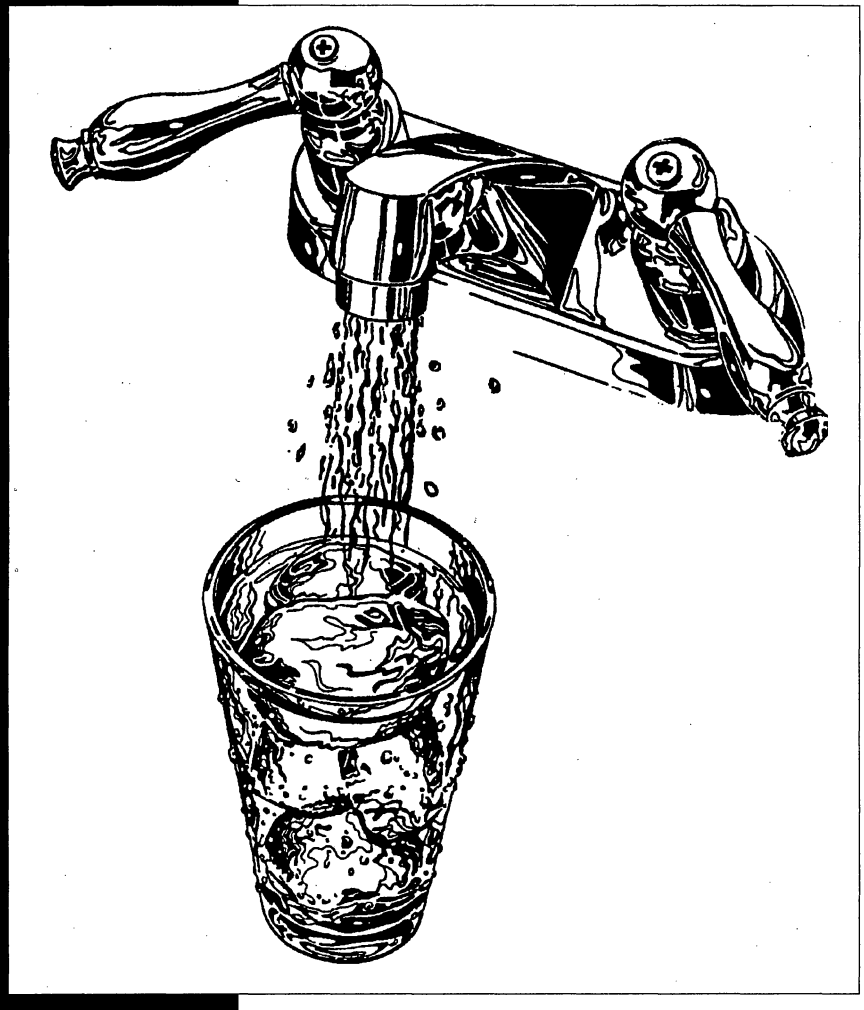
SUMMARY OF PUBLIC DRINKING WATER TEST RESULTS FOR 1991 AND 1992



NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WATER SUPPLY ELEMENT
BUREAU OF SAFE DRINKING WATER

CHRISTINE TODD WHITMAN, GOVERNOR
ROBERT C. SHINN, JR., COMMISSIONER

AUGUST 1995

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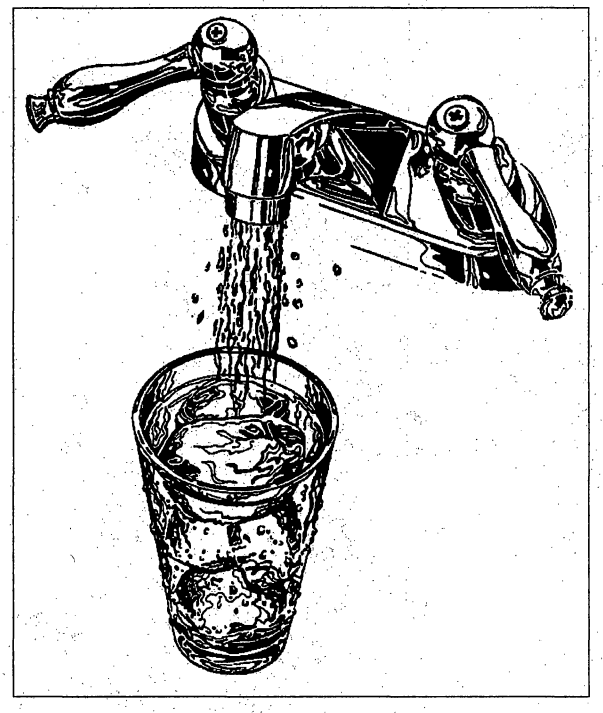

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ACKNOWLEDGMENTS

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Steve Nieswand, Administrator, Water Supply Element for his patience during the development of this document; Barker Hamill, Chief, Bureau of Safe Drinking Water, for his support and for sharing his knowledge of the New Jersey drinking water industry; the section chiefs, Bill Laffey, Vince Monaco, Phil Royer and their respective staffs for contributing in their individual areas of expertise; Leslie Sherratt, Administrative Analyst II for data retrieval and reports, and the many other individuals in the New Jersey Department of Environmental Protection who shared in making this document accurate, informative and readable.

EXECUTIVE SUMMARY

The Bureau of Safe Drinking Water (BSDW) of the New Jersey Department of Environmental Protection (NJDEP) has principal responsibility for the programs and activities under the Federal Safe Drinking Water Act and the New Jersey Safe Drinking Water Act to assure safe drinking water for both the citizens of New Jersey and visitors.

New Jersey's 636 community water systems and 4328 non-community water systems as of December 1992 were required to monitor drinking water quality according to federal regulations [40 CFR Part 141] and New Jersey regulations [N.J.A.C. 7:10-1 *et seq.*]. A community water system is defined by the US Environmental Protection Agency (USEPA) as a water system which serves at least 15 service connections used by year round residents or regularly serves at least 25 year-round residents, while a non-community water system is defined as a water system that serves at least 15 service connections or 25 persons at least 60 days of the year. Detailed definitions are presented on pages 13 and 14.

Test results are reported by public water systems to the BSDW for compliance determination with reporting requirements and the drinking water standards. Maximum contaminant levels, or MCLs, are drinking water standards developed by either the USEPA or NJDEP that are protective of health from ingesting drinking water. Major categories of contaminants monitored in public community drinking water supplies are microbiological, inorganic chemicals including lead and copper, volatile organic chemicals, pesticides, radionuclides, turbidity and total trihalomethanes (disinfection by-products).

Several major changes to the Federal Safe Drinking Water Act regulations took effect January 1, 1993. These changes have greatly expanded the scope of testing but will allow for "sampling waivers" based on the use of the regulated contaminants in the vicinity of the water sources and susceptibility of water sources to contamination. The transition period between the old regulations and new regulations caused some of the nonreporting violations discussed below.

Microbiological

In 1991 and 1992, over 20,000 and 22,000 bacteriological reports, respectively, were submitted to the BSDW from public water systems. There were reporting and maximum contaminant level (MCL) violations scattered throughout 1991 and 1992. Approximately two percent of the community water systems exceeded the acute MCL in each year and about six percent of the community water systems exceeded the monthly MCL. The majority of monthly MCL violations were recorded between June and October. Approximately 628,000 and 390,000 people were served by systems that exceeded the acute MCL and monthly MCL, respectively, in 1991. In 1992, approximately 519,000 and 575,000 people were served by systems that exceeded the acute MCL and monthly MCL, respectively. The BSDW is unaware of any diseases reported that could be attributed to drinking water

exceeding the bacteriological MCL. Reporting of test results from community water systems was generally good; improvements were seen in the reporting from non-community water systems. See pages 20 through 22 for discussion.

Inorganic Chemicals

Inorganic test results from 443 (78%) public community water systems using groundwater for the compliance period June 24, 1988 - June 23, 1991 showed scattered test results which exceeded the MCL. Surface water systems were required to monitor inorganic chemicals annually between June 24th and June 23rd of the subsequent year and showed an average of 82 percent reporting each annual interval. Due to the unusual sampling intervals for inorganic chemicals set by federal regulation, nonreporting violations were high for surface water systems. Between 1988 and 1992, no MCL violations were reported in community water systems for nitrate. Approximately one percent of non-community water systems reporting exceeded the MCL for nitrate between 1988 and 1992, however only about 30 percent of non-community water systems reported nitrate results. In 1993, sampling requirements for inorganic chemicals were finally changed so that water systems could follow a calendar year schedule.

Lead and Copper

Lead and copper monitoring requirements were modified in 1991 by federal regulations. New "action levels" that are different from "MCLs" were adopted to guide a water system's action to address lead or copper contamination at the consumer's tap. Twenty large water systems, each serving more than 50,000 people, all complied with the monitoring requirements for lead and copper in 1992, and all these systems were in compliance with the copper action level. Nine large water systems exceeded the lead action level and are proceeding with appropriate actions to achieve compliance.

Volatile Organic Contaminants

Community water systems testing semiannually for volatile organic chemicals (VOC) showed excellent monitoring compliance with 95% and 93% in 1991 and 1992, respectively, reporting test results. VOCs were monitored because of both state and federal regulations. The percentage of community water systems with a test result exceeding the MCL in 1991 increased over previous years, but dropped by 41% in 1992 when compared to 1991. This increase in VOCs in 1991 may be attributed to the use of water sources with marginal quality during 1991 when rainfall was nearly 6.5 inches below normal. The three most commonly detected VOCs in 1991-1992 were 1,1,1-trichloroethane, trichloroethylene and tetrachloroethylene. These three contaminants have been the most commonly detected contaminants since monitoring for VOCs began in 1984. In 1991-1992, 58 public community water systems exceeded VOC MCLs. In accordance with the state drinking water program, all public community water systems were required to begin remediation of drinking water quality problems within a year of confirmation.

