What does this indicator tell us?

Maximum contaminant level violation data and action level exceedence data were used as measures of the chemical and radiological safety of drinking water in 1995. A maximum contaminant level violation is generally issued after an initial sample exceeds the maximum contaminant level and subsequent quarterly monitoring shows that the average concentration of a contaminant is at or above the maximum contaminant level. An action level exceedence occurs when a water system does not meet the lead and/or copper action level for two consecutive six-month sampling periods.

The indicator for chemical drinking water standard compliance is presented separately for community water systems and nontransient noncommunity water systems.

Data Characteristics

The data used for this indicator were collected in 1995 in accordance with federal and state regulations. Safe Drinking Water Act violations for each group of contaminants were calculated in accordance with federal and state regulations. Drinking water samples were collected by the public water systems and analyzed at laboratories certified by the State of New Jersey using EPA approved analytical methodologies.

This indicator was developed for 1995 by first determining which water systems sampled for 1) the Lead and Copper Rule, 2) the Surface Water Treatment Rule, and 3) the chemical (volatile organic chemicals, synthetic organic chemicals, inorganic chemicals including nitrate, and disinfection byproducts) and radiological rules of the Safe Drinking Water Act. Next, the number of community water systems and nontransient noncommunity water systems that violated the drinking water standards for each contaminant group were compiled. The number of maximum contaminant level violations or action level exceedences was divided by the number of systems that sampled in 1995. This provided the percentage of systems that sampled in 1995 with maximum contaminant level or action level exceedences for each rule.

Some chemical data have been collected since 1979 when the New Jersey Safe Drinking Water Act Regulations were adopted. Since then, new state and federal statutes and regulations have expanded the list of contaminants, changed some of the original maximum contaminant levels, and altered the frequency and location of sampling (40 CFR 141, N.J.A.C. 7:10-1 et seq.).

The data are stored in a database maintained by the Bureau of Safe Drinking Water which can be obtained by calling (609) 292-5550.

Data Strengths and Limitations

The strength of the chemical data is that the results are collected from public water systems throughout the United States. The chemical violation data, however, is managed differently among states.

New Jersey has a drinking water standard setting process established by the 1983 amendments to the New Jersey Safe Drinking Water Act. This has resulted in 12 New Jersey standards that are more stringent than those set by EPA and five chemicals regulated by NJDEP that are not regulated by EPA.

Not all water systems or points-of-entry were required to sample for all chemical parameters in 1995. The chemical drinking water quality indicator is based on those systems that submitted results during 1995.

Several different types of drinking water data have been combined to develop this indicator. One of the difficulties with calculating
this indicator is that not all drinking water sampling rules apply to all public water systems. For example, the Surface Water Treatment Rule only applies to 35 of the community and nontransient noncommunity water systems. During 1995, four community water systems were issued Surface Water Treatment Rule violations. These violations represent 12% of the community water systems that are subject to the Surface Water Treatment Rule. However, these violations were issued to less than one percent of the community water systems serving water in New Jersey. One of the three nontransient noncommunity water systems that monitor as part of the Surface Water Treatment Rule was issued a maximum contaminant level violation which translates to 33% of the nontransient noncommunity water systems. This one nontransient noncommunity water system represents less than 0.1% of all nontransient noncommunity water systems.

For the other rules, it is also difficult to determine if the overall chemical indicator represents an overestimation or underestimation of the number of chemical violations in New Jersey public water systems.

For some parameters, such as radiological contaminants and disinfection byproducts, the test results represent the water quality in the water distribution system. For other parameters such as volatile organic chemicals, a sampling schedule is issued to each point-of-entry to the water distribution system individually. Depending on the size and configuration of the water system, there may be several test results that represent the quality of the drinking water for that system. Therefore, the chemical rule component of this indicator may provide an overestimation of the percent of public water systems exceeding the chemical drinking water maximum contaminant levels.

Conversely, water systems that exceed the lead and copper action level are not required to resume sampling until corrosion control equipment has been installed or other measures have been taken. Lead and copper rule violations may represent an underestimation of the percent of public water systems exceeding the action levels.

