Water Facts

Manitoba Water Stewardship

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CONTROLLING CISTERN WATER ODORS

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Decaying organic matter such as bird droppings, leaves, insects and bacteria cause unpleasant odors in cistern water. Where roof run-off water is being stored in a cistern, most of the organic matter enters the cistern with the first few gallons that flush the roof. Figure 1 demonstrates a gutter guard to keep leaves and large objects from entering the eavestrough. Figure 2 shows how the first barrel of water from each rainfall can be prevented from entering the cistern. The barrel should be emptied after each rainfall.

It is impossible to prevent all organic matter from entering cisterns; therefore, treatment of water in the cistern to reduce odors is beneficial.

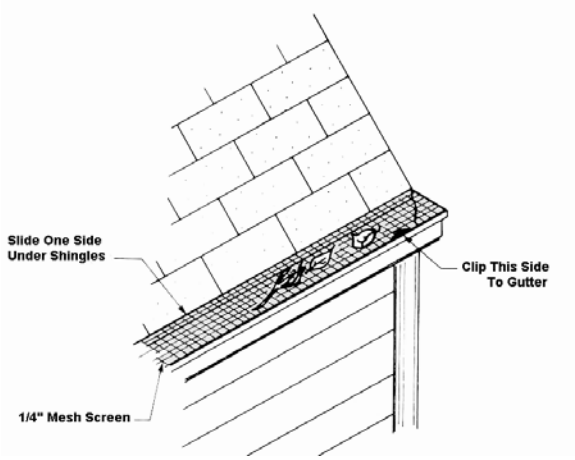

Figure 1: Eaves Trough Guard

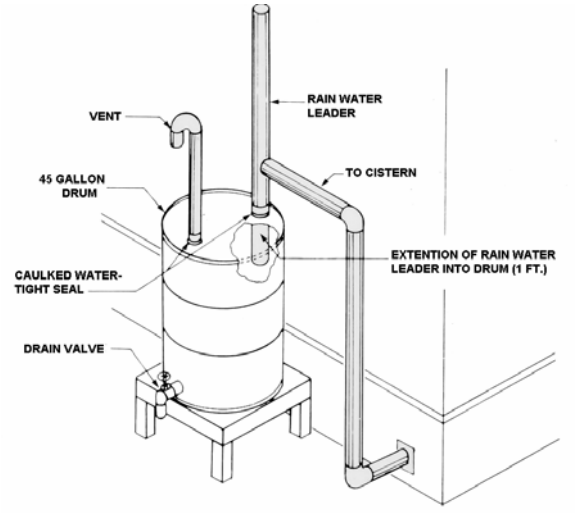

Figure 2: Run-off Water Sediment Barrel Located At Ground Level Outside Structure

Malodorous Cistern Water

Odorous organic matter in cistern water can usually be oxidized (burned up) by mixing chlorine into the cistern water at the rate of 4.5 litres (one gal.) of household laundry bleach (5.25 per cent chlorine) for each 4,550 litres (1,000 gal.) of water. If the organic odor has not disappeared within 24 hours, the treatment should be repeated. Once the organic matter is oxidized, the odor will not return until more organic matter enters the cistern. See Table 2 for comparative oxidizing strengths of various chlorine compounds. Any chlorine odor should disappear providing the cistern is adequately vented.

Powdered charcoal or activated carbon can be added to the cistern to control odors. Organic matter is not oxidized by this treatment, so odors may return. This treatment is effective in removing chlorine odor from water in poorly ventilated cisterns and this is the only time we would recommend its use.

The treatments listed above do not eliminate the need for cleaning and maintenance of the cistern and catchment.

Storing Conditioned Water

When conditioned water (treated water from a community system) is used to fill a cistern, 170 millilitres (3/4 c.) of chlorine laundry bleach should be added for each 4,550 litres (1,000 gal.) of water. This will provide two milligrams per litre (mg/L) or two parts per million (p.p.m.) of chlorine in addition to the current amount, if any, already present in the water. This additional chlorine should take care of any contaminants in tanks or those introduced during hauling.

Storing Unconditioned Water

When unconditioned well water is used to fill a cistern, enough chlorine should be added to oxidize iron, manganese, hydrogen sulphide and bacteria. In addition to the chlorine demand requirements (iron, manganese, etc.) 170 millilitres (3/4 c.) of laundry bleach, or an equivalent amount of another chlorine compound, should be added to each 4,550 litres (1,000 gal.) of water to provide residual of two milligrams per litre (mg/L).

When a water analysis is not available, 570 millilitres (one pt.) of chlorine laundry bleach, or an equivalent amount of another chlorine compound, should be added with each 4,550 litres (1,000 gal.) of water. Repeat treatment if no chlorine odor can be detected 12 hours after first treatment.

If the mineral content of the water is known, chlorine demand can be determined from Table 1.