Because of federal regulatory requirements, non-transient non-community water systems monitor for eight VOCs. In 1991-1992, 32 non-transient non-community water systems exceeded VOC MCLs.

Turbidity

The 34 suppliers of surface water had excellent compliance with the turbidity monitoring and reporting requirements.

Pesticides

All 68 public community water systems that utilize surface water were required to monitor for pesticides between June 24, 1990 and June 23, 1993. Sixty-eight percent of these supplies sampled and there were no MCL exceedences. New regulations effective January 1, 1993 dramatically changed the pesticide sampling requirements and may account for the lower than expected reporting. Ground water supplies that chose to test and submit test results also complied with the pesticide MCLs.

Radiological

Only one of the radiological parameters tested for was detected at levels above the MCL during the sampling interval June 24, 1988 through June 23, 1992. Radiological sampling compliance was 92 percent. Two water systems initially exceeded the radium 226 MCL and were resampled; no MCL violations were detected. One system continues to exceed the radium 226 MCL. Since USEPA is in the process of raising the radium 226 MCL by a factor of four, the BSDW has not recommended enforcement action against the water system.

Trihalomethanes

All 137 community water systems serving more than 10,000 people were required to sample for trihalomethanes; none exceeded the MCL. Monitoring compliance was good. In 1991 and 1992, 22 and 18 systems respectively, did not submit reports during one or more quarterly monitoring periods.

The BSDW goals are to insure that adequate prime source, treatment, pumpage, storage, transmission and distribution facilities are provided so as to produce drinking water of the highest quality and at sufficient volume and pressure to all consumers at all times. Compliance with the MCLs for regulated contaminants and adequate drinking water quality monitoring by the purveyors has been and will continue to be a major objective of the BSDW. A considerable amount of time and effort is expended promoting water of acceptable aesthetic quality, but public health concerns are the highest priority.

GLOSSARY and DEFINITIONS

A-280	1984 Amendments to the New Jersey Safe Drinking Water Act [P.L. 1983 c.443]
AL	Action level
BSDW	Bureau of Safe Drinking Water
Coliform	Resembling *Escherichia coli* or *E. coli*, the principal bacteria in the gut of warm-blooded animals.
CWS	Community water system (definition on pages 13 and 14)
DBP	Disinfection by-product
Disinfection By-Product (DBP)	Compounds formed when disinfectants such as chlorine, the most common disinfectant used for drinking water, reacts with organic matter found in raw water supplies. The group of DBPs that are presently regulated are called trihalomethanes. Also see THM and TTHM.
E. coli	*Escherichia coli*: A bacteria normally found in the lower bowel of humans and other warm blooded animals.
Ground Water Under the Direct Influence of Surface Water	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* or, 2) significant and relatively rapid shifts in characteristics such as turbidity, temperature, conductivity or pH which closely correlate to climatological or surface water conditions.
Hazardous Contaminant	In this document, volatile organic compounds, chlordane and PCBs constitute "hazardous contaminants."
Inorganic	The chemical elements or chemical compounds not usually classified as organic, not hydrocarbons or their derivatives. In the context of this report, metals, fluoride and nitrates[ites].
MCL	Maximum contaminant level
MCLG	Maximum contaminant level goal
mg/l	Milligram per Liter (see par. 3, page 18)
NAS	National Academy of Sciences

NCWS	Non-community water system (definition on pages 13 and 14)
NJDEP	New Jersey Department of Environmental Protection
NPDWR	National Primary Drinking Water Regulations
NTNCWS	Non-transient non-community water system (definition on pages 13 and 14)
Organic	The chemistry of carbon compounds, and/or derived from living organisms. In the context of this report, for other than a few exceptions, compounds containing hydrogen and carbon (hydrocarbons).
pCi	Picocurie - A quantity of radioactive material producing 2.22 nuclear transformations per minute.
pCi/l	Picocuries per liter
Public Notification	The owner or operator of a public water system which fails to comply with an applicable MCL shall notify persons served by the system by publication in a newspaper and by mail delivery. For MCL violations of contaminants that may pose an acute risk to human health such as nitrate/nitrite or coliform bacteria, a copy of the notice is to be furnished to radio and television stations serving the area served by the public water system. Continuous posting of a violation notice in a conspicuous place is sometimes acceptable for non-community water systems. See 40 CFR 141.31 for a more complete definition.
PWS	Public water system (definition on pages 13 and 14)
SDWA	Safe Drinking Water Act
SOC	Synthetic Organic Chemical
Symbols	< Less than
	<= Less than or equal to
	> More than
	>= More than or equal to

THM Trihalomethane: One of the family of organic compounds, named as derivatives of methane, wherein three of the four hydrogen atoms in methane are each substituted by a halogen (i.e., fluorine, chlorine, bromine or iodine) atom in the molecular structure. See TTHM.

TNCWS Transient non-community water system (definition on pages 13 and 14)

TTHM Total trihalomethanes: The sum of the concentration in milligrams per liter of the trihalomethane compounds (trichloromethane [chloroform], dibromochloromethane, bromodichloromethane and tribromomethane [bromoform]). See above definition of "disinfection by-products."

ug/l Microgram per Liter (see paragraph 3, page 18).

USEPA United States Environmental Protection Agency

VOC Volatile Organic Chemical

Water Systems are defined as follows according to federal regulations [40 CFR 141.2]:

Non-public or domestic water system: a system that serves less than 15 service connections or less than 25 people on a regular basis, or a system that operates less than 60 days a year.

Public water system (PWS): a system for the provision to the public of piped water for human consumption, if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year.

Public systems are further defined as community or non-community.

Community water system (CWS): a water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

Non-community water system (NCWS): a water system that serves at least 15 service connections or 25 persons at least 60 days of the year. Examples of non-community water systems are a school and a restaurant.

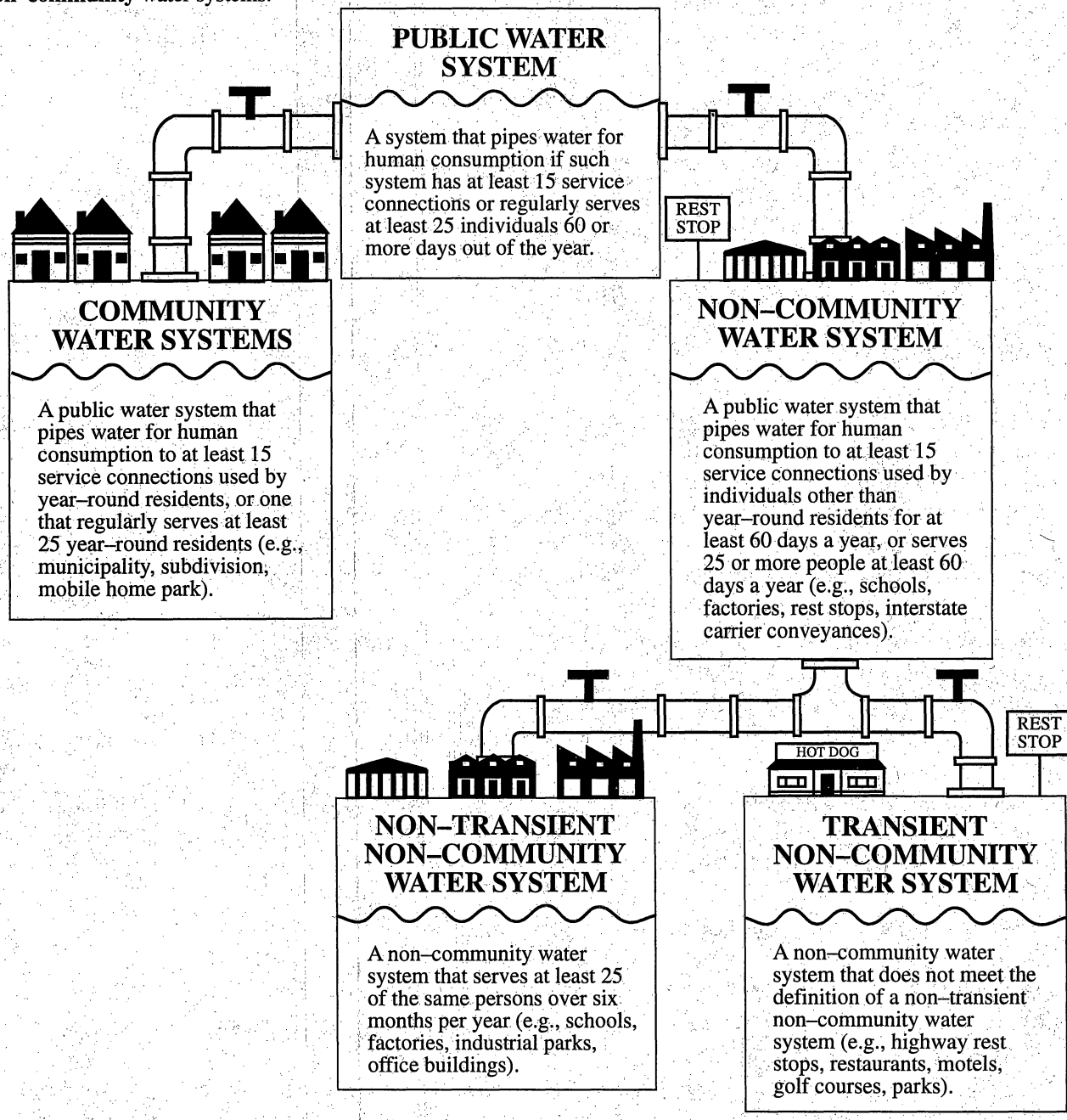
There are two types of non-community water systems.