**Discussion**

Ninety-four percent of community water systems submitted a sample for at least one of the chemical rules in 1995. A graphical presentation of the data, as seen in Figure 2, shows the percent of community water systems and nontransient noncommunity water systems that complied with the Lead and Copper Rule, the Surface Water Treatment Rule and the chemical rules for inorganic chemicals, volatile organic chemicals, synthetic organic chemicals including pesticides, and radiological parameters. In addition, this figure shows the percent of systems that sampled with no violations of the chemical rules. The milestone of 95% of the water systems meeting the chemical drinking water standards by the year 2005 has not yet been met for either community water systems or nontransient noncommunity water systems.
Goal: Every Person in New Jersey Will Have Safe Drinking Water

This goal was developed to recognize the importance of clean drinking water for all New Jersey residents at all times. Public drinking water systems serve approximately 87% of the State’s estimated 1995 population of 7,750,000. Wells that serve individual homes or small businesses, referred to as private wells or domestic wells, serve the remainder of the population.

Milestone: By 2000, 90% of public water systems will have compliance evaluations that are acceptable

This milestone measures the progress of public water systems towards operating water systems that comply with state and federal construction and operation standards.

Introduction to the Milestone

The proper operation of community water systems is an important aspect of New Jersey’s Safe Drinking Water Program. Compliance evaluations are integral in demonstrating New Jersey’s progress in meeting its goal of safe drinking water for everyone. For a public water system to be considered acceptable, it must meet sampling requirements, have no maximum contaminant level (MCL) violations, and be operated in a safe, responsible and efficient manner to ensure that potable water quality continues to meet Federal and State standards.

Environmental Indicators for this Milestone

The following indicators are being reported to measure progress in meeting this milestone.

1. “Percent of community water systems inspected in 1994 and 1995 that have acceptable compliance evaluations” (Condition Indicator)

2. “Number (percent) of noncommunity water systems evaluated for compliance in the last five years” (Response Indicator)

Other potential indicators for this milestone include:

3. “Number of enforcement actions for water systems that have unsatisfactory compliance evaluations” (Response Indicator)

4. “Number of water systems that voluntarily returned to compliance” (Response Indicator)
Milestone: By 2000, 90% of public water systems will have compliance evaluations that are acceptable.

Indicator: Percent of community water systems inspected in 1994 and 1995 that have acceptable compliance evaluations

In 1995, 78% of the complete compliance evaluations performed on community water systems were “acceptable.” This was an increase in the percent that were rated “acceptable” in 1994.¹

What does this indicator tell us?

The 1994-1995 data on acceptable compliance evaluations are the baseline data that will be used to measure progress in meeting this milestone. An acceptable evaluation indicates that the community water system was meeting federal and state statutes and regulations.

Data Characteristics

Compliance evaluations were tracked by state fiscal year 1994 (July 1, 1993 through June 30, 1994) and 1995 (July 1, 1994 through June 30, 1995). The database containing the community water system inspection information is generated and maintained by the Water Compliance and Enforcement Element and may

¹ In state fiscal year 1994, 298 complete inspections of community water systems were conducted. In state fiscal year 1995, 430 complete inspections of community water systems were conducted.
be obtained by calling (609) 984-5855. The date of the last inspection for any given community water system is tracked by the Bureau of Safe Drinking Water and may be obtained by calling (609) 292-5550.

**Data Strengths and Limitations**

In state fiscal year 1994, 298 complete community water systems inspections were done; for state fiscal year 1995, 430 complete inspections were done.

The Enforcement Element rates facilities as “acceptable,” “conditionally acceptable,” or “unacceptable.” Systems that are rated “acceptable” or “conditionally acceptable” are considered “in compliance” and systems that are “unacceptable” are “not in compliance.” A weakness in this indicator is the lack of a standard definition of “acceptable”, “conditionally acceptable”, or “unacceptable”.

**Discussion**

Figure 3 represents the percent of community water systems in 1994 and 1995 that are “in compliance.” Based on 1995 data, the milestone for community water systems has not been met, but the percentage has improved since 1994.

Since the compliance evaluation inspection ratings may be “unacceptable” for deficiencies other than water quality or maximum contamination level violations, the raw numbers do not indicate the potability of the water delivered to consumers or a direct increase or decrease in the quality of delivered water from year to year.
Milestone: By 2000, 90% of public water systems will have compliance evaluations that are acceptable

Indicator: Number of noncommunity systems evaluated for compliance in the last 5 years

Between 1991 and 1995, 78% of noncommunity water systems were evaluated for compliance with the Safe Drinking Water Act.²

Between 1991 and 1995, 1135 noncommunity water systems were added to the NJDEP inventory and 1659 noncommunity water systems were deleted from the inventory.

