

## Performance Measures of Pennsylvania's Filter Plant Optimization Programs

*The following report<sup>1</sup> contains information on the benefits, outcomes and outputs of the Filter Plant Performance Evaluation program (FPPE), 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, 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 the 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.

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<sup>1</sup> 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.

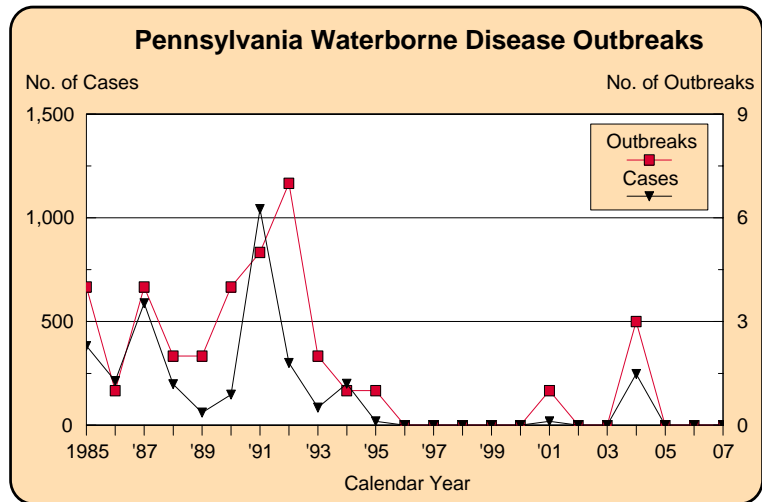
## Outcomes of the Programs

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 October 22, 2004, 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-



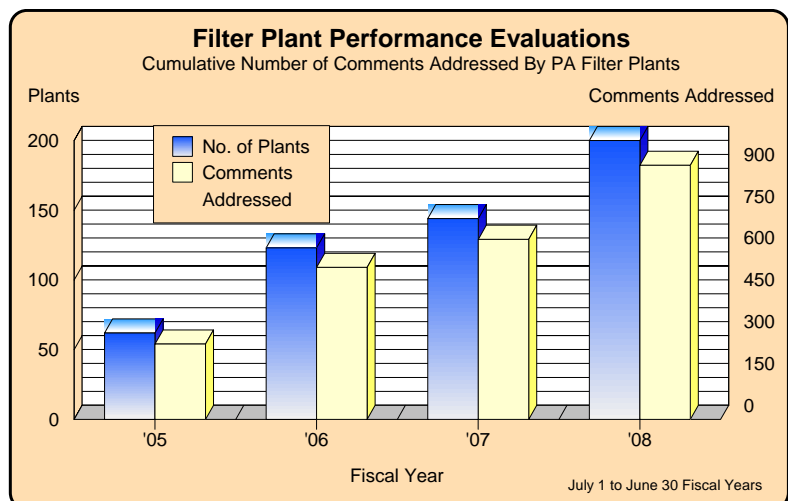
Disease Outbreaks" in their *Morbidity and Mortality Weekly Report*. According to the report, waterborne disease outbreaks in the state remain low. The FPPE program is one of the many initiatives in Pennsylvania's Safe Drinking Water Program that have reduced our disease outbreaks. In recent years, there 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 2007-2008 no waterborne disease outbreaks were reported in Pennsylvania, according to official CDC records.

