Groundwater Under the Direct Influence of Surface Water

The federal Surface Water Treatment Rule requires that all public water systems that use surface water, or use groundwater under the direct influence of surface water, meet performance standards of filtration and disinfection to deactivate pathogenic organisms within the water. This requirement is addressed in Oregon in Administrative Rule 333-061-0032. The fact that you have received this flyer indicates that Oregon Drinking Water Services staff has concluded that you may be susceptible to direct surface water influence.

What is groundwater under the direct influence?

Groundwater under the direct influence (GWUDI) of surface water occurs when, because of its proximity to surface water and the character of the aquifer, pathogenic organisms can move from the surface water source to the well or infiltration gallery.

What are the pathogenic organisms of concern in the GWUDI situation?

Pathogens, such as *Giardia* and *Cryptosporidium*, are often found in surface water, and can cause gastrointestinal illness and other health risks. In many cases, this water needs to be filtered and disinfected through the use of additives such as chlorine to inactivate (or kill) microbial pathogens.

*Cryptosporidium* is a significant concern in drinking water because it contaminates surface waters used as drinking water sources, it is resistant to chlorine and other disinfectants, and it has caused waterborne disease outbreaks. It may be especially harmful to people with weakened immune systems (e.g., infants and the elderly) and sometimes fatal in people with severely compromised immune systems (e.g., cancer and AIDS patients).

In the photomicrograph above, *Giardia* and *Cryptosporidium* are shown as seen through a microscope. These organisms are very small. The white bar in the diagram is approximately 10 microns (0.0004 inches) in length.

What causes GWUDI?

Groundwater typically flows towards streams or lakes. In some cases, however, the reverse may be true. Water flowing from a surface water source can occur naturally, as water moves back and forth from stream to the aquifer, or when the water level in the stream of lake rises to a higher level as a result of a storm event or during an extended rainy season. Water may also be drawn into the aquifer from a stream as a result of the pumping of water from a nearby well.
How far can these pathogens travel in the aquifer?

Because of their small size, *Giardia* and *Cryptosporidium* can readily move through the open spaces in the aquifer, i.e., through the openings between sand and gravel size particles or in fractures in bedrock. However, the farther they travel the more likely it is that they will be filtered out of the water by natural processes. Through previous studies, we believe that the risk related to these organisms is substantially reduced after travel of 200 feet in sand and gravel, and after 500 feet in fractured bedrock or layered volcanic rocks.

How do we determine if we are GWUDI?

Analysis of water for *Giardia* or *Cryptosporidium* is complex and costly. The EPA has indicated that monitoring source water for coliform bacteria may serve as a useful surrogate for the other pathogens. Consequently, we will require monthly coliform testing at the wellhead of the source for a period of up to 12 months. If at any time, the system fails to monitor, or experiences a confirmed positive *E.coli* test, the water system would be required to have two microscopic particulate analyses performed on the water. This latter test evaluates the occurrence of surface water organisms in general, e.g., diatoms and other algae, and generates a relative risk factor for pathogenic organisms.

What if we are GWUDI?

Public water systems that use groundwater under the direct influence of surface water as a source of their drinking water, must comply with the federal Surface Water Treatment Rule and the Long Term Enhanced Surface Water Treatment Rule (LT1 and LT2). Compliance with these two rules will generally require 3.0 log inactivation through a combination of filtration and disinfection.

EPA estimates that full compliance with LT1 and LT2 will significantly reduce the incidence of cryptosporidiosis - the gastrointestinal illness caused by ingestion of *Cryptosporidium*.

What is the timeline for the GWUDI evaluation?

Monitoring for the GWUDI determination is best accomplished during the Fall, Winter, Spring seasons. Therefore, we recommend that water systems begin their coliform monitoring by the fall of 2006 so that this seasonal monitoring can be completed by October, 2008.

Where can I get further information?

Fact Sheets on *Giardia* and *Cryptosporidium* are available at


Information regarding the Surface Water Treatment Rule and LT1 and LT2 is available at

http://www.epa.gov/safewater/therule.html#Surface

www.epa.gov/OGWDW/disinfection/lt2/index.html

Who can I contact?

Russell Kazmierczak

OHA Drinking Water Service

444 A Street

Springfield, OR 97477

Phone: 541-726-2587 ex 26

Email: russell.a.kazmierczak@state.or.us