**Figure 4:** The number of noncommunity water systems with compliance evaluations (inspections) between 1991-1995.

**What does this indicator tell us?**

This indicator describes the number and percent of noncommunity systems that had compliance evaluations (inspections) performed by the Bureau of Safe Drinking Water or the local health agencies during the period from 1991-1995. These compliance evaluations consist of an onsite review of water quality test data, and a review of the water source(s), facilities, equipment, operation and maintenance for producing and distributing safe drinking water.

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² Between 1991 and 1995, 1135 noncommunity water systems were added to the NJDEP inventory and 1659 noncommunity water systems were deleted from the inventory.
Data Characteristics

The Bureau of Safe Drinking Water maintains an inventory of noncommunity water systems which includes the date of the last inspection. This information is available from the Bureau of Safe Drinking Water by calling (609) 292-5550.

Data Strengths and Limitations

Because the Bureau of Safe Drinking Water does not conduct all the inspections on noncommunity water systems and because the database is updated only when the local health agency sends a completed inspection form to the Bureau of Safe Drinking Water, the database is only as accurate as the information received by the Bureau of Safe Drinking Water. If an inspection is performed and the local agency fails to forward the information to NJDEP, then the data are not entered into the database.

A total of 5826 noncommunity water systems were active, at least some of the time, between 1991-1995. This large number of noncommunity water systems active during each year highlights the Bureau of Safe Drinking Water’s difficulties in maintaining an accurate database of noncommunity water systems. The difficulty in inspecting all noncommunity water systems once every five years is compounded by the fact that between 1991 and 1995, 1135 noncommunity water systems were added to the NJDEP inventory and 1659 noncommunity water systems were deleted from the inventory.

Discussion

Of the 5826 noncommunity water systems that were active for at least some time between 1991-1995, 4528 (78%) were inspected by either the local health agencies or by NJDEP. Although NJDEP does not routinely conduct all of the inspections of noncommunity water systems, this indicator does show that most (78%) of these systems are inspected. These inspections are a valuable tool for educating and encouraging compliance with federal and state statutes and regulations. Figure 2 illustrates the percent of noncommunity water systems inspected during the period from 1991 - 1995.

Between 1991 and 1995, the former EPA-DEP workplans required the Bureau of Safe Drinking Water to perform 110 noncommunity compliance evaluations and delegated county health agencies to perform 1650 noncommunity compliance evaluations per year. Beginning in 1995, under NEPPS, the Performance Partnership Agreement requires that all noncommunity water systems have compliance evaluations once every five years.
Subgoal 1: All source water in New Jersey used for drinking water will be protected from pollution.

This subgoal focuses on the need to prevent drinking water supplies from becoming contaminated.

Milestone: By 2005, 50% of all public water systems will have a fully implemented source water protection plan

In order to protect both surface water and ground water drinking water supplies, a plan called a source water protection plan is used.

Introduction to Milestone

Since it is more effective to prevent rather than remediate pollution, the intent of this milestone is to protect source waters in New Jersey that are used for drinking water. Source water protection plans can provide a cost effective and proactive means of insuring safe drinking water for the citizens of New Jersey by developing source water protection measures in areas of existing or future drinking water supplies. The milestone is intended to apply to both surface and ground water sources.

A source water protection program is made up of four main elements: 1) the accurate location of the well or surface water intake, 2) the delineation of the geographical region from which the drinking water source draws water, 3) the development of a pollution inventory or source assessment for the delineated area, and 4) development of a source management plan.

Currently, NJDEP’s Wellhead Protection Program is the only fully developed source water protection program in New Jersey as well as the rest of the nation. Eventually, in New Jersey, the Watershed Program should incorporate a source water protection program for surface water intakes.

Environmental Indicators for this Milestone

The following indicators are being reported to measure progress in meeting this milestone.