Transient non-community water system (TNCWS); a public water system that serves a population that generally utilizes the water source for a short period of time. An example of this type of system is a restaurant.
Non-transient non-community water system (NTNCWS); a public water system that regularly serves at least 25 of the same persons over 6 months per year. An example of this type of system is a school.

FIGURE 1

Types of Public Water Systems

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



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

SUMMARY OF DRINKING WATER TEST RESULTS FOR 1991 and 1992

I. INTRODUCTION

The Bureau of Safe Drinking Water (BSDW) in the Water Supply Element of the New Jersey Department of Environmental Protection (NJDEP) has prepared this "Summary of Public Drinking Water Test Results for 1991 and 1992" in accordance with N.J.S.A. 58:12A-19. The purpose of this report is to summarize and analyze the results and effects of the testing program mandated by the 1983 amendments to the New Jersey Safe Drinking Water Act and make recommendations concerning Safe Drinking Water Act activities. As well, we hope to inform the interested public and regulated community of the quality of New Jersey drinking water. This report provides an analysis of the water quality, violations, and enforcement actions from two general types of public water systems: community water systems and non-community water systems. The non-community water systems are further categorized into transient non-community water systems and non-transient non-community water systems. The monitoring regulations in effect in 1991-1992 were nearly equivalent for both types of non-community systems. Figure 1 shows the categories of water systems.

New Jersey regulates drinking water supplies under the authorities of the federal [Pub.L. 93-523 as amended by the SDWA Amendments of 1986] and the New Jersey Safe Drinking Water Act [N.J.S.A. 58:12A-1 *et seq.*]. Regulations are found in 40 CFR Parts 141, 142 and 143 and N.J.A.C. 7:10-1 *et seq.*, respectively. National Primary Drinking Water Regulations are automatically adopted into New Jersey regulations by reference. The United States Environmental Protection Agency (USEPA) coordinates federal Safe Drinking Water Act activities. The NJDEP BSDW is the primacy agency for the federal regulations in New Jersey and implements the N.J. Safe Drinking Water Act. Tables 1 and 2 outline the sampling requirements for community and non-community water systems during 1991 and 1992. The sampling schedule that became effective January 1, 1993 can be found in Appendix A.

The BSDW is supported in its role by the NJDEP's Water and Hazardous Waste Enforcement Element, Division of Environmental Safety Health and Analytical Program (laboratories and quality assurance certification), Division of Science and Research (scientific and technical information) and Bureau of Revenue (operator certification and training), the Department of Health's Laboratories and Environmental Health Services (scientific and technical information) and delegated regional health offices.

TABLE 1
SAMPLING REQUIREMENTS FOR MAJOR CONTAMINANT CATEGORIES IN COMMUNITY WATER SYSTEMS [1991-1992 (a)]

Contaminant	Sampling Frequency	Number of Systems Required to Sample
1. Microbiological	Monthly	636 (b)
2. Turbidity	Daily	31 (b)
3. Inorganic		
Surface Water	Annual [e.g. June 24, 1991 - June 23, 1992]	68
Groundwater	Once per 3 Years [e.g. June 24, 1988 - June 23, 1991]	568 (b)
4. Lead and Copper	Jan. 1, 1992 - June 30, 1992 July 1, 1992 - Dec. 31, 1992	20 (c)
5. Volatile Organic Contaminants	Semi-annual [e.g. Jan. 1, 1991 - June 30, 1991]	577
6. Pesticides	Once per 3 years [e.g. June 24, 1990 - June 23, 1993]	68
7. Radionuclides	Once per 4 years [e.g. June 24, 1988 - June 23, 1992]	636
8. Total trihalomethanes	Quarterly	137 (b)

(a) The sampling schedules for many of the contaminants do not correspond to calendar years 1991 and 1992. The dates that most closely match up with the calendar years are listed and are discussed in this report.

(b) For this report, there are 636 community water systems; 68 serve surface water (from 31 suppliers) and 568 serve groundwater. 59 community water systems bulk purchase water and 577 community water systems serve potable water from their own sources. 137 community water systems serve greater than 10,000 people.

(c) Lead and copper regulations applied to the 20 systems each serving more than 50,000 people during 1991 and 1992. The medium sized systems (3,300 to <=50,000) began to sample July 1, 1992.

TABLE 2
SAMPLING REQUIREMENTS FOR MAJOR CONTAMINANT CATEGORIES IN NON-COMMUNITY WATER SYSTEMS [1991 - 1992]

Contaminant	Sampling Frequency	Number of Systems Required to Sample
1. Microbiological	Quarterly	4,499 / 4,328 (b)
2. Turbidity	Daily	3 (c)
3. Nitrate	Once per 3 Years (a) [e.g., June 24, 1988 - June 23, 1991]	4,630 (d)
4. Volatile Organic Contaminants	Once per 5 Years [i.e., First Sample by Jan. 1, 1991]	1,324 / 1,307 (b)

(a) The sampling schedule for nitrate does not correspond to calendar years 1991 and 1992. The dates that most closely correspond are shown above.

(b) The number of non-community water systems changes each year due to factors such as change in ownership, type of business, etc. Table 3 provides a summary of the number of active systems on December 31, 1991 and December 31, 1992. Both 1991 and 1992 figures are presented here: 4,499 / 4,328 transient non-community systems and 1,324 / 1,307 non-transient non-community systems.

(c) Three non-transient non-community water systems use surface water.

(d) The number of active non-community systems on June 30, 1991 was 4,630.

II. DRINKING WATER STANDARDS IN NEW JERSEY

Standards for drinking water quality are called MCLs and are the maximum permissible levels set by either the USEPA or the NJDEP of a contaminant in public drinking water. Contaminants added to the water under circumstances controlled by the user, such as water softening units, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition.

MCLs are grouped into the following categories of contaminants: microbiological, turbidity, inorganic chemicals including lead and copper, volatile organic chemicals, pesticides, radionuclides and trihalomethanes. All of the MCLs in effect in New Jersey are adopted from federal regulation except for 17 synthetic organic MCLs developed by New Jersey as a result of the 1984 amendments to the N.J. Safe Drinking Water Act. These amendments are commonly referred to as "A-280" amendments. According to New Jersey Statute [N.J.S.A. 58:12A-13(b)], when standards are developed by both federal and state drinking water agencies, the more stringent regulation applies. A complete list of regulated contaminants and MCLs are listed in Appendix B.

The MCLs are usually expressed as milligrams per liter [mg/l] or micrograms per liter [ug/l]. These units are equivalent to parts per million and parts per billion, respectively. Converting milligrams per liter and micrograms per liter into other scales can better clarify the minuscule quantities about which you are reading:
One milligram per liter [mg/l] = one part per million = one cent in $10,000 or one second in 12 days.
One microgram per liter [ug/l] = one part per billion = one cent in $10,000,000 or one second in 32 years.

Another way that the USEPA regulates drinking water is through "action levels" [AL]. To date, ALs have been established for lead and copper only. An AL is not an MCL. The ALs are the measurements used for stating the concentration of lead and copper in public drinking water supplies that, if exceeded, determines whether a water system must install corrosion control treatment, monitor source water, replace lead service lines and undertake a public education/notification program. Lead and copper will be discussed in a separate section of this report.

In 1991 and 1992, community water systems were required to monitor and comply with all contaminants regulated by the N.J. Safe Drinking Water Act regulations. Transient and non-transient non-community water systems monitored for bacteriological contaminants and nitrate; the non-transient water systems were also required to monitor for eight volatile organic contaminants.

III. PUBLIC WATER SYSTEMS IN NEW JERSEY

As of December 1992, there were 636 community water systems in New Jersey, of which 68 serve surface water (31 are surface water suppliers, 37 purchase and resell surface water) and 568 serve ground water. The 20 largest community water systems serve about 50% of the state's estimated 1992 population of 7,752,552. Of these 20 community water systems, 13 deliver mainly surface water to consumers and the remaining seven serve mainly groundwater.

There were 4,328 non-community systems in New Jersey as of December 31, 1992: 1,307 were non-transient supplies and 3,021 were transient supplies. Table 3 contains information on non-community systems in New Jersey. All but three of the non-community supplies utilize groundwater sources.

The number of non-community water systems changes because of the addition or deletion of systems in the BSDW's public water system inventory. Reasons for changes in the inventory include the opening and closing of businesses, hook-ups with community water systems or a change in use that results in fewer than 25 people being served.

TABLE 3

ACTIVE NON-COMMUNITY WATER SYSTEMS

	DEC. 1991	DEC. 1992
NON-TRANSIENT NON-COMMUNITY WATER SYSTEMS	1,324	1,307
TRANSIENT NON-COMMUNITY WATER SYSTEMS	3,175	3,021
TOTALS	4,499	4,328

IV. MICROBIOLOGICAL QUALITY

[40 CFR 141.21; 141.52; 141.63; 142.63]

Public water systems in New Jersey analyze the water delivered to the consumer for coliform bacteria. These bacteria are common in the environment and are not generally harmful. Coliform bacteria are monitored because their presence indicates the possible presence of pathogenic organisms. Sources of coliform bacteria in drinking water include the source water, the treatment process itself such as improper filter backwashing or the growth of organisms in the distribution system. Waterborne bacterial diseases include cholera and typhoid, which can cause diarrhea, nausea and vomiting, ranging from mild to severe in intensity, and death.