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



### **Outcome #2. Between July 1, 2004, and June 30, 2008, public water suppliers in Pennsylvania corrected 911 deficiencies at 216 filter plants 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



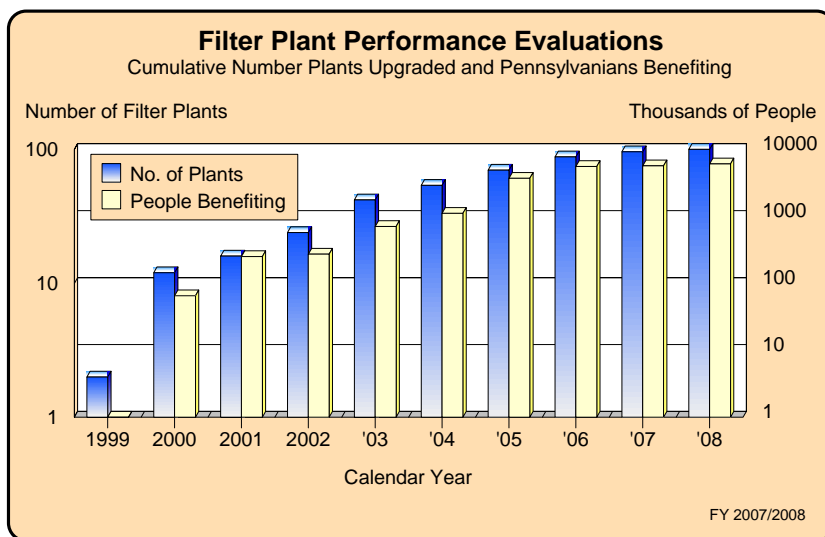
report that summarizes an assessment of plant operations, equipment and water quality conditions. The report also concludes whether the water supplier corrected problems that DEP identified during a previous FPPE. Fiscal year 2004-2005 (July 1 through June 30) is the first year when total corrections were tallied across the state. Overall, FPPEs have enhanced the skills of water supply operators and have improved drinking water quality. In fiscal year 2007-2008, statewide a total of 72 plants addressed 265 comments. Cumulative over the last four fiscal years, 911 deficiencies comments were addressed at 216 filter plants. 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 6.1 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, 10 filter plants serving over 413,759 people received an upgraded rating during follow-up FPPEs between July 1, 2007, and June 30, 2008. Forty-one plants are currently in the highest rating category of “Commendable.” Since 1999, the program has cumulatively benefited 106 filter plants serving over 6.1 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.

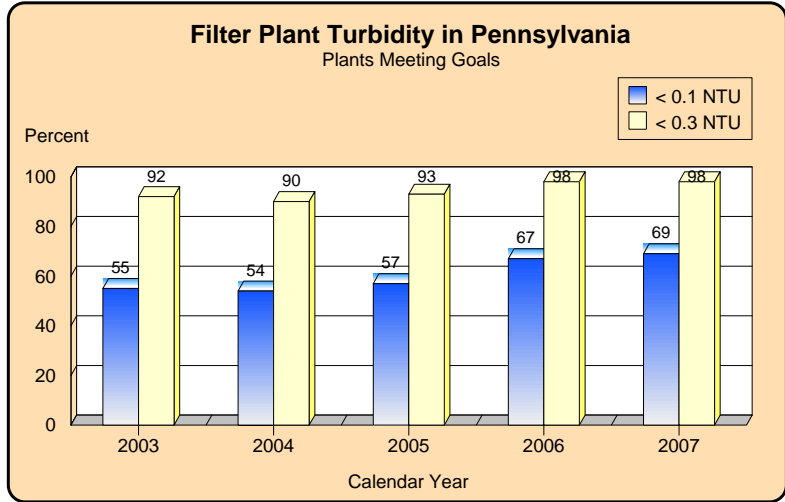


For more information: [Filter Plant Performance Evaluation: Program Information.](#)



**Outcome #4.** In calendar years 2006 and 2007, the percentage of filter plants meeting the optimization goal of 0.1 NTU for the maximum daily combined filter effluent turbidity was 67 percent and 69 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 0.1 NTU represent an increased risk of a waterborne disease outbreak. DEP uses an Excel-based

