

Performance Measures of Pennsylvania's Filter Plant Optimization Programs

The following report¹ contains information on the benefits, outcomes and outputs of the Filter Plant Performance Evaluation program (FPPE), Distribution Optimization program, Area Wide Optimization Program (AWOP), and the Partnership for Safe Water program (Partnership).

Benefits of the Programs

The Department of Environmental Protection (DEP) has invested in programs such as FPPE, Distribution Optimization, AWOP, and the Partnership to protect Pennsylvanians from waterborne diseases and, more recently, disinfection byproducts. These programs focus on filtered drinking water suppliers that obtain source water from reservoirs, lakes, rivers and streams, and groundwater sources under the direct influence of surface water. Since the mid-1990's, the Allegheny County Health Department has taken the lead on FPPEs within their county, but DEP continues to have the lead in all other counties in the state. These programs are important to Pennsylvanians and the state's surface water suppliers for the following reasons:

- ✓ **Population Impact:** Eight million people and numerous tourists receive some or all of their drinking water from the Commonwealth's filter plants.
- ✓ **Disease Prevention:** A treatment breakdown at a filter plant presents a widespread acute health threat from a waterborne disease outbreak. A disease outbreak can have a devastating impact on a community. Disease prevention saves lives and millions of dollars in expenses that businesses, homeowners, local government and state government would incur in response to an outbreak.
- ✓ **Economy and Essential Services:** The availability of safe public drinking water in sufficient quantity plays a critical role in the state's economic engine. Filter plants serve drinking water to large metropolitan areas and small rural communities and thus are a vital part of local infrastructure; they represent an essential service to factories, food processors, restaurants, and many other businesses; and they provide basic fire protection for homeowners and businesses.
- ✓ **Regulatory and Technical Complexities:** Filter plants are affected by some of the most complex regulations and involve complicated treatment processes. The FPPE and Partnership programs help suppliers in overcoming numerous on-going compliance challenges.
- ✓ **Infrastructure Improvements:** FPPEs have been a long-standing part of the ranking process for Pennsylvania's low-interest loan program called PENNVEST.

¹ This report contains underlined website links in the areas titled, "For More Information." To access the information, you will need to view the report on a computer that is connected to the Internet.

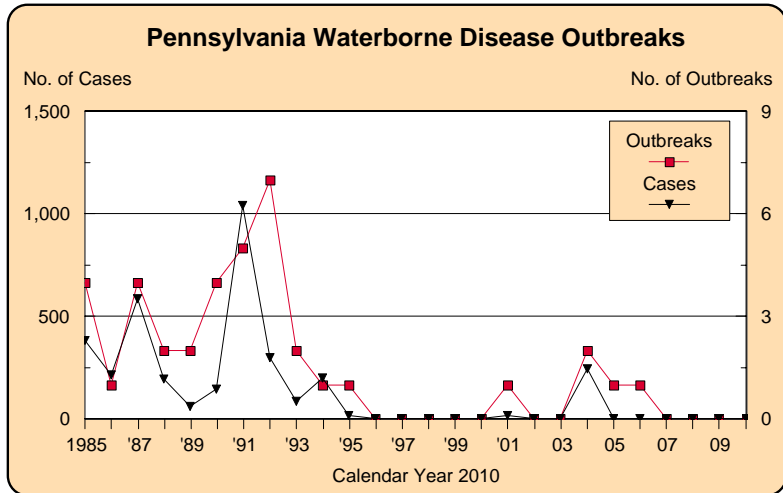
Outcomes of the Programs

The following outcomes measure the public health benefits of the programs.



Outcome #1. Waterborne disease outbreaks associated with public drinking water remain low in Pennsylvania.