1. “Percent of community water system wells located in susceptible aquifers.” (Cause Indicator)

2. “Pollution sources in the vicinity of susceptible public supply wells.” (Cause Indicator)

3. “Percent of community water system wells with delineated well head protection areas.” (Response Indicator)

Other potential indicators for this milestone include:

4. “Percent of community water systems wells and nontransient noncommunity water systems wells with pollution inventories.” (Response Indicator)

5. “Number and percent of well head protection
areas with point source discharges.” (Cause Indicator)

6. “Number and percent of community water system wells where ground water quality standards are being met.” (Condition Indicator)
Milestone: By 2005, 50% of all public water systems will have fully implemented source water protection plans

Indicator: Number and percent of community water supply wells located in susceptible aquifers

Type of Indicator: Cause, Ground Water

Using a United States Geological Survey (USGS) susceptibility model, rankings were developed for 71% of the community water system wells; 21% ranked as having low susceptibility; 12% had medium susceptibility; and 38% had high susceptibility.

![Susceptibility ranking for community water system wells](image)

**Figure 5:** Number of community water system wells with susceptibility rankings.

**What does this indicator tell us?**

This indicator relates to the susceptibility of community water supply wells to contamination from the land surface. When EPA developed a new monitoring framework, the agency recognized that source waters are not equally vulnerable to contamination. Two factors affect the vulnerability of a water source to contamination: 1) the susceptibility of the water source based on geologic formation and well construction characteristics, and 2) the use of particular chemicals in the vicinity of the source water. A DSR-sponsored research project was developed with the USGS to develop a New Jersey specific model that could be used to predict the hydrogeologic sensitivity of a well based on three variables: 1) distance from the aquifer outcrop area, 2) organic-matter content of the soils at the well, and 3) depth to
the top of the open interval of the well.

Of 2,063 active community water system wells, sufficient data were available to rank the susceptibility of 1,465 (71%) wells. Of the ranked wells, 21.4% (438 wells) have low susceptibility, 12% (249 wells) have medium susceptibility, and 37.4% (778 wells) have high susceptibility.

**Data Characteristics**

A file containing the susceptibility ranking for each community water system well is available through the BSDW by calling (609) 292-5550. Spacial and tabular data stored in the Geographic Information System (GIS) database include the following variables describing characteristics of the well or the environment near the well: 1) sensitivity of the hydrogeologic system, 2) well-construction and ground-water-quality characteristics, 3) land use and intensity of pesticide use, and 4) chemical and physical characteristics of pesticides. The GIS map of community water system well susceptibility rankings is available through the USGS by calling (609) 771-3900.

**Data Strengths and Weaknesses**

The most important variable used to predict well susceptibility is the distance of the well from the outcrop area of the aquifer in which the well is screened. All wells screened more than 1.6 km from the outcrop area have low susceptibility to contamination. The variables of soil organic matter and depth to the top of the open interval were used only with wells that were located less than 1.6 km from the outcrop area.

The numerical rating model developed by USGS is a means for conducting a preliminary assessment of the potential susceptibility of public supply wells to contamination from surface activities. This numerical rating model is limited by the necessary simplifying assumptions made in the analysis.

The locations of some community water system wells are not exact in all cases. Most are accurate to about one second of latitude and longitude, but there are many well were locations are only good to five to ten seconds. There were 598 community water system wells where insufficient information was available to assign a well susceptibility ranking. Often this was because exact locations, depth of the wells, and well permits were not available.

**Discussion**

An understanding of well susceptibility for community water systems in invaluable in developing source management plans. In the next three years, NJDEP will work to reduce the number of unranked community water system wells. Where possible, this assessment will be applied to nontransient noncommunity water system wells.
Milestone: By 2005, 50% of all public water systems will have fully implemented source water protection plans

Indicator: Pollution sources in the vicinity of susceptible public supply wells

Type of Indicator: Cause, Ground Water

The most common pollution sources in the vicinity of susceptible public water system wells are sources of volatile organic chemicals and nitrates.

Figure 6: Types of pollution sources in the vicinity of susceptible community water system wells.

Figure 7: Types of pollution sources in the vicinity of susceptible nontransient noncommunity wells.
What does this Indicator tell us?

This indicator is an indirect measure of progress in reaching this milestone. It is related to potential pollution sources in a circular calculated five-year time of travel model (Calculated Fixed Radius or CFR) surrounding the well. Six types of chemical pollution sources were evaluated: nitrate sources, agricultural pesticide sources, nonagricultural pesticide sources, inorganic chemical sources, volatile organic chemical sources, and semivolatile organic chemical sources. There were 1027 community wells that were ranked as susceptible, and 564 noncommunity wells ranked as susceptible. Currently, this indicator only deals with chemical pollution sources.