The number of samples that a community water system analyzes per month depends on the population served. The number of samples taken by community water systems in New Jersey ranges from one sample per month to 240 samples per month. Samples must be taken at regular intervals throughout the month at different locations throughout the water distribution system except that a system serving 4,900 people or fewer may collect all samples on a single day. If a water system bulk-purchases water, the bacteriological quality of the water is monitored as if the water was derived from the water utility's own wells or reservoirs.

All community water systems are required to disinfect the water supply, except that systems serving 100 or less service connections, with BSDW approval, can be exempted from this requirement if one additional bacteriological sample is taken biweekly per month.

There are 235 community water systems that serve less than 100 service connections, of which about half do not disinfect the water supply. The vast majority of non-transient non-community water systems do not provide disinfection.

Of the 4,328 non-community water systems, the vast majority sample quarterly for bacteriological quality. Only those systems which serve more than 1,000 people (61 non-community water systems) or those which use surface water (three non-community water systems) are required to monitor monthly. If the BSDW makes a determination that a non-community system utilizes groundwater under the direct influence of surface water, these systems will be required to sample at the same frequency as the like-sized community system.

A. REPORTING

Community water systems and non-community water systems are required to summarize their bacteriological analytical results and report this information to the BSDW; community water systems on a monthly schedule and non-community water systems quarterly. Over 7,200 bacteriological reports were received from community water systems annually in 1991-1992. According to the Safe Drinking Water Act regulations, these reports must be submitted

within the first 10 days of the month following the month when the samples were taken. Those supplies that do not submit bacteriological summary reports on time are sent reminder letters. Frequently, copies of test results are received immediately after our deadline for receipt, suggesting that the proper tests were performed but the results were mailed late, delayed in the mail, and in some instances, the water utility neglected to forward the test results to the BSDW. During 1991 and 1992, the BSDW sent an average of 40 reminder letters per month to community water systems when test results were not received on time.

In 1991, 67 community water systems were responsible for 225 reporting violations, and in 1992, 64 community water systems accounted for 201 reporting violations. Twenty-three community water systems had reporting violations in both years. Over half of these violations were single month nonsubmittal violations. Violators not responding to reminder telephone calls or reminder letters were reported to the Enforcement Element for appropriate action.

For non-community supplies, over 13,000 and 15,000 summary reports were submitted in 1991 and 1992, respectively. Reminder letters were sent out on a quarterly basis since these supplies are required to sample quarterly. The number of reminder letters decreased from approximately 2,500 sent in early 1991 to approximately 800 at the end of 1992 as more water utilities began to comply with the state monitoring and reporting requirements. The number of non-community systems that did not submit any test results decreased from 723 in 1991 to 384 in 1992.

B. MCL

The BSDW puts a great amount of effort into insuring that the bacteriological quality of drinking water is acceptable because of the acute nature of bacteriological contamination. The absence of coliform bacteria is used to indicate acceptable bacteriological quality. If a routine test is total-coliform positive, a minimum of three follow up samples must be performed within 24 hours of receiving the result. The resampling locations are as follows: one sample taken at the site of the positive sample, one sample taken within 5 service connections upstream of the positive bacteria location and one sample taken within 5 service connections downstream of the positive test result location. If one or more of the repeat samples test positive, an additional set of repeat samples must be collected; this process must be repeated until total coliforms are not detected in one complete set of repeat samples or the system determines that the MCL has been exceeded. In addition, any total coliform positive samples must be tested for the presence of fecal coliforms or *Escherichia coli* (*E. coli*).

The two types of microbiological violations that are monitored by the state are "acute MCL violation" and "monthly MCL violation." An acute violation occurs when either *E. coli* or fecal coliform is detected in the first sample and the repeat sample is positive for either *E. coli* or fecal coliform bacteria as well. A monthly MCL violation occurs when too many samples are positive for coliform bacteria - either five percent of the samples for systems taking more than 40 samples per month or no more than one positive for systems taking less

than 40 samples per month. Mandatory language developed by USEPA must be included in public notification announcements.

In 1991 and 1992, 12 (2%) community water systems annually exceeded the acute MCL. The monthly MCL was exceeded by 34 (5%) community water systems in 1991 and 41 (6%) community water systems in 1992, with the majority of acute MCL violations occurring between June and October of each year. Public notification was required [40 CFR 141.32] for all public water systems that exceeded this standard. The BSDW is unaware of any diseases reported that could be attributed to drinking water exceeding the bacteriological MCL.

In 1991 and 1992, the bacteriological MCL violations in New Jersey occurred mainly in the smaller water systems and reporting violations occurred mainly in small to mid-size water systems. Many of these monitoring violations are attributable to changes in ownership of these smaller water utilities, or to operational problems. The violations that resulted from insufficient sampling most often occurred in larger systems because of increases in population that automatically trigger an increase in the number of monthly bacteriological tests required.

V. TURBIDITY

[40 CFR 141.13; 141.22]

Only surface water suppliers are required to test for turbidity in New Jersey. Turbidity is a measure of the "cloudiness" of water and is caused by suspended inorganic and organic particles. Turbidity is an important parameter to measure because the suspended particles can interfere with the disinfection process. Appendix B lists the MCL.

Daily test results of the water leaving the treatment plant must be reported to the BSDW by the tenth day of the month following the month in which the samples were taken. There are three types of turbidity violations that can occur: exceedence of the daily average MCL/monthly average MCL, late submittal or non-submittal of test results, or insufficient number of samples. Only one of the 31 public community water supplies that provides surface water in New Jersey exceeded the monthly average MCL for turbidity during one month in 1991. During the two year period from 1991 and 1992, nine water supplies did not submit test results for turbidity during one of the months and eight water supplies did not perform sufficient sampling for turbidity. These violations were considered to be minor and did not result in enforcement referral.

The three non-community surface water supplies complied with the MCL and monitoring regulations for turbidity.

VI. INORGANIC CHEMICALS
[40 CFR 141.11; 141.62]

In 1991 and 1992, ten inorganic MCLs were in effect for all public community water systems. Appendix B contains a listing of these contaminants and the MCLs. The monitoring frequency depended on the source of the water. Community water systems serving surface water monitored annually, regardless of how large or small a population served. Tests for the ten inorganic contaminants in drinking water had to be conducted between June 24th and June 23rd of the following year. This coincided with the effective date of June 24, 1977 for the National Interim Primary Drinking Water Regulations.

Community water systems utilizing ground water were required to complete their first round of inorganic sampling by June 23, 1979, then repeat the monitoring at three year intervals. The sampling interval for ground water systems is June 24, 1988 through June 23, 1991. The sampling location for inorganic contaminants in 1991 and 1992 is in the water distribution system representing the water quality delivered to the consumer.

A. REPORTING

Between June 24, 1988 and June 23, 1991, the mandated reporting period for systems serving ground water, there were 443 [78%] public community water systems who reported the results of inorganic testing of 568 groundwater systems required to test. The next reporting cycle for ground water purveyors began June 24, 1991 and was scheduled to end on June 23, 1994. Changes in the federal regulations changed the reporting period to January 1, 1993 through December 31, 1995 [Phase II, 56 FR 20, 3579, Jan. 30, 1991; Phase IIB, 56 FR 126, 30266, July 1, 1991; Phase V, 57 FR 138, 31838, July 17, 1992]. Between June 24, 1991 and December 31, 1992, 230 water systems reported inorganic test results. An average of 82 percent of the 68 surface water systems reported test results annually between 1988 and 1992.

The only inorganic compound that non-community water systems were required to monitor for in 1991-1992 was nitrate. Non-community systems delivering ground water were required to sample once between June 24, 1988 through June 23, 1991; only 32 percent of systems reported results. The next sampling period began on June 24, 1991 and ended on December 31, 1992 because of a change in sampling rules; 30 percent of non-community water systems submitted test results.

Three non-community systems delivered surface water during the period June 24, 1990 through December 23, 1992. They were required to sample for nitrate on an annual basis between June 24th and June 23rd of the following year. None reported nitrate test results.

B. MCL

The numbers of community water systems serving ground water with MCL exceedences for inorganic chemicals from June 24, 1988 through December 31, 1992 are presented in Table 4. Since testing for inorganic chemicals in surface water was performed on an annual basis, results since June 24, 1988 or five rounds of test results are presented in Table 5. There were fewer surface water systems with inorganic contamination than ground water systems, though the percentages of surface water and ground water systems exceeding the MCL are similar. There were no exceedences of chromium, nitrate, and silver MCLs between 1988 and 1992 in community water systems.

TABLE 4

INORGANIC CHEMICALS
COMMUNITY WATER SYSTEMS WITH MCL EXCEEDENCES
GROUND WATER

	JUNE 24, 1988-JUNE 23, 1991	JUNE 24, 1991-DEC. 31, 1992
CHEMICAL	>MCL	>MCL
Arsenic	0	1
Barium	5	4
Cadmium	4	6
Chromium	0	0
Lead	4	1
Mercury	8	3
Nitrate[N]	0	0
Selenium	3	0
Silver	0	0
Fluoride	1	0
TOTAL	25* (6%)	15* (3%)

*When an MCL was exceeded, the water system was required to take three check samples within a month. The average of four samples was compared to the drinking water standard to determine if there was an MCL violation. The above totals represent MCL violations because either check samples were not taken during the prescribed time, or check samples were taken but the average of the four samples was still above the MCL. The above numbers represent numbers of water systems with violations.

