The drop on water

Iron Bacteria and Sulphur Bacteria

Iron bacteria and sulphur bacteria are small living organisms that naturally occur in soil, surface water, and groundwater.

Sources

Iron bacteria and sulphur bacteria are naturally occurring organisms in the environment.

Iron bacteria combine iron (or manganese), present in water, with oxygen. The iron bacteria may form large masses of an orangey-brown slime.

There are two categories of sulphur bacteria: sulphur oxidizers and sulphur reducers. **Sulphur-oxidizing bacteria** chemically change sulphide present in drinking water into sulphate. **Sulphur-reducing bacteria** live in oxygen-deficient environments. They break down sulphur compounds present in water, producing hydrogen sulphide gas in the process. Of the two types, sulphur-reducing bacteria are the more common.

Bacteria may be introduced during drilling or servicing of a well or when pumps are removed for repair and laid on the ground. Iron bacteria and sulphur bacteria can also exist naturally in groundwater. Iron bacteria are more common than sulphur bacteria, because iron is more abundant in groundwater.

QUICK FACTS

- Iron bacteria or sulphur bacteria may be introduced during drilling, servicing, or repairing of a well, or may occur naturally in the groundwater.
- Iron bacteria and sulphur bacteria can coat the inside of the water system and create many water quality and quantity problems.
- Iron bacteria and sulphur bacteria can be detected through special laboratory testing.
- Iron bacteria and sulphur bacteria are not known to cause health problems in humans.
- Homeowners should use one of several treatment options to remove iron bacteria and sulphur bacteria from well water. Chemical treatments, especially with acids, should only be done by qualified professionals.
- In most cases, the bacterial populations will build-up again with time, and regular treatments may be required.
- Homeowners should take precautions to prevent iron bacteria and sulphur bacteria from entering a well.

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Iron Bacteria and Sulphur Bacteria in Drinking Water

Iron and sulphur bacteria can create problems such as

- sudden, undesirable colour, stains or deposits
- stained plumbing fixtures and laundry
- unpleasant tastes and odours commonly reported as "swampy," "cucumber," "sewage," "rotten vegetation," or "musty," which may be more noticeable when the water has not been run for several hours
- reduced well yield and restricted water flow in distribution lines
- plugged water treatment equipment

The problems listed above are typical of iron bacteria or sulphur bacteria. However, objectionable stains, tastes, or odours may also be caused by iron, sulphate, hydrogen sulphide, or manganese.

Iron Bacteria

Iron bacteria form rusty deposits, bacterial cells, and a slimy material that causes unpleasant smells and corrosion of plumbing materials. The sticky slime is typically rusty (reddish) in colour, but may be yellow, orange, brown, or grey. It can also appear as filament-like particles in the water or cause water to be a yellow, orange, or red colour. It can clog well screens, well casing, pipes, pumping equipment, and plumbing materials.

Sulphur Bacteria

Sulphur-oxidizing bacteria produce effects similar to those of iron bacteria – a dark slime that can clog plumbing and well materials.

The most obvious sign of a sulphur-reducing bacteria problem is the distinctive "rotten egg" odour of hydrogen sulphide gas. See our fact sheet on hydrogen sulphide for more information.

Health Risks

Iron bacteria and sulphur bacteria are not known to cause health problems or disease in humans.

Testing

If you suspect iron or sulphur bacteria is present in your well water, contact an accredited water testing laboratory. A specific laboratory test is necessary to identify iron bacteria or sulphur bacteria in well water. Find a list of accredited water testing laboratories at **www.gov.ns.ca/nse/water/waterlabs.asp** or see the Yellow Pages under "laboratories."

Get the special sampling bottles and instructions on proper sampling from the laboratory.

The special laboratory test for analyzing water samples for iron or sulphur bacteria can be relatively expensive and time consuming. The cost for each test can range from $60 to $100.

Solutions

Iron bacteria and sulphur bacteria are often difficult to tell apart, because the symptoms are similar and often both types may be present. Fortunately, both types of bacteria can be treated using the same treatment techniques.

Eliminating iron or sulphur bacteria can be extremely difficult and only partially successful once they are established in the well. Treatment techniques used to remove or reduce iron or sulphur bacteria include physical removal, chemical treatment, and pasteurization.

Physical removal is typically done as a first step in heavily infected wells. The pumping equipment in the well must be removed and cleaned, normally by a qualified well contractor or pump installer. The well casing is then scrubbed. Physical removal is usually followed by chemical treatment.

Treatment

Chemical treatment is the most commonly used method for removing iron bacteria or sulphur bacteria. Three groups of chemicals are most typically used:

- Disinfectants, such as chlorine, are the most commonly used chemical for treating iron or sulphur bacteria. Shock chlorination involves flushing the water system with large amounts of chlorine. It can be an effective way of controlling iron or sulphur bacteria, but may need to be repeated.

REGULAR TESTING

Homeowners are responsible for monitoring the quality of their well water:

- Test for bacterial quality every 6 months.
- Test for chemical quality every 2 years.
- Test more often if you notice changes in physical qualities – taste, smell, or colour.

Regular testing alerts you to problems with your drinking water.

Iron Bacteria and Sulphur Bacteria

- Surfactants, which are detergent-like chemicals, are generally used in conjunction with other chemical treatment.
- Acids (and bases), which should only be handled by trained professionals.

Pasteurization has also been successfully used to control iron bacteria or sulphur bacteria. Steam or hot water is injected into the well and kept at 60°C for 30 minutes. Pasteurization is effective, but may be expensive.

The treatment methods listed above will likely solve the immediate aesthetic problems associated with iron or sulphur bacteria (odour, slime, etc.), but they may not be long-term solutions. Iron and sulphur bacteria may build up again a few months after treatment. However, both iron and sulphur bacteria are easier to control after the initial treatment.

The best treatment for both iron and sulphur bacteria is prevention.

Tips for preventing iron or sulphur bacteria from entering a well:

- Disinfect any water placed in a well for drilling, repair, or priming of pumps. Never use water from a lake or pond in your well.
- Make sure that the well casing is watertight, properly capped, and extends 152 millimeters (6 inches) or more above ground.
- Keep pumps, well pipes, and well equipment off the ground when they are being repaired – laying them on the ground can cause them to become contaminated with iron or sulphur bacteria.
- Disinfect the well, pump, and plumbing after repairs.

Considerations

Be aware of the risk of bacteria entering your water system whenever work is done on its outside parts. Take the precautions listed above. Check your water system regularly and treat promptly.

FOR MORE INFORMATION

Contact
Nova Scotia Environment at
1-877-9ENVIRO
or 1-877-936-8476

www.gov.ns.ca/nse/water/

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