Data Characteristics

This information was developed by the Division of Science and Research and the Bureau of Safe Drinking Water as part of the Pesticide Waiver Program. The information was collected during 1994 and 1995. All water purveyors that wanted a waiver for sampling pesticides were required to answer a questionnaire about pollution sources within a calculated fixed radius around each of their wells. The calculated fixed radius was calculated based upon the location of the well, the aquifer thickness, and the pumping rate. A calculated fixed radius corresponding to a five-year time of travel to the well was used. All but one community water system and 93.4% of the nontransient noncommunity water systems completed the survey. The data are available from the Bureau of Safe Drinking Water by calling (609) 292-5550.

Data Strengths and Weaknesses

This indicator is a first attempt at determining the types of pollution sources around susceptible public supply wells in New Jersey.

The information reported in this indicator comes from a survey of purveyors. As such, it is subject to the types of errors inherent in such data. Two major types of errors may impact this data: 1) errors in calculation of CFR, 2) human error in completing the survey.

The information presented here is for public supply wells that were ranked as having medium or high susceptibility to contamination from the land surface (See previous indicator entitled “Number and percent of community water supply wells located in susceptible aquifers”). Susceptibility rankings were only available for 72% of the community water systems and 96% of the nontransient noncommunity water systems. This means that the data base does not give a complete picture of pollution sources particularly for the community water systems.

Discussion

Information about pollution sources surrounding public water system wells is important if NJDEP is to protect source waters in the state. This indicator can be improved in the future by: 1) increasing the number of public supply wells that have a susceptibility ranking, 2) using a more accurate five-year time of travel model such as that being developed by the Wellhead Protection Program, and 3) developing more accurate information about exact locations of pollution sources.

In the future, the survey should be expanded to include microbiological sources of pollution. In order to do that a separate section of the survey based on a two-year time of travel will be required.
Milestone: By 2005, 50% of all public water systems will have fully implemented source water protection plan

Indicator: Percent of community water system wells with delineated well head protection areas

Type of Indicator: Response, Ground Water

By the end of 1996, of the 2086 community water system wells in unconfined aquifers that will still need wellhead protection areas delineated, 113 (5.4% of the wells) have delineated wellhead protection areas.

![Figure 8: Community water system wells that have been accurately located. Number of wells in unconfined aquifers with wellhead protection areas delineated.](image)

**What does this indicator tell us?**

This indicator is a baseline measure of the progress of the department in implementing a Well Head Protection Program in New Jersey. The two initial steps required are: 1) accurately locating the well, and 2) delineation of a well head protection area.

**Data Characteristics**

The Well Head Protection Program only addresses wells drilled into unconfined aquifer systems. Wells in confined aquifers are not considered to be as susceptible to contamination from the land surface. The US Geological Survey, with assistance from the NJ Geological Survey (NJGS), determined which community...
water system wells were unconfined based on mapping, geophysical characteristics and modeling data. For confined wells, the New Jersey Safe Drinking Water regulations require that the owner acquire and control a circular area with a radius of 50 feet around the well. For unconfined wells, a well head protection area needs to be defined. In order to provide an accurate well head protection area delineation, the well’s geographic location has to be determined. Utilizing NJDEP staff, well locations are being determined utilizing the Global Positioning System (GPS).

After a well has been accurately located a specific well head protection area will be delineated for each well. This is done by staff of the NJGS utilizing the EPA WHPA model. WHPA is a modula, semi-analytical ground water flow model developed by the International Ground Water Modeling Center at the Holcomb Research Institute in Indianapolis. NJGS principally uses the RESSQC module, which delineates time-related capture zones around pumping wells in homogeneous aquifers with uniform ground water flow. NJGS prepared a program called OUTPATH, that rotates the RESSQC output and formats it for GIS. OUTPATH files are available on a 1:24,000 scale.

All data are stored on the Geographic Information System (GIS) at NJGS. It will eventually be made available on NJDEP’s GIS system.

**Data Strengths and Weaknesses**

**Well locations:** The data collected using the Global Positioning System geographic positioning will provide an accurate statewide coverage of all community water systems and, eventually, all nontransient noncommunity water system on GIS with an accuracy of three to five feet from ground truth.