Pennsylvania once led the nation in the number of reported waterborne disease outbreaks. On September 12, 2008, the U.S. Centers for Disease Control and Prevention and the U.S. Environmental Protection Agency released the latest disease information in a summary titled



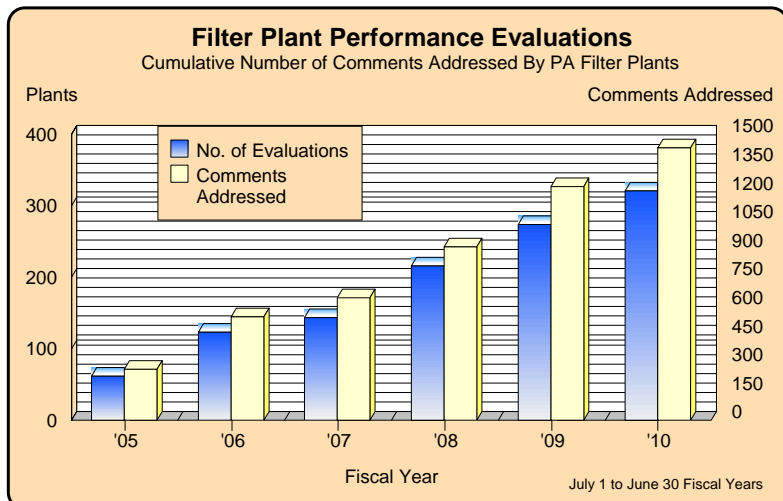
"Surveillance for Waterborne Disease and Outbreaks Associated with Drinking Water and Water not Intended for Drinking " in their *Morbidity and Mortality Weekly Report*. According to the report, waterborne disease outbreaks in the state remain low. The FPPE program is one of the many initiatives in Pennsylvania's Safe Drinking Water Program that have reduced our disease outbreaks. In recent years, there have been a few documented outbreaks. However, it's important to note that these have been at very small ground water systems, which do not benefit from the FPPE process. During 2009-2010 no waterborne disease outbreaks were reported in Pennsylvania, according to official CDC or Pennsylvania Department of Health records.

For more information: [Waterborne Diseases Reach All-Time Low in Pennsylvania.](#)



Outcome #2. Between July 1, 2004, and June 30, 2010, public water suppliers in Pennsylvania corrected 1430 deficiencies at 321 evaluations as a result of the FPPE program.

The FPPE process is a method of determining the effectiveness of a filter plant in removing disease-causing organisms from the incoming raw water. Following the on-site evaluation, the water



supplier receives DEP’s detailed report that summarizes an assessment of plant operations, equipment and water quality conditions. The report also concludes whether the water supplier corrected problems that DEP identified during a previous FPPE. Fiscal year 2004-2005 (July 1 through June 30) is the first year when total corrections were tallied across the state. Overall, FPPEs have enhanced the skills of water supply operators and have improved drinking water quality. In fiscal year 2009-2010, statewide a total of 205 deficiency comments were addressed at 47 filter plant evaluations. Over the last six fiscal years, 1430 deficiency comments were addressed at 321 filter plant evaluations. Since FPPE comments outline factors that are limiting optimal plant performance, adequately addressing previous comments can be considered a measure of the effectiveness of the FPPE process and a real world outcome.

For more information: [Filter Plant Performance Evaluation: Program Information.](#)

