 5) of the Cross-Cutting Issues/Programs section of this document.
5. Describe up to ten state enforcement settlements in which innovative Supplemental Environmental Projects (SEPs) or injunctive relief are utilized.	Air - not applicable WQ - NJDEP will provide descriptions of SEP's utilized in the settlement of enforcement actions. DW - Not applicable	See discussion of “SEPs” in the Compliance and Enforcement section (section 5) of the Cross-Cutting Issues/Programs section of this document.
6. Average time (for each media) needed by state either to return significant violator to compliance or to issue enforceable compliance plan (starting from identification of violation).	Air - Facility-specific compliance & enforcement information for major sources will be provided through AIRS WQ - NJDEP will continue to supply data to PCS. DW - NJDEP will continue to supply data to FRDS.	Although facility-specific information is supplied to the EPA national databases, NJDEP has not separately tracked this information. See also the discussion of “Performance Measures” in the Compliance and Enforcement section (section 5) of the Cross-Cutting Issues/Programs section of this document.
7. Percent of significant violators in each media that have new or recurrent significant violations within	Air - Facility-specific compliance & enforcement information for major sources will be provided	Although facility-specific information is supplied to the EPA national databases, NJDEP has not separately tracked this information. See also the discussion of “Performance

Performance Measures	New Jersey Response	New Jersey Performance
two years of receiving a formal enforcement action.	through AIRS WQ - NJDEP will continue to supply data to PCS. DW - NJDEP will continue to supply data to FRDS.	Measures" in the Compliance and Enforcement section (section 5) of the Cross-Cutting Issues/Programs section of this document.
8. Reduction in pollutant emissions, discharge loadings, and improperly managed substances achieved by state through enforcement settlements including SEPs and injunctive relief.	Air - This information is not available. WQ - EPA needs to complete enhancements to PCS so that this measure can be reported. DW - Not Applicable	NJDEP has not previously tracked this information.
9. Describe state's compliance assistance program including: the types of assistance provided, the number and percent of facilities in industry sectors assisted through each type and an evaluation of effectiveness using available data.	Air - A description of the air program's compliance assistance activities can be found in the FY96 Self-Assessment. WQ - NJDEP will provide a narrative description of the compliance assistance program. DW - Not Applicable	See discussion of "Compliance Assistance" in the Compliance and Enforcement section of the Cross-Cutting Issues/Programs section of this document.
10. Percent of facilities seeking assistance under the Interim policy on Compliance Incentives for Small Business, which complied within the requisite correction period (180 days or 360 days with pollution prevention.	Air - This information is not available. WQ - NJDEP will work with EPA in FY96 to develop an appropriate tracking and reporting protocol.	See discussion of "Compliance Assistance" in the Compliance and Enforcement section of the Cross-Cutting Issues/Programs section of this document.

Performance Measures	New Jersey Response	New Jersey Performance
	DW - Not Applicable	

4. Pollution Prevention Performance Measures

Performance Measures	New Jersey Response	New Jersey Performance
1. The state must have integrated enforcement and compliance and pollution prevention technical assistance strategies.	This will be covered in the NJDEP Office of Pollution Prevention (OPP) Report to the New Jersey Legislature in 1996 and will be summarized for EPA.	In FY '97, NJDEP will provide compliance assistance at the request of small businesses or local government entities as part of a six-month pilot program. This assistance will be on a multi-media basis, and will stress pollution prevention strategies whenever possible. New Jersey has a technical assistance program that receives funding through OPP. It is housed at the New Jersey Institute of Technology in Newark, and provides pollution prevention assistance to businesses. (Also, see the Enforcement and Compliance Section of Cross-Cutting Issues/Programs - Item 3 of Programs Section.)
2. The state must be developing and actively implementing ecosystem or community-based environmental protection strategies.	NJDEP will summarize information on both ecosystem and community based strategies within the scope of this Agreement.	See the Community-Based Planning Section of Cross-Cutting Issues/Programs (Item 2 of Issues Section) and Sections 4.1 and 4.2 of the Land and Natural Resources Self-Assessment.
3. The state must have an established state pollution prevention program.	New Jersey Pollution Prevention Act of 1991 established a comprehensive pollution prevention program. This will be covered in OPP's Report to the New Jersey Legislature in 1996 and will be summarized for EPA.	The New Jersey Pollution Prevention Program is described in the Pollution Prevention Section of Cross-Cutting Issues/Programs (Item 1 under Programs Section).
4. The state must be carrying out multi-media activities, including multi-media inspections, permits, and/or training.	This will be covered in OPP's Report to the Legislature in 1996 and will be summarized for EPA.	Pursuant to its Pollution Prevention Law, NJDEP has a pilot program to issue facility-wide, multi-media permits to 17 industrial facilities. This program includes staff-level training. NJDEP also has a high level enforcement process team that is developing a multi-media/facility-wide approach to regular compliance inspections that includes a pollution prevention emphasis. Further, the hazardous waste compliance and enforcement program uses a multi-media checklist when doing

Performance Measures	New Jersey Response	New Jersey Performance
		inspections of generators and TSDFs.