Table 1 - Chlorine Requirements for Oxidizaton

Chlorine	Mineral (1 mg/L)
0.6 mg/L	Iron
3.5 mg/L	Manganese
8.5 mg/L	Hydrogen Sulphide

Chlorine requirements are based on the concentration of minerals. The more minerals present, the more chlorine is required.

The amount of chlorine compound necessary can be determined from Table 2.

From Table 2 it is determine that the chlorine demand (3.0 mg/L) for 4,550 litres (1,000 gal.) of water can be met by one of the following quantities of chlorine compounds: 227 millilitres (one c.) of 5.25 per cent bleach; 114 millilitres (1/2 c.) of 12 per cent bleach; four calcium hypochlorite tablets or nine grams (2/3 avoirdupois (A.V.) ounces (ounces by weight) of granular calcium hypochlorite.

Therefore, the total chlorine to be added to the 13,650 litres (3,000 gal.) of water would be three times this quantity plus 2 mg/L for residual. The total chlorine requirement in this example could be met by one of the following amounts of chlorine compounds: 1210 millilitres (5.33 c.) of 5.25 per cent bleach; 606 millilitres (2.66 c.) of 12 per cent bleach; 20 calcium hypochlorite tablets or 85 grams (three oz. by weight); or 126 millilitres (nine level tbsp.) of calcium hypochlorite.

Table 2 - Comparative Amounts of Chlorine Compounds

To obtain chlorine concentration of	Add one of the following amounts of chlorine per 4,559 litres (1,000 gal.) of water				
	Sodium Hypochlorite		70% Calcium Hypochlorite		
	5.25% Bleach	12% Bleach	Tablets *	Granular	Dry Measurement
				Grams (oz .by wt.)	
0.2 mg/L	14 ml (1 tbsp.)	1/2 tbsp.	1/4	1.5 1/20	1/2 tsp.
0.4 mg/L	28 ml (2 tbsp.)	1 tbsp.	1/2	3 1/10	1 tsp.
0.75 mg/L	57 ml (1/4 cup)	1 fl.oz.	1	6 1/5	2 tsp.
1.5 mg/L	114 ml (1/2 cup)	1/4 cup	2	9.5 1/3	1 tbsp.
3 mg/L	227 ml (1 cup)	1/2 cup	4	19 2/3	2 tbsp.
13 mg/L	909 ml (4 cups)	2 cups	16	76 2 2/3	8 tbsp.
50 mg/L	3630ml (128 fl.oz.)	64 fl.oz.	64	312 11	33 tbsp.

Calcium hypochlorite should be dissolved in lukewarm water in a non-metallic container before it is added to the cistern. The mixture should be thoroughly stirred (minimum of five minutes) to ensure that it dissolves.

Volume of Cistern

To determine the number of litres in a rectangular cistern, use the following formula:

$$\frac{\text{Length x width x depth (centimetres)}}{1{,}000} = \text{litres (L)}$$

or in Imperial units:

length x width x depth (ft.) x 6.2 = Imperial gal.

to determine the number of litres in a round cistern, use the following formula:

$$\frac{\text{diameter}^2 \text{ x depth (centimetres) x } 0.785}{1{,}000} = \text{litres (L)}$$

or in Imperial units:

4.87 x diameter^2 x depth (ft.) = Imperial gal.

Example Calculation for Adding Chlorine to Unconditioned Water

If 13,650 litres (3,000 gal.) of water with 3.5 mg/L of iron and 0.25 mg/L of manganese is to be added to a cistern, first calculate the chlorine demand for each 4,550 litres (1,000 gal.) of water using Table 1.

3.5 (iron) x 0.6 (chlorine demand) = 2.1 mg/L

0.25 (manganese) x 3.5 (chlorine demand) = 0.9 mg/L

total chlorine demand 3.0 mg/L

- Based on 100 tablets being equivalent to 454 grams (one lb.) of calcium hypochlorite compound.
- Milligrams per litre (mg/L) equal to parts per million.

Metric Conversions

NOMINAL Pipe Dia. mm	in	FLOWS	WEIGHTS
		1 Imp.gal.=4.546L 1 U.S.gal.=3.785L	1 oz.=28.35g 1 lb.=0.4536kg
3	1/8		2.2 lb.= 1kg
6	1/4		
10	3/8	**DIMENSIONS**	
12	1/2	1 in=25.4mm	**POWER**
20	3/4	1 in=2.54cm	1 hp = 0.7457 kW
25	1	1 ft.=0.3048m	1 kW = 1.34 hp
32	1 1/4	3.26 ft=1m	
40	1 1/2		
50	2	**PRESSURE**	
75	3	1 psi=6.895 kPa	
100	4		
150	6		
200	8		

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

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Dauphin, MB	Brandon, MB	Beausejour, MB
(204)622-2116	(204)726-6078	(204)268-6059

or

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