TABLE 5
INORGANIC CHEMICALS
NUMBER OF COMMUNITY WATER SYSTEMS WITH MCL EXCEEDENCES
SURFACE WATER

[all dates are from June 24th through June 23rd]

CHEMICAL	88-89 >MCL	89-90 >MCL	90-91 >MCL	91-92 >MCL	92-93 >MCL
Arsenic	0	0	0	0	0
Barium	0	2	1	0	0
Cadmium	1	0	0	0	0
Chromium	0	0	0	0	0
Lead	1	0	0	1	0
Mercury	0	0	0	0	0
Nitrate[N]	0	0	0	0	0
Selenium	1	0	1	0	0
Silver	0	0	0	0	0
Fluoride	0	0	0	0	0
TOTALS	3*(5%)	2*(4%)	2*(3%)	1*(2%)	0*

*When an MCL was exceeded, the water system was required to take three check samples within a month. The average of four samples compared to the drinking water standard determines if there is an MCL violation.

Approximately one percent of the non-community systems reporting nitrate results exceeded the MCL. Between June 24, 1988 and June 23, 1991, and between June 24, 1991 and December 31, 1992, 14 and 10 non-community water systems, respectively, exceeded the MCL. Non-community water systems are generally more susceptible to contamination by agricultural activities and septic tanks because the wells are usually more shallow than those of municipal systems.

VII. LEAD and COPPER

[40 CFR 141.80 through 141.91]

A. BACKGROUND

Lead and copper differ from other drinking water contaminants because they generally do not occur in significant amounts in source water, but rather occur as a result of the corrosive action of the water in contact with plumbing materials containing lead and copper. Lead and copper are being reported separately in this report rather than being grouped with the other regulated inorganic contaminants because new USEPA regulations (promulgated June 7, 1991, with an effective date of December 7, 1992) now regulate lead and copper differently than the other inorganic chemicals. These regulations establish a treatment technique that includes requirements for corrosion control treatment, source water treatment, lead service line replacement and public education. These requirements are triggered by lead and copper action levels measured in samples collected at consumers' taps.

The lead action level is exceeded if the concentration of lead in 10 percent of tap water samples collected during any monitoring period is greater than 0.015 mg/l (i.e., if the "90th percentile" lead level is greater than 0.015 mg/l). The copper action level is exceeded if the concentration of copper in 10 percent of tap water samples collected during any monitoring period conducted in accordance with the regulations is greater than 1.3 mg/l (i.e., if the "90th percentile" copper level is greater than 1.3 mg/l)."

Under the regulations in effect prior to December 7, 1992, the MCL for lead was 0.05 mg/l [40 CFR 141.11(b)]. Lead was monitored according to the same schedule as the other inorganic chemicals described above. For copper, there was a nonenforceable state secondary drinking water regulation of 1.0 mg/l. A taste consideration, rather than toxicity, was the basis for the copper limit of 1.0 mg/l.

Even though the effective date of these new regulations was December 7, 1992, the regulations specified two consecutive initial sampling periods, each six months long, beginning in early 1992 for community water systems and non-transient non-community water systems. Sampling periods began January 1, 1992 for systems serving more than 50,000 people; July 1, 1992 for systems serving 3,301 to 50,000; and July 1, 1993 for systems serving 3,300 or fewer people. During the time frame of this report [1991 and 1992], both old and new regulations were in effect.

Strict sampling regulations apply for lead and copper monitoring. The drinking water samples for lead and copper are first draw tap samples of one liter (about a quart) in volume that have remained motionless in the plumbing system of each sampling site for at least six hours.

B. REPORTING

The 20 public water systems serving more than 50,000 people complied with the lead and copper reporting requirements in 1992 and none of these large supplies exceeded the copper action level.

C. ACTION LEVEL

The lead action level was exceeded by nine and seven water systems, respectively, during the two, six month sampling periods in 1992. These water utilities are required to establish, as prescribed by federal regulations, a treatment technique that includes corrosion control treatment, source water treatment, lead service line replacement, and public education as a result of exceeding the lead action level. Lead monitoring results from large systems are presented in Table 6; copper monitoring results from large systems are presented in Table 7.

TABLE 6

LEAD MONITORING and ACTION LEVEL COMPLIANCE
LARGE SYSTEMS [supplying >50,000]

	JAN.- JUNE 1992	JULY - DEC. 1992
# CWS Reporting	20	20
# CWS Required to Report	20	20
% Monitoring Compliance	100 %	100 %
# CWS AL > 0.015mg/l	9 *	7 *
% CWS AL > 0.015mg/l	45 %	35 %
# Samples Reported	2038	2123
# Samples Expected	1640	1640
# Samples AL > 0.015mg/l	238	241

* In the first sampling round, eight of the nine water systems that exceeded the lead action level supplied surface water. In the second round, five of the seven were surface water suppliers. Three surface water suppliers exceeding the action level in the first round tested less than the action level in the second round.

TABLE 7

COPPER MONITORING AND ACTION LEVEL COMPLIANCE
LARGE SYSTEMS [supplying >50,000]

	JAN.- JUNE 1992	JULY - DEC. 1992
# CWS Reporting	20	20
# CWS Required to Report	20	20
% Monitoring Compliance	100 %	100 %
# CWS AL > 1.3mg/l	0	0
% CWS AL > 1.3mg/l	0 %	0 %
# Samples Reported	2038	2123
# Samples Expected	1640	1640
# Samples AL > 1.3mg/l	6	9

III. VOLATILE ORGANIC CHEMICALS
[N.J.S.A. 58:12A, N.J.A.C. 7:10-14,16]

A. REPORTING

Nearly all of the approximately 636 public community water systems must submit test results for 17 volatile organics, chlordane and PCBs semi-annually (hazardous contaminants). The 59 water utilities that bulk purchase their source water are on a slightly modified schedule. Purveyor compliance with the hazardous contaminant testing requirements is very good. In 1991, 95% of the community water systems and in 1992, 93% of the community water systems conducted the required hazardous contaminant testing.

B. WATER QUALITY EVALUATION

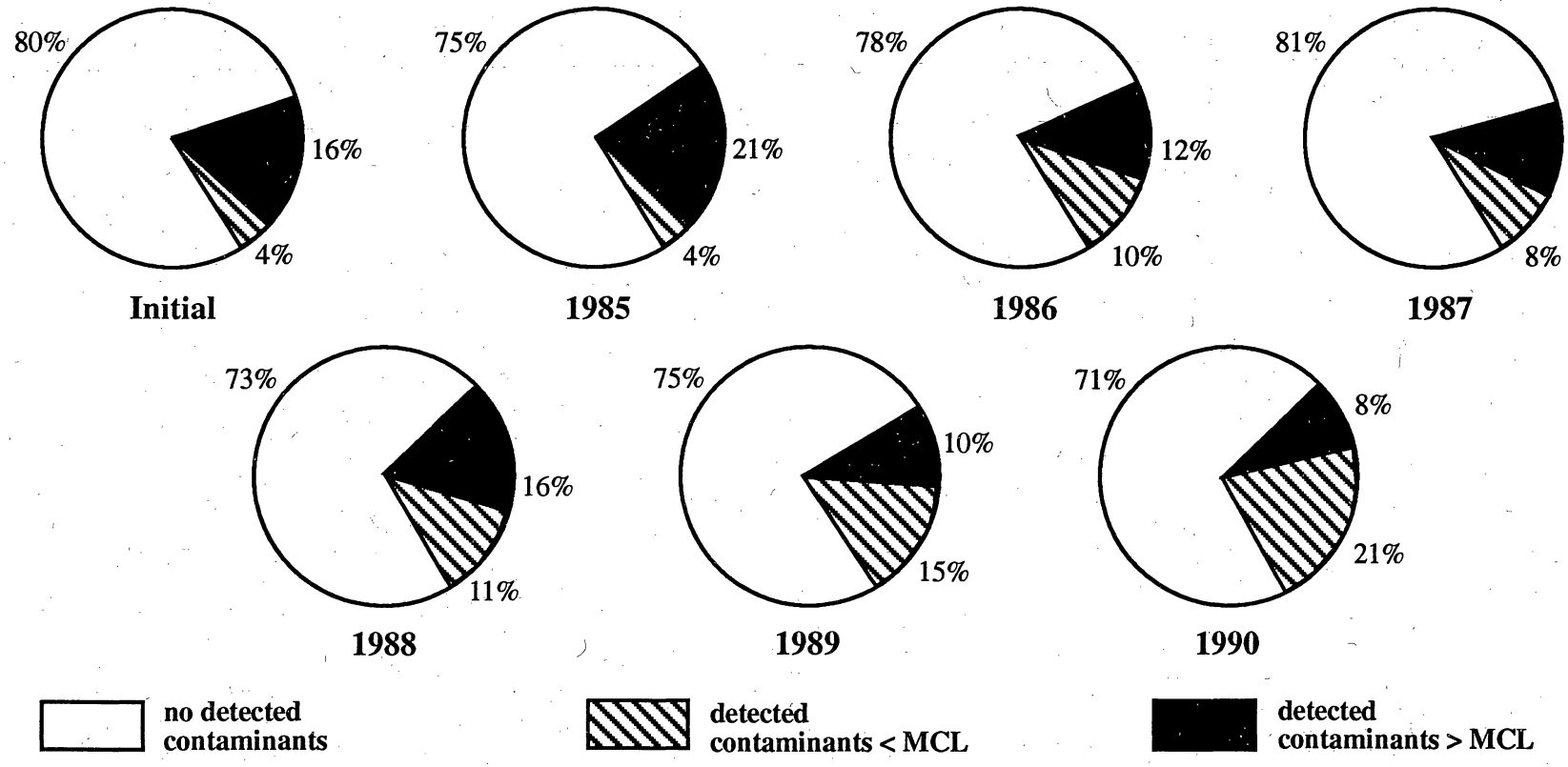
Figure 2 and Figure 3 show the distribution of public community water systems that detected one or more of the hazardous contaminants above the MCL; between the detection limit and the MCL; and below the detection limit. The hazardous contaminants or "A-280" contaminants are listed in Table 8 on page 27. The detection limit for these hazardous contaminants is 0.5 ug/l. If a water system detected a single contaminant in either of the two semi-annual monitoring intervals at a concentration exceeding the MCL, then the public community water system was placed in the "greater than MCL" category, although the test result may not have been confirmed by subsequent testing.