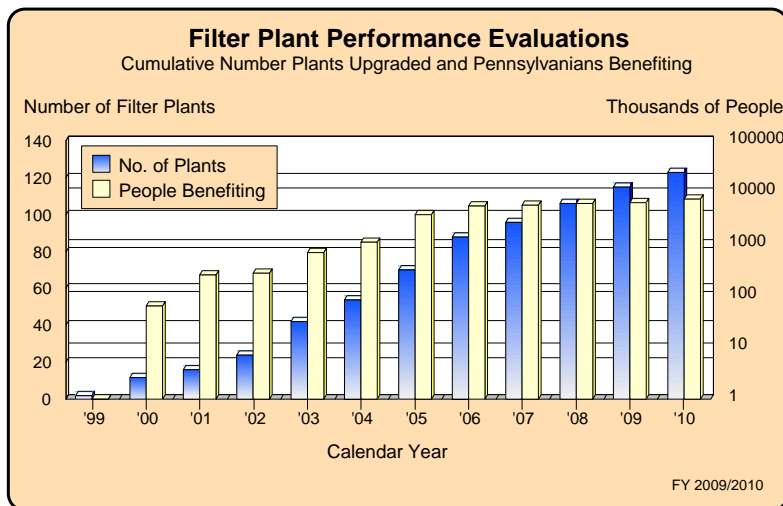


Outcome #3. Approximately 7.4 million Pennsylvanians are benefiting from improved drinking water quality. These consumers receive water from filter plants where DEP has upgraded the performance rating in the FPPE program.

FPPE staff rate the filter plants as “Commendable,” “Satisfactory” or “Needs Improvement” for their ability to remove pathogenic protozoa. The ratings are based on the plant’s ability—and operators’ skill level—to maintain optimal performance over the long-term.

Due to improvements, 8 filter plants serving over 1.1 million people received an upgraded rating during follow-up FPPEs between July 1, 2009, and June 30, 2010. Forty-six plants are currently in the highest rating category of “Commendable.” Since 1999, the program has cumulatively benefited 123 filter plants serving over 7.4 million people. A plant rating may be upgraded twice, from “Needs Improvement” to “Satisfactory” and then again from “Satisfactory” to “Commendable”. Each time an upgraded rating is assigned, significant improvements must occur. Therefore the above chart is cumulative and may include two upgrades for the same filter plant.

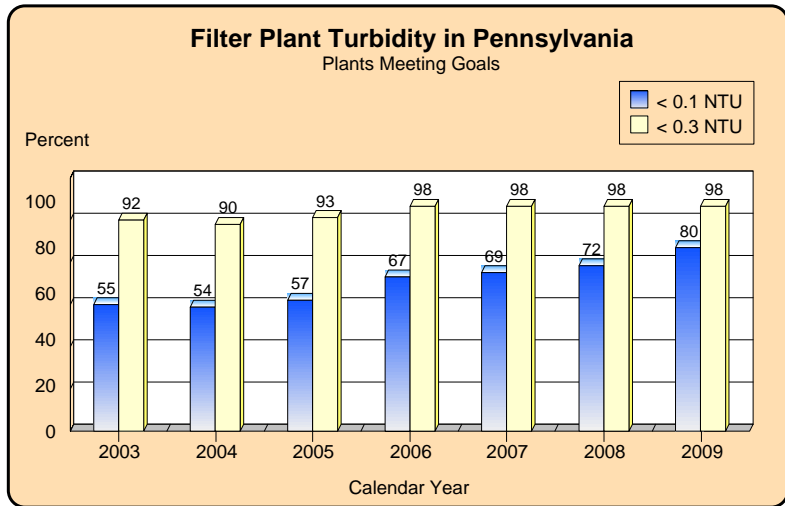
For more information: [Filter Plant Performance Evaluation: Program Information.](#)





Outcome #4. In calendar years 2008 and 2009, the percentage of filter plants meeting the optimization goal of 0.10 NTU for the maximum daily combined filter effluent turbidity was 72 percent and 80 percent, respectively.

Operators at filter plants use “turbidity” to measure the effectiveness of the treatment processes. Basically, turbidity is an indicator of the presence of protozoa, bacteria, viruses and other disease-causing organisms. It is measured as “NTU” or nephelometric turbidity units. Turbidity levels over 0.10 NTU represent an increased risk of a waterborne disease outbreak. DEP uses a Web-based software program called WebOAS (Web Optimization Assessment Software), which determines whether plants across the state are meeting the goals and maximizing public health protection by optimizing performance. Unlike compliance data, the optimization goal is a measure of whether water suppliers are *maximizing* public health protection by *minimizing* risks of a waterborne disease outbreak. Currently, WebOAS data is available for 48 percent (170) of the plants in the state.

