

# UV vs. Chlorination



**AIR & WATER QUALITY INC.**

160 US Route 1 • Freeport, ME 04032  
388 Bangor Road • Ellsworth, Me 04605  
Tel # (800)698-9655 • awqinc.com

## Introduction

Air & Water Quality (AWQ) has installed many ultra violet (UV) systems and chlorination systems. We have investigated both techniques for the purposes of primary disinfection. We have considered the following key points when deciding the best approach.

## Key points

- Coliform bacteria are found in or on all living and decaying organic matter. The presence of Coliform bacteria indicates the presence of these materials. As a result, coliform bacteria are considered indicator organisms.
- Typically the coliform bacteria found in well water is, in and of itself, not dangerous to our health.
- Since organic matter is not present in ground water, any indication of its presence means there is contamination leaking into the well directly from the surface. The easiest way to identify this contamination is to test for coliform bacteria.
- The surface contamination indicated by the presence of coliform bacteria can bring with it many other pathogens of which some can and will be viruses. Viruses must be inactivated by 99.99% to meet current drinking water standards.
- To achieve the 4 log (99.99%) inactivation of viruses with UV, the water would have to receive a dose of 186 mJ/cm<sup>2</sup>. Current NSF standards for UV systems only require a dose of 40 mJ/cm<sup>2</sup>. To obtain the required dose, at least 5 NSF rated units would be required.
- The installation of a UV light will inactivate the only organism (coliform) that will indicate there is surface water contamination without removing the rest of the pathogens. With a UV system in place, a water test will show no coliform and you will think you are safe even though other pathogens may be present. In other words, the UV system will only cover up the problem not solve the problem.
- It is easy for the homeowner to determine if a chlorination system is functioning by doing a simple chlorine test. Most installed residential UV systems do not have any kind of UV monitor to know if they are functioning properly. Many water treatment companies will not install UV systems with monitors because the monitors have been found to be very unreliable.

- The Maine Drinking Water Program (DWP) discourages the use of UV. The following is the statement posted on the front of the MAINE DRINKING WATER PROGRAM (DWP) UV POLICY<sup>i</sup>

"IMPORTANT NOTIFICATION: The EPA Ground Water Rule (GWR) which takes effect in 2009 requires ground water systems with E. coli present in the raw water to install treatment capable of 4-log inactivation or removal of viruses. Currently available UV treatment equipment may not (as of the date of this policy, most single units do not) meet this level of virus inactivation unless several units are installed in series, which is a very expensive method of maintaining GWR compliance. Chlorination systems on the other hand, can be modified to meet the GWR virus inactivation requirement by simply increasing the chlorine dose or providing more contact time, both of which will likely be less expensive than providing 4-log virus inactivation with a UV disinfection system. Therefore, when evaluating UV disinfection as an alternative, please be aware that after a UV system is installed and approved per this policy, the presence of E. coli may require the subsequent installation of a continuous chlorination system or substantial additional UV disinfection equipment in order to meet the requirements of the GWR."

Title: UV Policy  
SOP ID: To be assigned Date: Dec 26, 2008  
Revision Number: G  
Date of Revision: Dec 26, 2008  
Maine Drinking Water Program

## Conclusion-

The safest least expensive way to control microorganisms in well water is to use chlorine (sodium hypochlorite also known as bleach) for disinfection.

<sup>i</sup> Note- the notice refers to E. coli which is a type of coliform bacteria.

AIR & WATER QUALITY INC.  
160 US Route 1, Freeport, ME 04032  
388 Bangor Road, Ellsworth, ME 04605  
1(800)-698-9655 awqinc.com