This type of analysis has been performed annually since A-280 monitoring began in 1984 and past data are reported in "Assessing New Jersey's Drinking Water Quality, A Status Report on the Implementation of the New Jersey Safe Drinking Water Act (1984-1990)." Figure 3 presents the distribution of public community water systems reporting hazardous contaminants in 1991 and 1992. When compared to previous data, the number of public community water systems exceeding the MCL in a single sample in 1991 and in 1990 is the same; however, the number of public community water systems reporting detectable contamination less than the MCL increased by five percent in 1991 over 1990 levels.

Most of the large community water systems serving surface water are in northeast New Jersey. During 1991, total precipitation in northeast New Jersey was 6.47 inches below the long term normal rainfall of 47.57 inches (see Appendix C) and a drought warning, the precursor to a drought emergency, was declared for the Delaware River Basin. When rainfall is below normal, water utilities, especially those that rely on surface water, sometimes need to turn to ground water sources with marginal water quality to supply customer demand. This might be one explanation for the increased low level contamination reported by public community water systems in 1991. In 1992, rainfall was within an inch of normal, and consequently, the number of water systems with samples exceeding the MCL and reporting low level contamination decreased to levels lower than reported in 1990.

FIGURE 2

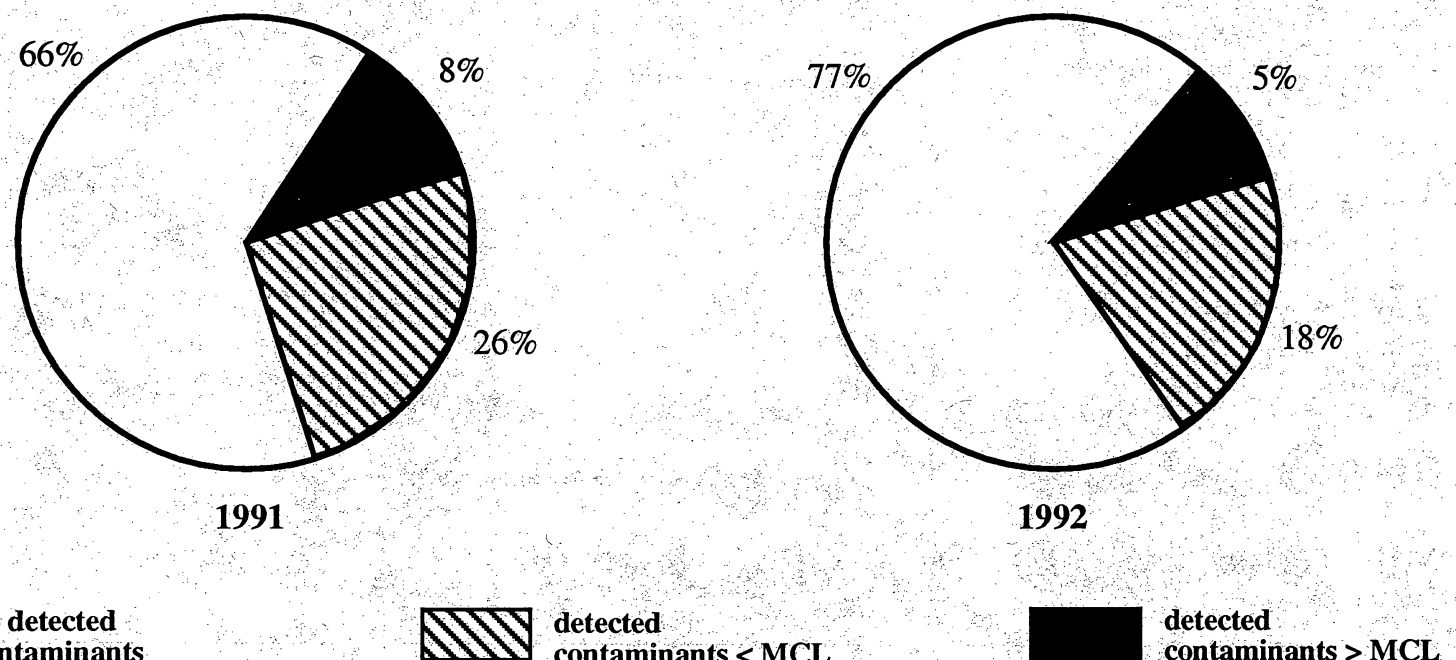
Distribution of Public Community Water Systems Reporting Detectable Levels of Hazardous Contaminants 1984-1990



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

FIGURE 3

Distribution of Public Community Water Systems Reporting Detectable Levels of Hazardous Contaminants 1991-1992



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

The most frequently detected contaminants in public community water systems during 1991 and 1992 were 1,1,1-trichloroethane, trichloroethylene, tetrachloroethylene and methylene chloride, as listed in Table 8. This is consistent with the A-280 VOC data reported to date, although the frequency of the top three contaminants has shown some variation. The fifth most frequently detected contaminant in 1984-1990, trans-1,2-dichloroethylene, was not detected in 1991 or 1992, but its isomer, cis-1,2-dichloroethylene, became the fifth most frequently detected contaminant.

In 1991, the percentage of detections (1.3%) compared to the number of screened analytical results, and in 1992, the percentage of detections (0.9%) compared to the number of screened analytical results was extremely low. There was a significant decrease in hazardous contaminant detections and MCL exceedences from 1991 to 1992. The decrease in number of detections of hazardous contaminants is indicative of an increase in drinking water quality.

Table 9 shows the number of analyses that exceeded the MCL in each county, total number of analytical results analyzed, and the number of systems that had a result that exceeded the MCLs. There was a 41% decrease in the number of samples that exceeded the New Jersey MCLs for VOCs between 1991 and 1992. It is important to keep in mind that all MCL exceedences are to be followed by three check samples and the average of the numbers are compared to the MCL to determine if there was an MCL violation. In 1991, of the 45 systems that had an MCL exceedence, 37 had an MCL violation, and in 1992, of the 28 systems with an MCL exceedence, 21 had an MCL violation. The number of public community water systems that exceeded the MCL in 1991 and 1992, and were required to go on public notification and correct their drinking water quality problems within a year, were 37 and 21, respectively.

Non-transient non-community water systems were required by federal regulation to monitor for eight volatile organic compounds, to begin no later than January 1, 1991. Results are shown in Table 10. Groundwater systems were required to sample quarterly at the point of entry to the distribution system. If the first quarterly sample had no detectable level of VOCs, sampling at that entry point to the distribution system was complete, and the monitoring was to be done no less frequently than every five years.

TABLE 8

HAZARDOUS CONTAMINANT ANALYTICAL RESULTS BY CONTAMINANT FOR COMMUNITY WATER SYSTEMS

A-280	CONTAMINANT	NUMBER OF ANALYTICAL RESULTS			
		1991 DETECTS*		1992 DETECTS*	
		>0.5 ug/l	>MCL	>0.5 ug/l	>MCL
1.	BENZENE	5	2	5	1
2.	CARBON TETRACHLORIDE	9	1	7	1
3.	CHLORDANE	0	0	0	0
4.	CHLOROBENZENE	0	0	0	0
5.	o-DICHLOROBENZENE	2	0	5	0
	m-DICHLOROBENZENE	1	0	1	0
	p-DICHLOROBENZENE	10	0	1	0
6.	1,2-DICHLOROETHANE	7	2	6	0
7.	1,1-DICHLOROETHYLENE	8	3	11	2
8.	cis-1,2-DICHLOROETHYLENE	25	1	14	0
9.	trans-1,2-DICHLOROETHYLENE	0	0	0	0
10.	METHYLENE CHLORIDE	37	13	7	2
11.	POLYCHLORINATED BIPHENYLS	0	0	0	0
12.	TETRACHLOROETHYLENE	45	27	55	22
13.	TRICHLOROBENZENES	3	0	0	0
14.	1,1,1-TRICHLOROETHANE	105	1	70	0
15.	TRICHLOROETHYLENE	82	40	58	25
16.	VINYL CHLORIDE	0	0	0	0
17.	XYLENES	20	1	7	0
	TOTALS	359	91	247	53

*The number of analytical results detected includes the analytical results that exceeded the MCL. The detection limit for the hazardous contaminants is 0.5 ug/l. The number of analytical results screened to yield these results were 27,478 in 1991, and 26,220 in 1992. This translates into approximately 1600 and 1550 VOC samples collected in 1991 and 1992, respectively.