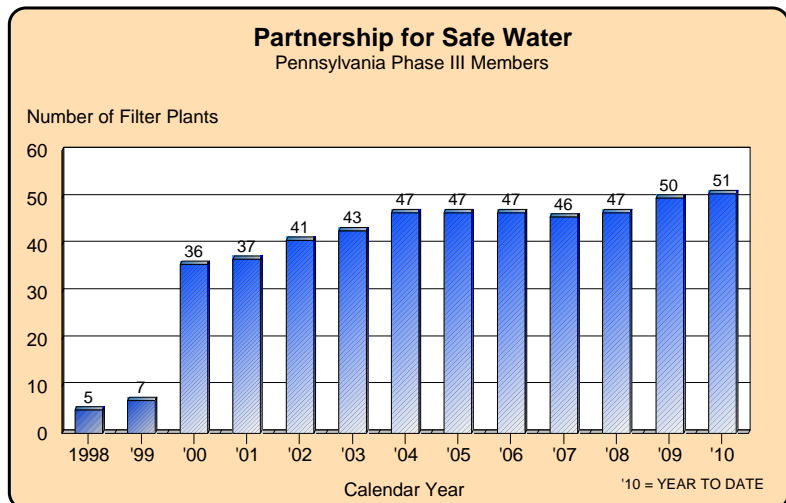


For more information: [Area Wide Optimization Program](#).



Outcome #5. Approximately 4 million Pennsylvanians are benefiting from improved drinking water provided from 51 filter plants that have achieved Phase III of the Partnership program.

Phase III of the Partnership program is a detailed, peer-reviewed report that summarizes a rigorous self-assessment. This phase is specifically geared toward identifying weakness in plant operation, design and administration that could lead to a breakthrough of waterborne disease-causing organisms into finished water that is distributed to consumers. Based on 95th percentile turbidity values, a



national Partnership report revealed that plant performance improved more than 60 percent following the Partnership Phase III self-assessment.

For more information: [Partnership for Safe Water: Annual Data Summary Report](#).



Outputs and Status of the Programs

The following outputs measure the productivity and current status of the programs.



Output/Status #1. Statewide, staff have performed 74 FPPEs between July 1, 2009, and June 30, 2010. At that rate, all plants are on an evaluation cycle of once every 4.8 years.

In July 1999, the FPPE program was decentralized and field operations staff began conducting evaluations at all of the state's 355 surface water treatment plants. DEP and the Allegheny County Health Department performed 1009 evaluations from July 1999 through June 2009. Seventy-four FPPEs occurred between July 1, 2009, and June 30, 2010. DEP's goal is to conduct an FPPE at each plant every 3 years.

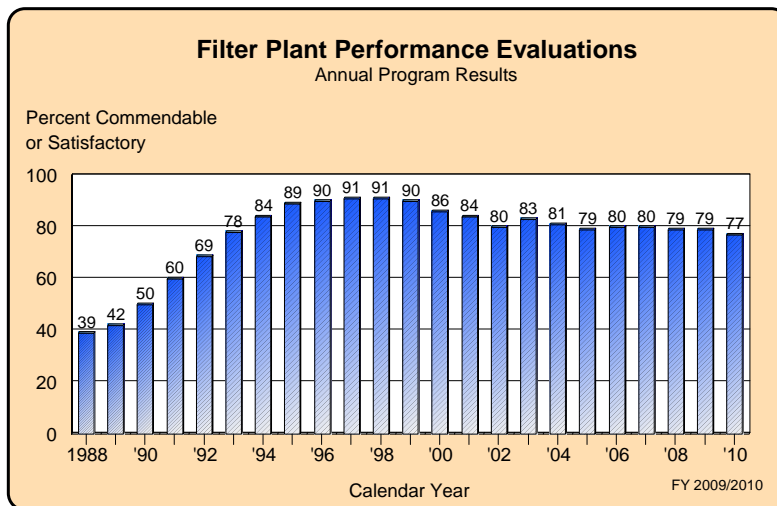
For more information: [Filter Plant Performance Evaluation: Program Information](#).