**Well Delineation:** Development of a well head protection area requires information about well construction, well depth, length of screening or open interval, capacity, and the aquifer system into which a well is drilled. This information is found in the well drilling records. These well drilling records are poor for older wells, but the accuracy has improved for new wells.

Research by NJGS has shown that for the short times of travel, between 200 days and five years, the analytical method RESSQC is a good first approximation. RESSQC is a two dimensional model of the surface around the well. The weakness of the RESSQC model is that it does not take into account the pumping being done by other wells in the same vicinity. In addition, as hydrogeology becomes more complex, it is not clear that the model will be adequate for wells in the bedrock aquifers in Northern New Jersey.

**Discussion**

The Well Head Protection Program is designed to protect source waters used for drinking water. Approximately 71% of the 2652 community water system wells have been located using a Global Positioning System. Of the 2652 wells, 2086 or 77.6% are located in unconfined aquifers, and will need well head protection areas delineated. At the end of 1996, well head protection delineations were completed for 5.4% of the unconfined wells in New Jersey.

Work is currently in progress to locate noncommunity water system wells. The data are currently not computerized in a central location. Over the next few years, collection and evaluation of this data is a high priority of NJDEP.
Subgoal 2: Every person in New Jersey should drink water that is free of disease-causing organisms.

This subgoal was developed to recognize the importance of drinking water that is free from pathogenic microorganisms for all New Jersey residents at all times. Public drinking water systems serve approximately 87% of the State’s estimated 1995 population of 7,750,000. The remainder of the population is served by private or domestic wells.

Milestone: No detectable waterborne disease from the consumption of drinking water.

This milestone measures the status of waterborne disease outbreaks in New Jersey attributable to drinking water supplies using the New Jersey Department of Health and Senior Services disease surveillance systems.

Introduction to the Milestone

Waterborne disease is caused by drinking water that contains disease-causing microorganisms. Some disease-causing microorganisms are normal inhabitants of soil and water and occur in the absence of animal wastes or fecal contamination. An example is the bacterium Legionella pneumophila, which is found in surface waters in low concentrations. In certain situations, such as hot water systems, this bacterium can multiply to disease-causing levels.

The majority of disease-causing or pathogenic organisms responsible for waterborne human disease are found in the fecal wastes of infected humans or animals. Such organisms include a variety of bacteria (e.g., Salmonella, Shigella), viruses (e.g., rotavirus, hepatitis-A, Norwalk viruses), and protozoan parasites (e.g., Giardia, Cryptosporidium, Entamoeba). Most of the fecal-derived organisms cause gastrointestinal diseases such as hepatitis and diarrheal diseases, but a few cause skin and respiratory diseases.

Since most pathogenic microorganisms are found in fecal wastes, water that is free of fecal contamination cannot cause disease except under unusual conditions (see Legionella above). Ground waters in which the ground filtration barrier has been bypassed or otherwise breached (see below), and surface waters almost always contain fecal wastes from animals, and hence contain some amount and variety of disease-causing microorganisms. Sources of fecal contamination include untreated or treated sewage, septic tank effluent, combined sewer overflows, storm water and contaminated soil and sediments. Ground water is usually free of pathogenic organisms because the ground filters out the organisms prior to consumption. Unless surface waters or contaminated ground waters are treated to remove or inactivate pathogens prior to consumption, disease may occur.

Environmental Indicators for this Milestone

The following indicators are being reported to measure progress in meeting this milestone.

1. “Number of detected infectious disease
outbreaks caused by drinking water.” (Condition Indicator)

2. “Number of surface water treatment plants with filtration.” (Cause Indicator)

3. “The number of community water system supply wells under the direct influence of surface water.” (Cause Indicator)

4. “The percent of surface water systems that meet disinfection requirements in a year.” (Response Indicator)

5. “The percent of community water systems and nontransient noncommunity water systems that have disinfection.” (Response Indicator)

6. “The percent of surface water treatment systems below the monthly turbidity requirements in a year.” (Response Indicator)

7. “The percent of noncommunity water systems that take at least two total coliform samples a year.” (Response Indicator)

Other potential indicators for this milestone include:

8. “Number of watersheds with intakes susceptible to nonpoint source microbiological loadings from farm animals.” (Cause Indicator)

9. “Number of publicly owned wastewater treatment plants one mile/five miles upstream of potable water intakes.” (Cause Indicator)

10. “Number of storm water discharges one mile/five miles upstream of potable water intakes.” (Cause Indicator)

11. “Number of events resulting in the release of untreated sewage from publicly owned wastewater treatment plants including pump station bypasses upstream of potable water intakes.” (Cause Indicator)
Milestone: No detectable waterborne disease from the consumption of drinking water.