TABLE 9

HAZARDOUS CONTAMINANT ANALYTICAL RESULTS BY COUNTY FOR COMMUNITY WATER SYSTEMS

	1991			1992		
COUNTY	# of Results >MCL	#Observ.	# Systems >MCL	# of Results >MCL	#Observ.	#Systems >MCL
ATLANTIC	9	1809	2	1	1893	1
BERGEN	6	1782	3	7	1748	4
BURLINGTON	5	1955	2	3	1958	3
CAMDEN	21	1655	6	11	1772	3
CAPE MAY	1	1009	1	0	823	0
CUMBERLAND	5	1049	2	1	1126	1
ESSEX	10	1174	3	3	953	2
GLOUCESTER	1	1149	1	3	1209	1
HUDSON	1	144	1	0	144	0
HUNTERDON	3	1042	2	0	900	0
MERCER	1	538	1	2	487	2
MIDDLESEX	3	854	2	5	966	2
MONMOUTH	1	1847	1	0	1950	0
MORRIS	5	2961	5	8	2947	5
OCEAN	4	3001	3	1	2469	1
PASSAIC	2	1457	2	0	1154	0
SALEM	0	388	0	0	441	0
SOMERSET	4	262	1	0	295	0
SUSSEX	5	1871	5	2	1659	2
UNION	3	507	1	6	378	1
WARREN	1	1024	1	0	948	0
TOTAL	91	27,478	45	53	26,220	28

TABLE 10

SUMMARY OF NON-TRANSIENT NON-COMMUNITY WATER SYSTEM VOLATILE ORGANIC CHEMICAL MONITORING RESULTS

VOLATILE ORGANIC CONTAMINANT	NUMBER OF SAMPLES >MCL 1991	1992
1. BENZENE	7	5
2. VINYL CHLORIDE	4	2
3. CARBON TETRACHLORIDE	1	3
4. 1,2-DICHLOROETHANE	5	2
5. TRICHLOROETHYLENE	45	30
6. 1,1-DICHLOROETHYLENE	6	6
7. 1,1,1-TRICHLOROETHANE	3	0
8. p-DICHLOROBENZENE	0	0
TOTAL	71	48

A total of 7,589 analytical results were received during 1991 and 1992 from non-transient non-community water systems. An MCL violation is determined by averaging the results of three check samples (taken within 30 days of the original sample) with the value of the original sample and comparing the average to the drinking water standard. However, if the original MCL exceedence divided by four would not result in a number below the MCL, the check samples are not usually taken. The above totals are all MCL violations because either check samples were not taken during the prescribed time, or samples were taken but the average of the four was still above the MCL.

Many of the above samples came from the same source, e.g., trichloroethylene: 10 samples in 1991 and 8 samples in 1992 were reported by the same system. Of the 32 systems reporting the 119 MCL exceedences in 1991 and 1992, 15 reported samples greater than the MCL in 1991, 6 in 1992, and 11 in both years.

IX. PESTICIDES

[40 CFR 141.12; 141.24]

Only surface water supplies were required to sample once every three years for four pesticides: endrin, lindane, methoxychlor, and toxaphene; and two herbicides: 2,4-D and 2,4,5-TP (Silvex). Groundwater supplies were not required to monitor. However, the state had the option to require testing.

Table 11 provides a summary of the number of community water systems that submitted pesticide data. Because of the effective date of the federal regulations, the three year period for sampling that coincides with the 1991-1992 time frame in this report was between June 24, 1990 and June 23, 1993 for surface water supplies. Samples were to be collected during the period of the year designated by the state as the period when contamination by pesticides is most likely to occur. New federal regulations, known as "Phase II" and "Phase V," became effective January 1, 1993 and changed the number of parameters tested and the reporting cycle for pesticides as well as for many other drinking water contaminants.

Of the 158 public water systems who performed pesticide analyses during 1991 and 1992, there were no MCL exceedences

TABLE 11

COMMUNITY WATER SYSTEMS SUBMITTING DATA FOR PESTICIDE TESTING IN 1991-1992

SURFACE WATER SUPPLIERS	GROUNDWATER SUPPLIERS*
46 [68%]	112 [20%]

*Approximately 20% of the groundwater suppliers monitored for pesticides even though it was not required.

X. RADIOLOGICAL

[40 CFR 141.15; 141.16; 141.25; 141.26]

Community water systems are required to monitor for gross alpha particle radioactivity at least once every four years, as specified in federal regulations. The most recent complete cycle began on June 24, 1988 and ended June 23, 1992. Four consecutive quarterly samples are composited and analyzed as one sample.

In New Jersey, 583 (92%) public community water systems completed radiological testing. Two systems marginally exceeded the radium 226 MCL. In both instances, levels were reduced by blending, an accepted, safe, cost effective and commonly used technique. The resamples were both below the MCL. One small system had an MCL violation for the past two monitoring periods. This system went to public notification and attempted to resolve the problem by drilling a new well (the new well also had elevated radium levels). During this period, the EPA proposed new standards for radium 226, raising the MCL by a factor of four. Since that would eliminate this violation, the BSDW has not recommended enforcement action against the water system.

The ten surface water supplies serving more than 100,000 people were required to sample for gross beta activity. Compliance is based on analysis of a composite of four consecutive quarterly samples. After the initial analysis, monitoring is required at least every four years. The most recent sampling period was June 24, 1988 through June 23, 1992. There were no sampling or MCL violations in 1992, the end of the last sampling period, for gross beta activity.

XI. TRIHALOMETHANES

[40 CFR 141.12; 141.30]

Trihalomethane (THM) compounds are formed when chlorine, the most common disinfectant used in drinking water, reacts with organic matter found in raw water supplies. This organic matter might be vegetation decay or introduced organic material. Typically, in New Jersey, surface water supplies have much higher concentrations of THMs than ground water supplies.

The MCL of 0.10 mg/l for TTHM (total THM) applies only to community water systems which serve a population of 10,000 or more individuals and which add a disinfectant to the water in any part of the drinking water treatment process. The reported TTHM level is the sum of the concentrations of bromodichloromethane, dibromochloromethane, trichloromethane (chloroform) and tribromomethane (bromoform). Compliance with these regulations is determined based on a running annual average of quarterly samples collected as prescribed by these regulations. If the average of samples covering any twelve month period exceeds the MCL of 0.10 mg/l, a violation of the MCL standard occurs.

In New Jersey, all 137 community water systems serving 10,000 or more people use chlorination or combined chlorine for disinfection. Of the 548 possible reporting periods per year (137 CWSs doing quarterly sampling), there were 23 reporting violations in 1991 and 21 reporting violations in 1992. There were no TTHM MCL violations in New Jersey during 1991-1992.

XII. OTHER SAFE DRINKING WATER ACTIVITIES

The BSDW administers additional regulatory activities to protect public water supplies including the issuance of permits for proper construction and operation of water treatment facilities.

When contamination is detected, the Water Supply Loan Program may be utilized. The Water Supply Bond Act of 1981, as amended, authorized issuance of $350 million in bonds to provide for planning and construction of infrastructure necessary to assure adequate supplies of potable water. In accordance with the New Jersey Statewide Water Supply Plan, the Bond Act established a low interest loan program to help water purveyors with the cost of certain types of improvements. The Water Supply Replacement (Contaminated Wellfield) Loan program, in 1991 and 1992, delivered nine loans for a total of $11.06 million to address groundwater contamination problems which adversely affect potable water service.

There are several other support units, both within and outside of NJDEP that are directly involved with BSDW activities. The Water and Hazardous Waste Enforcement Element performs routine inspections of public community water systems and non-community water systems, and issues the citations for water systems referred by the BSDW. The Division of Science and Research (DSR) has consistently provided scientific and technical support in such areas as analytical chemistry and risk assessment. DSR also performs research in areas such as bacterial regrowth in water distribution systems and performs surveys in current drinking water issues such as pesticide incidence in shallow wells and surface waters.

The Environmental Health Services in the New Jersey Department of Health (NJDOH) also provides health effects support by interacting with local health departments and performing epidemiological studies of populations exposed to contaminated drinking water. The NJDOH and NJDEP laboratories perform an important support function by analyzing samples collected by the BSDW in response to consumer concerns. The Bureau of Radiological and Inorganic Analytical Services of the NJDEP performs the radiological testing for BSDW.

XIII. FUTURE SAFE DRINKING WATER ACT ACTIVITIES

The 1986 amendments to the federal Safe Drinking Water Act resulted in the adoption of several new regulations that were discussed in earlier sections of this report: the treatment of surface water (June 29, 1989), the monitoring of coliform bacteria (June 19, 1990), and the regulation of lead and copper (June 7, 1991). Four additional regulations were adopted that required monitoring for 65 IOCs, VOCs and synthetic organic contaminants (SOCs)

including pesticides and 35 "unregulated" chemicals. These four regulations also completely revised the monitoring locations and frequencies. They took effect January 1, 1993. These four IOC, VOC and SOC regulations are commonly referred to as "Phase II/V" regulations.

In addition to new contaminants and new MCLs that were included in Phase II/V, the "standardized monitoring framework" was promulgated. The goal of the standardized monitoring framework is to streamline the drinking water monitoring schedules across rules and contaminants groups. The schedules are based on a sampling frequency of one year, a three-year "compliance period," or a nine year "compliance cycle." The first compliance period is between January 1, 1993 and December 31, 1995. The schedules are based on a calendar year instead of the day that the regulations took effect. Non-transient non-community water systems are required to perform nearly the same monitoring requirements as community water systems as a result of the Phase II/V regulations.

