RURAL WATER PIPELINES
PROTECTION OF DRINKING WATER

FACT SHEET

The construction of rural water pipelines has been beneficial to those areas of the province where water shortages are being experienced. However, this benefit does not come without the risk of contamination of the drinking water within the pipelines. For the most part, contamination will result from cross-connections. A cross-connection exists when there is the presence of or the potential for a physical connection between a drinking water supply line and a source of contamination or pollution.

In the case of rural drinking water distribution lines, farmsteads that are connecting to these lines usually have existing private water supplies. Cross-connections become a problem when farmers are intending to interconnect the existing private water supply system with the rural water pipeline system. As the interconnection of the two systems is in most cases inevitable, care must be taken to protect the rural water pipeline system from becoming contaminated.

Contamination of the rural water pipeline - drinking water can occur when an unprotected cross-connection exists and backflow caused by backpressure (in the case where the private system is under a higher pressure than the pipeline system) or back-siphonage (in the case where a negative or reduced pressure exists in the pipeline system) occurs.

As owners of a water distribution system, cooperatives must deal with the risk of contamination. In the case where the users of the pipeline water are willing to live with no protection from contamination, the cooperative may choose to do nothing more than advise the users of the possible contamination problems. However, should the cooperative wish to take a more proactive approach, there are a number of different methods that can be used for protecting water systems from backflow resulting from interconnections. It should be noted that the rural water supply must give written approval of private water supplies that are interconnected with the pipeline system. When determining whether protection is necessary, the following should be considered: the probability of back flow due to back siphonage or back pressure; the severity of the hazard; and the type of building. The degrees of hazard are defined below:

> **SEVERE:** Any type of cross-connection or potential cross-connection involving water that has additives or substances that, under any concentration, can create a danger to health.
>
> **MODERATE:** Any type of cross-connection or potential cross-connection that has a low probability of becoming a severe hazard. This category includes, but is not limited to, connections involving water where the aesthetic qualities of the water have been reduced and, under certain conditions, can create a danger to health.

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MINOR: Any type of cross-connection or potential cross-connection that involves a substance that constitutes only a nuisance and that results in a reduction in only the aesthetic qualities of the water.

Typical residential buildings are generally considered a minor hazard location while farm facilities are considered a moderate to severe hazard.

Backflow prevention devices should be selected based on an understanding of the available devices and the type of protection that they provide and the maintenance requirements of the available devices.

Below is a list of some common backflow prevention methods in order of preference. When choosing a device please consult your local public health inspector.

Table 1: Backflow Preventer

Type	Description	Advantages	Disadvantages
Air gap	• the unobstructed vertical distance through air between the lowest point of a water supply outlet and the flood level rim of the fixture into which the fixture discharges	• effective against backflow caused by backpressure or back-siphonage • high level of protection • inexpensive • not mechanical • not subject to failure no need to test	• can be easily bypassed • not for continuous pressure • pressure from supply is lost
Reduced pressure principle backflow prevention assembly (RP)	• two independent check valves with a relief valve and test cocks	• effective against backflow caused by backpressure or back-siphonage • maximum mechanical protection • high level of protection • relief valve flow indicates failure • can be tested in line • may be used under continuous pressure	• may be incompatible to systems where fluctuating supply pressure is common • may periodically discharge water from the relief valve • expensive
Double check valve assembly (DCVA)	• two independent check valves, equipped with test cocks	• effective against backflow caused by backpressure or back-siphonage • can be tested in line • may be used under continuous pressure	• medium level of protection • moderately expensive
Dual check with atmospheric port (DCAP)	• two independent check valves and relief valve	• effective against backflow caused by backpressure or back-siphonage • relief valve flow indicates failure • may be used under continuous pressure	• may not have test cocks • medium level of protection • may be incompatible to systems where fluctuating supply pressure is common • moderately expensive
Pressure vacuum breaker (PVB)	• single loaded check valve and an air inlet valve with test cocks	• only effective against backflow caused by back-siphonage • can be tested in line • may be used under continuous pressure	• not effective against backflow caused by backpressure • medium level of protection • moderately expensive

Atmospheric vacuum breaker (AVB)	• single float and disk with atmospheric port	• only effective against backflow caused by back-siphonage • relatively inexpensive	• not effective against backflow caused by backpressure • not for continuous pressure • disk can stick and cause failure • no test cocks • medium level of protection
Dual-check valve (DuC)	• two independent check valves	• effective against backflow caused by backpressure or back-siphonage • relatively inexpensive	• not for continuous pressure • no test cocks, must be taken out of line to be tested • medium level of protection
Hose connection vacuum breaker (HCVB)	• single check with atmospheric vacuum breaker vent	• effective against backflow caused by back-siphonage and low end backpressure • inexpensive	• not for continuous pressure • not a testable device • low level of protection

The above mentioned mechanical devices require maintenance and therefore there is a need for an on-going testing and monitoring program to ensure that the devices are working and remain in place. It is the pipeline cooperatives' responsibility to ensure that a maintenance program is implemented when mechanical devices are installed.

Table 2: Selection Guide for Backflow Preventers

Type	**CSA Standard Designation**	**Degree of Hazard**		
		Minor	Moderate	Severe
Air gap		√	√	√
Reduced pressure principle backflow prevention assembly (RP)	CSA B64.4	√	√	√
Double check valve assembly (DCVA)	CSA B64.5	√	√	
Dual check with atmospheric port (DCAP)	CSA B64.3	√	√[1]	
Pressure vacuum breaker (PVB)	CSA B64.1.2	√	√	√
Atmospheric vacuum breaker (AVB)	CSA B64.1.1	√	√	√[2]
Dual-check valve (DuC)	CSA B64.5	√		
Hose connection vacuum breaker (HCVB)	CSA B64.2	√	√[1]	√[2]

1 When the recommended device is used for this degree of hazard , zone or area protection with a DCVA backflow preventer, RP backflow preventer, or an air gap should also be required.

2 When the recommended backflow preventer is used for this degree of hazard, zone protection with an RP backflow preventer or an air gap should also be used.

Additional information can be obtained from:

The Saskatchewan Ministry of Health's website (www.health.gov.sk.ca/environmental-health) provides information on plumbing.

For more information on this fact sheet and/or other plumbing topics, contact your local health region public health inspector.

http://www.saskatchewan.ca/residents/health/understanding-the-health-care-system/saskatchewan-health-regions/regional-public-health-inspectors