Output/Status #2. Since the FPPE program's inception in 1988, the percentage of plants that were rated and currently have a "Commendable" or "Satisfactory" performance rating has increased to the current level of 77 percent.

Since 1988, over 1,662 FPPEs have occurred in the state. The drinking water industry and the FPPE protocol, have substantially evolved over this time period.

New research indicates that a higher level of plant performance is necessary to remove pathogens. Also, the U.S. Environmental Protection Agency has promulgated more stringent regulations at the national level. As a result, DEP's on-site FPPEs continue to become more rigorous in order to encourage water suppliers to produce finished water quality that is better than current regulatory standards. Since the FPPE program's inception in 1988, a philosophy of maintaining a rigorous program positions Pennsylvania's filter plants for compliance with future



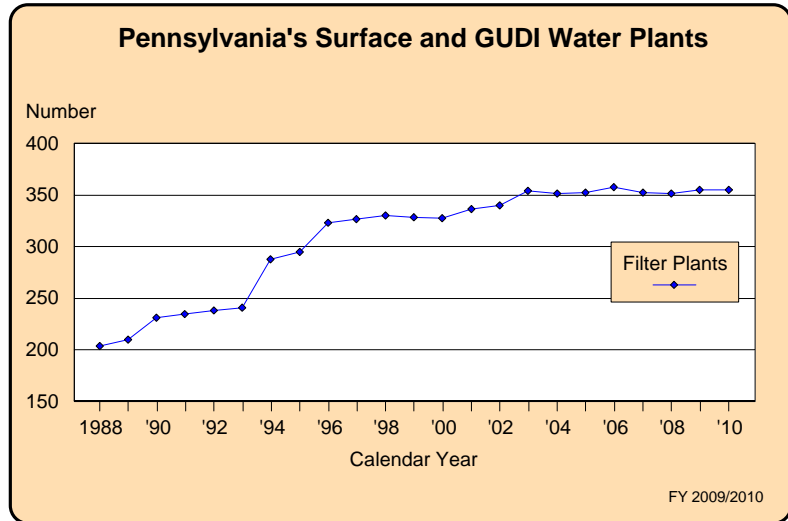
regulations and the prevention of waterborne diseases. Therefore, when taking this into account, the accompanying graph shows that 23 percent of the plants are still not optimized in the state.

For more information: [Filter Plant Performance Evaluation: Program Information.](#)



Output/Status #3. *The state's surface water treatment plants increased from 204 (1988) to the current level of 355 plants, which together serve approximately eight million Pennsylvanians and numerous out-of-state visitors.*

In 1989, the adoption of Pennsylvania's mandatory surface water filtration regulation resulted in a dramatic decline in risks from waterborne giardiasis and cryptosporidiosis. The number of filter plants has increased dramatically. Our exposure to organisms resistant to disinfection, like *Giardia* and *Cryptosporidium*, is much more limited. Today, Pennsylvania's community of surface water treatment plants provides water to over 8 million people. That's nearly 70 percent of the state's residents.

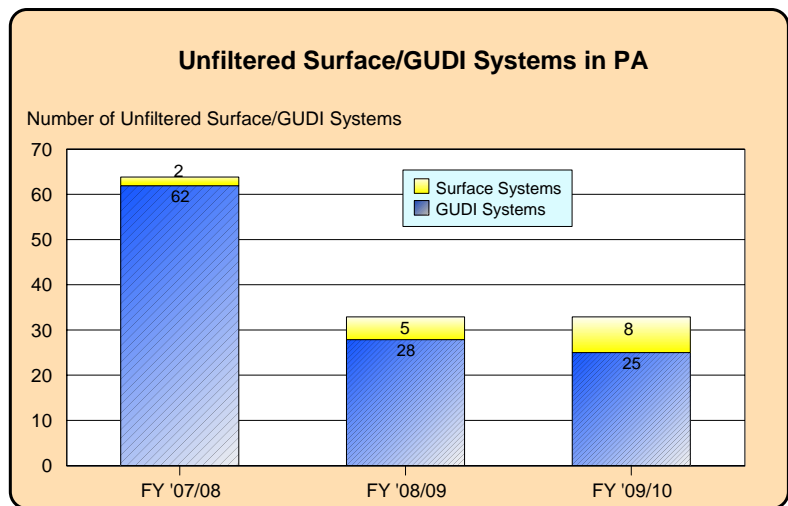


For more information: [Pennsylvania's Surface Water Treatment Plants Improve Dramatically.](#)