The Phase II/V regulations allow reductions of the sampling frequencies for asbestos, VOCs and SOCs based on "sampling waivers" issued by the state. A sampling waiver for asbestos can be issued for source water sampling or for distribution water sampling. The geological deposits containing asbestos bearing rocks in New Jersey have been identified. If the source water does not draw water from one of these geologic formations, a source water waiver can be issued. The BSDW may also issue an asbestos sampling waiver from distribution system sampling if the water in the distribution system is not susceptible to asbestos contamination. The BSDW sent a questionnaire to all community water systems and non-transient non-community water systems requesting information on the presence of asbestos pipe in the water distribution system and the corrosiveness of the drinking water in each system. This information is used by the BSDW to determine if a distribution system asbestos sampling waiver can be issued.

Two types of sampling waivers can be issued for VOCs and SOCs: use waivers and susceptibility waivers. A VOC/SOC susceptibility waiver can be issued if the source water is not vulnerable to contamination. A use waiver can be issued if a VOC/SOC contaminant was not used, manufactured or stored in the area of review. The BSDW looked at past VOC and nitrate data, vulnerability information and use of regulated contaminants. A research contract administered through the DSR with the United States Geological Survey determined the susceptibility of the sources of water used by community water systems to contamination based on geological conditions and aquifer characteristics for groundwater. The BSDW sent a questionnaire to all community water systems and non-transient non-community water systems using groundwater asking for land use data in the vicinity of their water sources. Using this information, the BSDW could determine if VOC/SOC regulated contaminants are used within a specific radius from each well head. For those water sources that cannot be issued waivers based on use and/or susceptibility, the BSDW is collecting and analyzing samples for targeted pesticides to determine occurrence. If the pesticides are not detected in the water sources, a sampling waiver will be issued. For VOCs however, each point of entry must be sampled at least once by each water system during the 1993-1995 sampling interval in order to be eligible for a sampling waiver.

Surface water systems were analyzed within each watershed using land use data available through the NJDEP's Geographical Informational System databases. The Bureau of Pesticide Control collects pesticide usage data, allowing the drinking water program to determine that certain SOCs have not been used in the state. DSR determined that fate and transport characteristics of other SOCs would prevent these contaminants from entering either ground or surface water sources. All this information is being used to determine sampling schedules for the most vulnerable water systems. This waiver determination program will be very important in the analysis of VOC/SOC water quality data collected in 1993 and thereafter.

APPENDIX A

SAMPLING REQUIREMENTS FOR MAJOR CONTAMINANT CATEGORIES IN PUBLIC DRINKING WATER SYSTEMS [1993-1995 (a)]

Contaminant	Sampling Frequency	Types of Systems Required to Sample
1. Microbiological	Monthly (b)	CWS
	Quarterly	NTNC, TNC
2. Turbidity (c)	Daily	CWS,NTNC
3. Inorganic Chemicals		
Surface Water	Annual	CWS, NTNC
Nitrate	Quarterly	CWS, NTNC
Nitrite	Once in Cycle	CWS, NTNC
Ground Water	Once every 3 Years [e.g. 1/1/1993-12/31/1995]	CWS, NTNC
Nitrate	Annual	CWS, NTNC, TNC
Nitrite	Once in Cycle	CWS, NTNC
4. Lead and Copper	Every 6 Months (d)	CWS, NTNC
5. Volatile Organic Chemicals	4 quarterly samples [between 1/1/1993 - 12/31/1995] (e)	CWS, NTNC
6. Synthetic Organic Contaminants	4 quarterly samples [between 1/1/1993 - 12/31/1995] (f)	CWS, NTNC
7. Radionuclides	Once every 4 years	CWS
8. Total trihalomethanes	Quarterly (g)	CWS

APPENDIX A continued:

(a) This sampling schedule became effective January 1, 1993. The schedule for microbiological, turbidity, lead and copper, radionuclides and total trihalomethanes is identical to 1991-1992. The monitoring schedule for the 65 regulated IOCs, VOCs and SOCs, however, is a dramatic departure from the 1991-1992 monitoring schedule in terms of number of contaminants, sampling locations and sampling frequency. The initial compliance period for IOCs, VOCs and SOCs is January 1, 1993 to December 31, 1995.

(b) Depending on population served, the number of samples taken by CWS during the monthly cycle varies, and samples are to be taken at regular time intervals throughout the month. A NTNCWS using ground water under the direct influence of surface water, a NTNCWS using surface water, and a NTNCWS using any water source but supplying a population $>1,000$ must monitor at the same frequency as a like-sized CWS.

(c) These requirements apply only to PWS using water obtained in whole or in part from surface sources.

(d) The initial monitoring periods for all CWS and NTNCWS are at six month intervals, regardless of system size. This frequency continues after installation of any necessary corrosion control. The system can reduce monitoring to once a year with a reduction in the number of samples taken after two consecutive six month monitoring cycles meet the action levels for lead and copper,

(e) Four consecutive quarterly samples every three years, reduced to one sample annually if no detections. A sampling waiver based on susceptibility and use can be issued to further reduce monitoring.

(f) Four consecutive quarterly samples every three years and after one round of no detections, systems $>3,300$ reduce to two samples per year every three years (1996-1998); systems $<=3,300$ reduce to one sample every three years (1996-1998). A sampling waiver based on susceptibility and use can be issued to further reduce monitoring.

(g) A CWS utilizing only ground water sources may have the sampling frequency reduced to annually.

APPENDIX B

DRINKING WATER MCLs IN EFFECT 1991-1992
[Beginning 1993, more contaminants were regulated and some MCLs changed]

INORGANIC CHEMICALS	MCL ug/l [ppb]
ARSENIC	50
BARIUM	1000
CADMIUM	10
COPPER	1300 [AL]*
LEAD	50
LEAD	15 [AL]*
MERCURY	2
NITRATE [N]	10,000
SELENIUM	10
SILVER	50
FLUORIDE	4,000

*Action levels [AL] became effective beginning January 1992.

PESTICIDES\ HERBICIDES	MCL ug/l [ppb]
ENDRIN	0.2
LINDANE	4
METHOXYCHLOR	100
TOXAPHENE	5
2,4-D	100
2,4,5-TP [SILVEX]	10

APPENDIX B cont'd.

DRINKING WATER MCLs IN EFFECT 1991-1992

A-280 HAZARDOUS CONTAMINANTS

CONTAMINANT	MCL ug/l [ppb]
BENZENE	1
CARBON TETRACHLORIDE	2
CHLORDANE	0.5
CHLOROBENZENE	4
o-DICHLOROBENZENE	600
m-DICHLOROBENZENE	600
p-DICHLOROBENZENE	75
1,2-DICHLOROETHANE	2
1,1-DICHLOROETHYLENE	2
cis-1,2-DICHLOROETHYLENE	10
trans-1,2-DICHLOROETHYLENE	10
METHYLENE CHLORIDE	2
POLYCHLORINATED BIPHENYLS	0.5
TETRACHLOROETHYLENE	1
TRICHLOROBENZENES	8
1,1,1-TRICHLOROETHANE	26
TRICHLOROETHYLENE	1
VINYL CHLORIDE	2
XYLENES [total]	44

APPENDIX B cont'd.

DRINKING WATER MCLs IN EFFECT 1991-1992

RADIOACTIVITY

RADIUM 226 & RADIUM 228 [combined] 5 pCi/l [MCL]
Picocurie [pCi]: the quantity of radioactive material producing 2.22 nuclear transformations per minute.

GROSS ALPHA PARTICLE ACTIVITY 15 pCi/l [MCL]
[including radium 226 but excluding radon and uranium]

BETA PARTICLE & PHOTON RADIOACTIVITY FROM MAN-MADE RADIONUCLIDES: The average annual concentration in drinking water shall not produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem/year [MCL]

TURBIDITY

MCL - ONE TURBIDITY UNIT [determined by a monthly average pursuant to 40 CFR 141.22] except that five or fewer turbidity units may be allowed if the supplier of water can demonstrate to the state that the higher turbidity does not do any of the following:

[1] Interfere with disinfection;
[2] Prevent maintenance of an effective disinfectant agent throughout the distribution system;
[3] Interfere with microbiological determinations.

APPENDIX B cont'd.

DRINKING WATER MCLs IN EFFECT 1991-1992

TRIHALOMETHANES

For trihalomethanes, BROMODICHLOROMETHANE, CHLORODIBROMOMETHANE, TRICHLOROMETHANE [CHLOROFORM] and TRIBROMOMETHANE [BROMOFORM], the MCL of 0.10 mg/l is the sum of the concentrations [TOTAL] of the four halomethanes, and is called TOTAL TRIHALOMETHANES [TTHM].

MICROBIOLOGICAL

MCLs are dependent on the size of the population served. A complete discussion of microbiological MCLs is on pages 18 and 19. There are, besides MCLs, MCLGs of zero for other specific microorganisms. They are: *Giardia lamblia*, viruses, *Legionella*, and total coliforms. These microorganisms are controlled by monitoring treatment rather than measuring the concentrations of these microorganisms directly.

APPENDIX C

ANNUAL PRECIPITATION IN INCHES IN NORTHEAST NEW JERSEY

YEAR	AVERAGE
1986	48.37
1987	49.52
1988	42.84
1989	54.36
1990	58.14
1991	41.10
1992	48.00
LONG TERM NORMAL	47.57

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