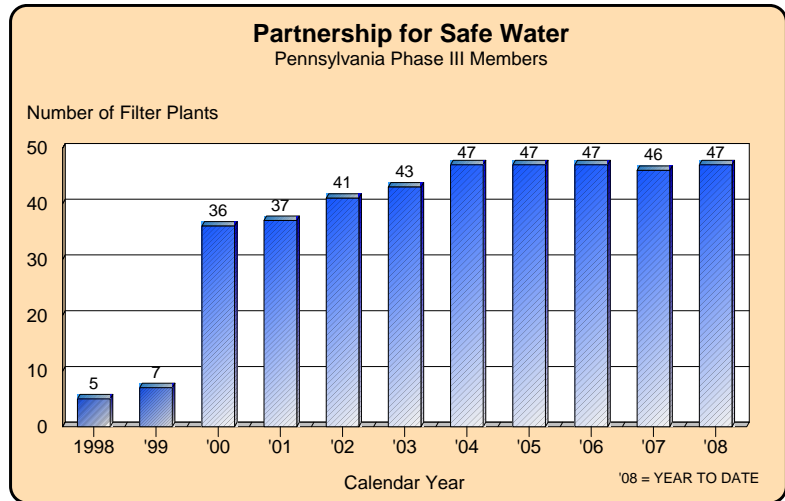


software program called “Optimization Assessment Software,” which determines whether plants across the state are meeting the goals and maximizing public health protection by optimizing performance. Unlike compliance data, the optimization goal is a measure of whether water suppliers are *maximizing* public health protection by *minimizing* risks of a waterborne disease outbreak. Currently, data is available for 73 percent (257) of the plants in the state. For more information: [Area Wide Optimization Program](#).



**Outcome #5.** Approximately 3.7 million Pennsylvanians are benefiting from improved drinking water provided from 47 filter plants that have achieved Phase III of the Partnership program.

Phase III of the Partnership program culminates in 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 50 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.

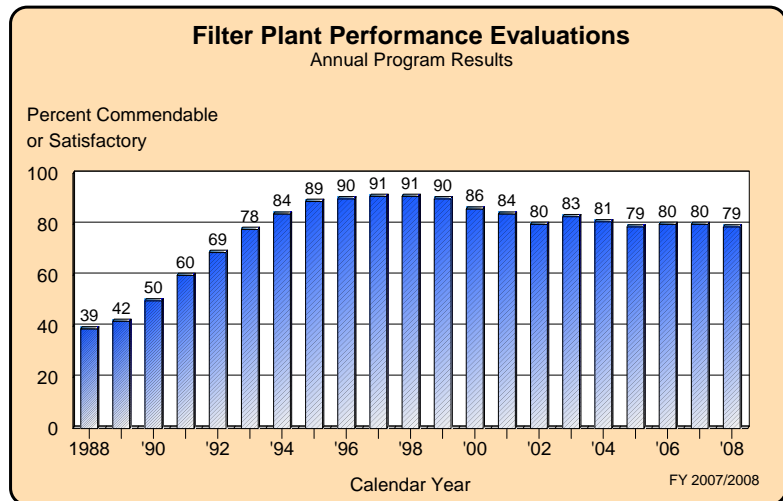


**Output/Status #1.** Statewide, staff have performed 104 FPPEs between July 1, 2007, and June 30, 2008. At that rate, all plants are on an evaluation cycle of once every 3.4 years.

In July 1999, the FPPE program was decentralized and field operations staff began conducting evaluations at all of the state’s 352 surface water treatment plants. DEP and the Allegheny County Health Department performed 855 evaluations from July 1999 through June 2008. One hundred four FPPEs occurred between July 1, 2007, and June 30, 2008. DEP’s goal is to conduct an FPPE at each plant every 3 years. In the accompanying graph, the lower bars represent more frequent FPPEs within the region.

**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 79 percent.

Since 1988, over 1,494 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 20 percent of the plants are still not optimized in the state.

