

DW Module 9:  
Cross Connection Control  
**Answer Key**

- 🗣️ List some examples of common cross-connections.

**Ans:** **Garden Hose** – Garden hose ends are often intentionally or accidentally submerged in fertilizer and/or pesticide solutions during gardening activities, in containers of soapy water during cleaning activities (such as vehicle washing), in wash basin/tubs, and in puddles of water on the ground. Each of these potential cross-connections involving a common garden hose represents opportunities through which backflow can occur.

**Pressure Relief Valves** – Pressure relief valves that vent to the atmosphere can provide a connection to atmospheric air, particles, and aerosols. A more serious potential cross-connection involving relief valves includes improperly installed relief valves in a pit or chamber that may become submerged, allowing external water to flow back into the drinking water system. Relief valves are included in some backflow prevention devices but must be properly installed and maintained so as to not be a potentially hazardous cross-connection.

**Pipe/Joint Leaks** – Common pipe and pipe joint leaks can also be considered a cross-connection. During periods of negative or sub-atmospheric pressure in the water system pipeline, groundwater or other contaminants from outside the pipe wall can be drawn through cracks in the pipe and pipe joint leaks into the water supply.

**Pump By-pass Arrangements** – Booster pumping applications are often arranged with a pump bypass line with a check valve. Leaking check valves can result in backflow into the system. A single check valve is not an effective backflow prevention device.

**Plumbing Errors** – Mistaken connections are often made to fire protection piping, process water piping, irrigation systems, or other non-potable water supply. These cross-connections can result in large amounts of contaminants entering the public water system.

**Filling Tanker Trucks** – Filling water trucks with either a submerged inlet or by allowing a hose end to be submerged in the tank represents a cross-connection and can result in backflow if the connection is unprotected by a backflow prevention device.



**Exercise for Unit 1 – Overview of Cross-Connection Control and Backflow**

**Prevention.**

1. The two basic types of cross-connections are direct and indirect.
2. Backflow is a flow condition caused by differential pressure.

3. The most common backflow contaminants are bacteria or biological although chemical and other physical contamination can also occur.
  4. List three examples of common backflow contamination events:
    - a. answers may vary
    - b. answers may vary
    - c. answers may vary
  5. The normal hydraulic gradient slopes from the higher elevation to the lower elevation.
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What are additional examples of hazardous facilities?

**Ans:** The following is a list of additional examples of hazardous facilities. Be sure to review any that participants do not think of on their own.

Piers and other waterfront facilities.  
Mortuaries  
Laboratories.

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What are additional examples of aesthetically objectionable facilities?

**Ans:** The following is a list of additional examples of aesthetically objectionable facilities. Be sure to review any that participants do not think of on their own.

Barber shops.  
Beauty salons.  
Supermarkets.

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### Exercise

For each of the following scenarios, explain what type of prevention device would be appropriate.

1. Restricted access military base

**Ans:** An air gap or RPZD should be installed since access for inspection of the water facilities and potential hazards is restricted.

2. Customer fire loop

**Ans:** If no chemical additives are used in the system, the hazard is stagnant water, tastes, and odors, which would require protection by a DCVA. If the fire system uses chemical conditioners, a RPZD or air gap would be required.

3. Water hauling trucks

**Ans:** Water hauling trucks can present cross-connections with tanks contaminated with toxic chemicals or other contaminants. Air gaps or RPZDs are typically required. Some water purveyors require water haulers to fill only at designated locations equipped with permanently established air gaps.

4. Single family residence

**Ans:** Residential dual check valves are generally recommended.

5. A hospital or medical building

**Ans:** Various hazards exist at medical facilities. Air gaps or RPZDs are required and other devices, such as AVBs, are often used concurrently at the highest hazard locations such as laboratories.

6. Commercial car wash

**Ans:** An RPZD or an air gap is recommended due to potential contamination by cleaning agents and recycled wash water.



**Exercise**

1. List five indicators of backflow.

**Ans:** Five of any of the following: customer complaints, pressure reductions, loss of disinfectant residual, water meters running in reverse, total coliform detections and reported backflow events.

2. Describe four methods for mitigating backflow events.

**Ans:** contaminated area isolation, public notification, system flushing and cleaning, pipeline replacement and identify and correct the source of contamination.