Safe use of water is critical in fresh fruit and vegetable production. Water can move harmful microorganisms originating from animal or human feces across a large area or a large volume of product. The water source and how and when the water is applied greatly influence the risk for crop contamination to occur. This fact sheet covers some of the risk factors associated with the water we use to grow, harvest, and handle fresh produce and how to reduce the risk of contamination.

**Pre- Versus Postharvest Water**
When we think about agricultural water and food safety, it is useful to consider the many ways water is used during production, harvesting, and handling fresh produce. Preharvest water is used for crop irrigation, cooling, frost protection, as a carrier for fertilizers and pesticides, and for washing tools and harvest containers, handwashing, and drinking. Postharvest water is used for washing and transporting produce, cooling, applying waxes and coatings, handwashing, and drinking.

**Water Source Increases or Decreases Risk**
Sources of water used on the farm can be grouped into three types based on the likelihood that they can become contaminated: (1) surface water, (2) well water, and (3) municipal water.

**Surface water** includes ponds, open springs, lakes, rivers, and streams. It has the highest risk for contamination because we often do not have control over what might be entering the water source upstream at any given time. Access of wild and domestic animals, drainage from upstream cattle operations, runoff from manure piles, and sewage discharges are all possible causes for sudden and unexpected surface water contamination.

Water obtained from the **wells** on your farm generally has an intermediate risk. The potential for well water to become contaminated with harmful microorganisms is greatest when they are located too close to flood zones, septic tanks, cesspools, animal agricultural sites, manure storage areas, or drainage fields. Risks are greatly increased if the wells have not been constructed properly, or if the well casing has become cracked over time. However, if wells are properly sited, constructed, and maintained, they can be a reliable source of contaminant-free water.

**Municipal water** obtained from your local water authority has the lowest level of food safety risk. We expect this to be the safest type of water because it is required by law to meet the highest chemical and microbiological drinking water standards, and it is tested regularly to ensure that it is consistently safe to drink.
• Maximize the time between overhead irrigation and harvest.
• Consider switching to well or municipal water for overhead irrigation and crop spraying methods.

Well Water
• Monitor your well water quality at least twice during the growing season.
• Check that your well is installed correctly. There should be at least 2 inches of grout maintained between the well casing and the surrounding soil to prevent infiltration of surface water. Because well drilling is not regulated in Pennsylvania, your well may not have the proper casing and grout to exclude surface water contaminants.
• Maintain a 100-foot radius around the well that is kept free from animal intrusion, manure piles, or other contamination sources.
• Install a sanitary well cap to prevent insects or small mammals from entering the well.
• Inspect your wells at least once each year. Check that the well cap and casing seal are in good condition.

Monitoring Water Quality
Regular water testing can give you useful knowledge about the safety of water and how it might vary during the season or from year to year. Water testing labs test for E. coli instead of Salmonella spp., Listeria monocytogenes, hepatitis A virus, parasites, and other sources of human illness because it can be a useful indicator of these and other pathogens.

Growers who sell their produce through wholesale markets may be required to test their water as a condition of sale. Contact your buyers to make sure you understand their testing requirements. The Food Safety Modernization Act will require water testing for produce growers regulated under the law.

Where Can I Test My Water?
Penn State’s College of Agricultural Sciences has established a farm food safety irrigation water testing program to facilitate and encourage testing by fresh produce growers in Pennsylvania. Instructions on how to submit a water sample to the laboratory are provided with test kits available from Penn State Extension offices. Several private laboratories in the state also perform E. coli testing on agricultural water. A list of labs may be found in the “Resources” section of the Penn State Extension Farm Food Safety website at extension.psu.edu/food/safety/farm.

Many labs, including the Penn State College of Agricultural Sciences, conduct potable water testing. Make sure to follow water testing directions included in the test kits.

What Standard Does My Water Need to Meet?
Postharvest water used for washing and transporting produce, cooling, applying waxes and coatings, and handwashing and drinking must meet the drinking water standard.

The most commonly used microbial standard for preharvest agricultural water (crop irrigation, frost protection, as a...
carrier for fertilizers and pesticides, for washing tools and harvest containers) is based on the U.S. Environmental Protection Agency (EPA) standards for recreational water. This standard says that you may have no more than 235 \( E. \ coli \) bacteria in a single 100-milliliter sample and that the average for the last five samples can be no more than 126 \( E. \ coli \) bacteria per 100 milliliters. High \( E. \ coli \) levels do not always predict the presence of human pathogens, but they are the only true indicator of fecal contamination and thus suggest conditions where pathogens might be present. It is important that you ask your testing laboratory to provide you with the actual number of \( E. \ coli \) bacteria in your sample, not just a confirmation of whether they are absent or present.

**Additional Resources**

Food Safety Modernization Act Proposed Rule for Produce Safety: see [www.fda.gov/FSMA](http://www.fda.gov/FSMA) for information on specific provisions

Penn State Agricultural Analytical Lab Farm Food Safety (GAP) Water Testing: [agsci.psu.edu/aasl/water-testing/farm-food-safety-gap-water-testing](http://agsci.psu.edu/aasl/water-testing/farm-food-safety-gap-water-testing) or call 814-863-0841

Penn State Extension Farm Food Safety: [extension.psu.edu/food/safety/farm](http://extension.psu.edu/food/safety/farm)

Penn State Extension “Safeguarding Wells and Springs from Bacterial Contamination”: [extension.psu.edu/natural-resources/water/drinking-water](http://extension.psu.edu/natural-resources/water/drinking-water)