Indicator: Number of detected infectious disease outbreaks caused by drinking water.

As of the end of 1996, the New Jersey Department of Health and Senior Services had not identified any outbreaks due to disease-causing microorganisms in drinking water in New Jersey since 1989. The July 1989 outbreak was in a well at a campsite.³ Eight persons were infected with an unidentified pathogen.

What does this Indicator tell us?

Certain diseases or outbreaks of disease (N.J.A.C. 8:57-1.2) are required to be reported by New Jersey physicians, or persons in charge of institutions such as hospitals, nursing homes, sanitaria, and prisons to the reporting officer of the jurisdiction in which the diagnosis is made. Some of these illnesses are caused by pathogens which can be spread by contaminated water. Possible waterborne illnesses that are required to be reported to New Jersey Department of Health and Senior Services include giardiasis, hepatitis (type-A), legionellosis, salmonellosis, cryptosporidiosis and shigellosis, among others. A waterborne outbreak related to drinking water is defined by the U.S. Centers for Disease Control and Prevention as a similar illness in two or more people (or single cases for amoebic meningioencephalitis) resulting from exposure to water intended for drinking (public or private) with epidemiological evidence implicating the water as the source of the illness.

Physicians having knowledge of any outbreak of any disease must immediately report this information by telephone to the New Jersey Department of Health and Senior Services. In some cases following illness reports, the New Jersey Department of Health and Senior Services conducts an epidemiological investigation to determine the cause or source of the illness (e.g., food, drinking water, inhaled organisms, person-to-person spread, etc.). If water intended for drinking is determined to be the source of the disease-causing organism, then the illness episode is classified as a drinking water-related disease outbreak. Outbreak data are reported annually to the U.S. Centers for Disease Control and Prevention by the New Jersey Department of Health and Senior Services and other states on a voluntary basis.

Data Strengths & Limitations

The data are a direct measure of the extent to which New Jersey is meeting the above milestone and subgoal. However, the symptoms of many illnesses caused by waterborne disease

agents, especially those not on the New Jersey Department of Health and Senior Services list of reportable diseases, are comparatively mild (e.g., diarrhea, fever, nausea). People with such symptoms rarely seek the aid of a physician or require hospitalization. For this reason, it is very difficult to identify waterborne disease outbreaks and an unknown number of outbreaks may be occurring but are not being detected. Furthermore, because reporting of waterborne disease outbreaks to the U.S. Centers for Disease Control and Prevention is voluntary on the part of each state, the biannual listing of waterborne disease outbreaks in the United States published by the U.S. Centers for Disease Control and Prevention is an underestimation of the number of outbreaks actually occurring nationwide.

Discussion

As of the end of 1996, the New Jersey Department of Health and Senior Services has not identified any outbreaks due to disease-causing microorganisms in drinking water in New Jersey since 1989. The July 1989 outbreak was in a transient noncommunity well at a campsite. Eight persons were infected with an unidentified pathogen. A water treatment deficiency was noted as the cause of the outbreak.
Milestone: No detectable waterborne disease from the consumption of drinking water.

Indicator: The number of surface water treatment plants with filtration.  
Type of Indicator: Cause

Only one of the 34 surface water treatment plants (both community and nontransient noncommunity) active in 1995 did not filter its source water.

**Figure 9:** Number of community and nontransient noncommunity water treatment plants that use surface water that filtered their source waters in 1995.

**Filtration of Surface Water 1995**

- With filtration
- Without filtration

**What does this Indicator tell us?**

All surface waters contain microorganisms including some that have the potential to cause disease if ingested. Ground waters are usually free of these microorganisms. The microorganisms are filtered out by soil and subsurface materials unless the soil filtration process is bypassed or breached as in ground water under the direct influence of surface water. Filtration reduces the number of microorganisms, including disease-causing microbes (and also soil and sediment particles), present in surface waters and ground water under the influence of surface waters. Disinfection of surface water or ground water under the influence of surface water kills or inactivates most, but not all, pathogenic microorganisms potentially present. Therefore, in addition to disinfection, surface waters and ground water under the influence of surface water...