Output/Status #4. *There are thirty-five Surface/GUDI water systems that are using unfiltered source water.*

DEP is continuously working with water systems that are using unfiltered surface and GUDI sources by having these systems either abandon their unfiltered sources or install filtration. In most cases, these water systems use disinfection as their only form of treatment. Therefore, DEP is concerned about the public health

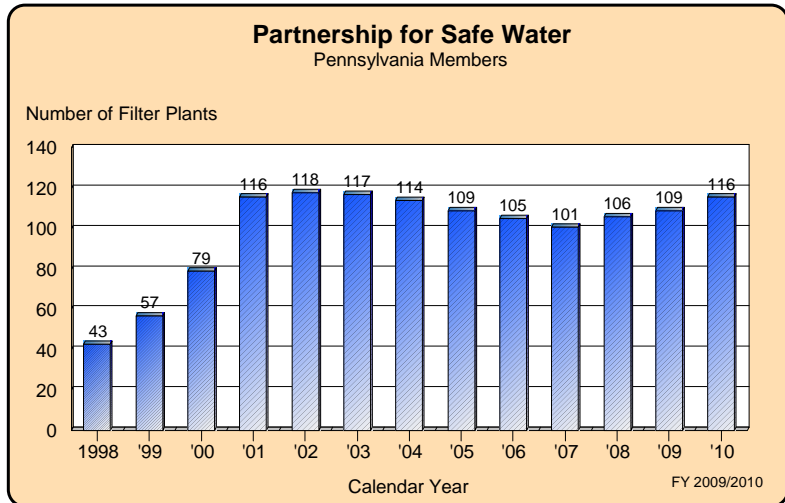


risk that is created when pathogenic organisms, such as *Cryptosporidium*, are not being removed by filtration. During the last two years, the total number of unfiltered systems has remained relatively the same; although, the actual systems within this category may be slightly different. Systems with newly identified surface/GUDI sources are being added to this category; while, systems that have abandoned their source(s) or installed filtration are being removed.



Output/Status #5. With 116 Partnership members serving 6.4 million customers, Pennsylvania is the leader in the nation.

The Partnership is made up of DEP, the U.S. Environmental Protection Agency, the Pennsylvania Section American Water Works Association and other drinking water organizations. Its goal is to implement preventative measures that are based on optimizing treatment plant performance.



Participation shows a continuing commitment toward the goal of providing safe water 100% of the time and achieving operational excellence in water treatment. Currently, Pennsylvania accounts for over 28 percent of the nation’s total membership.

For more information: [Partnership for Safe Water: General Questions and Information.](#)



Output/Status #6. Pennsylvania continues to develop a Distribution System Optimization Program, with one staff dedicated to this objective.

In support of the development of this program, from July 1, 2009 to June 30, 2010, continuous on-line monitoring equipment was deployed at five water systems in Pennsylvania with associated report completion and data analysis. DEP staff also participated in two EPA Area-Wide Optimization Program (AWOP) Distribution System Optimization Field Events designed to implement current distribution system optimization tools and support future program and distribution optimization tool development. Distribution system optimization guidelines have been drafted and should be ready for public dissemination by 2011. These guidelines focus on data collection and management as it relates to drinking water distribution system optimization. Pennsylvania staff also participated on the review committee for the development of the Partnership for Safe Water (PfSW) Self Assessment Guide for Distribution System Optimization.

For more information: [Area Wide Optimization Program](#)