

SHOCK CHLORINATION FOR IRON BACTERIA CONTROL August 1999

Iron Bacteria and Its Effects

Water systems are often infested with iron bacteria. Although they do not cause disease in humans, these bacteria form a reddish brown slime which can damage or destroy a water system. Suspended in water, they can ruin its taste, stain laundry and corrode or clog water pumps, pipes, pressure tanks, filters, screens and valves.

Deposits of slime often form on household fixtures and toilet tanks. Zeolite water softeners quickly become useless as the slime coats the mineral. Deposits of iron bacteria may reduce water flow capacities and pressures.

Use of contaminated pumping or well drilling equipment may introduce iron bacteria into deep wells. Once in the well or water system, the bacteria grow and spread.

Control of Iron Bacteria

Iron bacteria occurs widely in Manitoba. The organisms live in water and feed on dissolved iron or iron in contact with the water. These bacteria may be found in shallow or deep wells, dugouts and springs. Water from wells driven in swampy land or sloughs are often infested with it.

One of the simplest and most effective measures to control iron bacteria in wells and water distribution systems is through the application of shock chlorination, a process which flushes large quantities of chlorine into the water system. This procedure is recommended twice a year, each spring and fall, to maintain water quality.

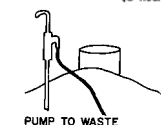
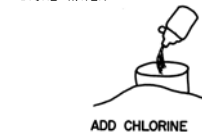
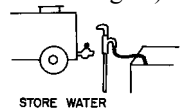
With shock chlorination, organic material which builds up in the water system is oxidized. Pathogenic bacteria and taste or odour producing organisms such as iron bacteria and sulphate reducing bacteria are destroyed. To prevent the introduction of iron bacteria, the well and water distribution system should be shock chlorinated after any construction work, equipment installation or repair.

Tests

A microscopic examination of iron sludge deposits is necessary to identify iron bacteria. In the rural home, an inspection of the inside of the toilet flush tank for slime deposits will indicate the presence of bacteria. It is distinguished by slime iron deposits, as compared to the hard gritty coating produced by dissolved metallic iron deposits.

Procedures for Shock Chlorination

The following procedure for applying shock chlorination is suitable for most rural water systems, but not for flowing wells. (For information on shock chlorination of flowing, or large diameter wells, contact your regional Farm Water Source Technologist.)



1. Thoroughly clean the well, removing all floating debris. Scrub or hose foreign material from the well curbing or casing.
2. Pump the well until the water is clear.
3. Make provisions for storing enough water to meet household and farm needs for 12 hours.
4. Pump 1200 l (300 gal.) of water into clean storage close to the well head.
5. Pour 10 l (2 gal.) of household laundry bleach (5.25% chlorine) into the well. An equivalent strength of chlorine may be obtained by substituting 5 l (1 gal.) of sodium hypochlorite (12% chlorine) or 600 g (22 oz.) by weight of calcium hypochlorite (70% chlorine).
6. Allow at least one hour for the water to return to the non-pumping level in the well.
7. Pour 10 l (2 gal.) of household laundry bleach into the 1200 l (300 gal.) of water stored close to the well head. Syphon this mixture into the well. **This procedure is essential** as it forces the chlorinated water out of the bottom of the well into the aquifer. If the backwash procedure is not followed, beneficial effects may last only two to three weeks.
8. Open each hydrant, faucet, etc. in the distribution system and let it run until the water at the outlet has a chlorine odour.
9. Leave the chlorinated water in the distribution system for at least eight hours. Plan to do this overnight.
10. Pump the solution to waste on the ground surface until all odours have disappeared. Do not run this water through the filters, softeners or hot water tanks. Wastewater is not harmful to hardy plant growth (woody plants and grass) but should not be used for watering flowers or other tender species.
11. Following main system flushing, backwash all filters and softeners, and flush the hot water tank.

Effect of Shock Chlorination

This table demonstrates the effectiveness of shock chlorination in reducing the iron content of several wells.

Well	Iron Content		
	Before Chlorination	After Chlorination	5 Months Later
A	over 10 mg/l	nil	1 mg/l
B	over 10 mg/l	2 mg/l	5 mg/l
C	over 10 mg/l	3 mg/l	5 mg/l
D	over 10 mg/l	3 mg/l	7 mg/l
E	6 mg/l	3 mg/l	5 mg/l

These results show that iron bacteria can be controlled, but not entirely eradicated with shock chlorination. Dissolved iron may remain after the shock chlorination process.

Amount of Chlorine

It is difficult, if not impossible to tell in advance the exact quantity of chlorine required to shock chlorinate a water system. When pumping the solution from the well after chlorination, it can be determined whether or not the correct amount of chlorine carrier was used.

These characteristics of waste water will help you know if the correct amount of chlorine has been applied:

- A distinct foul or “slough” odour indicates insufficient chlorine was used. The chlorination procedure should be repeated.
- A strong chlorine odour and difficulty in removing the chlorine from the well indicates too much chlorine was applied.
- When the correct quantity of chlorine is used, the wastewater will have a chlorine odour, but all odours will disappear after the well has been pumping continuously for several hours.

Safety

The simplest and safest product to use for shock chlorination is **sodium hypochlorite**, which is a strong bleach containing either 6.25 or 12% chlorine. When applying it, avoid splashing since the strong alkaline solution can cause severe eye and skin damage. Because sodium hypochlorite is corrosive, a corrosion-resistant material should be used for handling and dispersing. Rubber gloves, aprons, goggles and other suitable protective equipment should be used.

Note: If sodium hypochlorite contacts acid, the sodium hydroxide content will be neutralized releasing chlorine gas. (This will be pronounced if muriatic acid is used). Use of chlorine gas is not recommended for shock chlorination of farm wells since it is toxic and can cause damage to lungs when inhaled.

For further information, please contact your Regional Farm Water Source Technologist at one of the following locations:

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