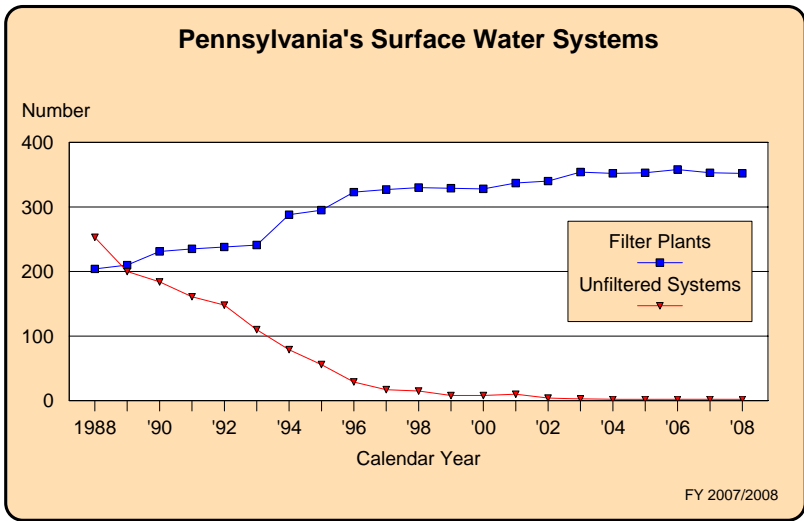


For more information: [Filter Plant Performance Evaluation: Program Information](#).



**Output/Status #3. The state's surface water treatment plants increased from 204 (1988) to the current level of 352 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. For example, the number of public water systems using unfiltered surface water sources decreased from 277 in 1985 to 2 in the year 2003. In most cases, these water systems used disinfection as the only form of treatment and did not filter the water. The two remaining small systems only serve a combined population of less than 500 people. Conversely, the number of filter plants has increased dramatically. Our exposure to organisms resistant to disinfection, like *Giardia* and *Cryptosporidium*, is much more limited.

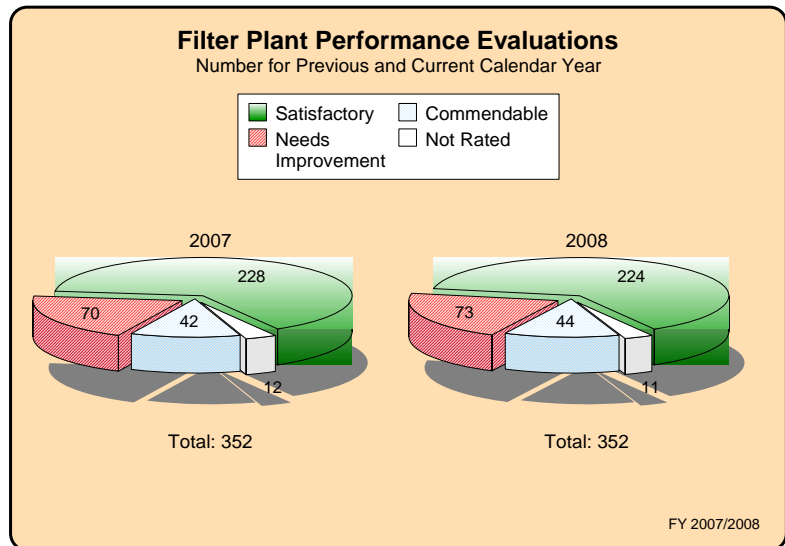


For more information: [Pennsylvania's Surface Water Treatment Plants Improve Dramatically.](#)



**Output/Status #4. Eleven filter plants still need an FPPE and 73 plants hold a "Needs Improvement" performance rating in Pennsylvania.**

DEP will continue to work with the state's water systems that remain in the "Needs Improvement" status. The plants in this status serve over 541,858 Pennsylvanians. In addition, newly constructed filter plants in Pennsylvania still need a performance rating under the FPPE program. The graph does not include approximately 62 unfiltered systems using ground water under the direct influence that may need to construct new filter plants.



**Output/Status #5. With 96 Partnership members serving 4.8 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 24 percent of the nation's total membership.

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

