

Cross-Connection Control Surveys – Chapter 15

A complete cross-connection control program requires a detailed plan to survey and inspect all plumbing systems to locate existing, potential, and controlled cross-connections. This cross-connection control survey is a comprehensive inspection of new and existing potable water distribution systems, fixtures, and appliances. The objective of the survey is to determine whether each water connection or outlet in the system is protected from an actual or potential cross-connection between the potable water supply and a source of contamination or pollution. A survey report will document the results of the survey and include controlled and uncontrolled cross-connections within the water distribution system and recommendations to alleviate hazards found during the survey. The information presented in this chapter contains the key elements for implementing and performing cross-connection control surveys.

There are eight steps that should be taken to establish cross-connection control surveys as part of a cross-connection control program. They are:

1. Establish legal authority to conduct a cross-connection control survey and shut off water for noncompliance.
2. Establish education programs. Certify those who will administer the survey program to ensure that only knowledgeable personnel conduct survey inspections. Educate the industrial, commercial, and residential water user concerning the purpose and requirements of a cross-connection control survey.
3. Prioritize establishments according to the degree of hazard and implement isolation, containment, or both approaches to cross-connection control and backflow protection.
4. Perform preliminary inspection requirements. Review plans of existing and new facilities, send notification to owner or owner's agent and to proper authorities, and complete owner's cross-connection control survey questionnaire.
5. Perform survey inspection.
6. Document survey findings and prepare written reports and recommendations. Notify owner of any defects, required corrective action, and time limit for compliance.
7. Send notification and reinspect for compliance.
8. Establish procedures for noncompliance including hearings, follow-up, and request for water shut-off.

15.1 LEGAL AUTHORITY TO CONDUCT CROSS-CONNECTION CONTROL SURVEYS

A successful survey program for cross-connection control is dependent upon legal authority to conduct the survey of residential, commercial, and industrial facilities to eliminate cross-connections and backflow conditions. Under the provisions of the Safe Drinking Water Act of 1974, the federal government established, through the Environmental Protection Agency (EPA), national standards for safe drinking water. The states are responsible for the enforcement of these standards. For the states to obtain primary enforcement responsibility of the Safe Drinking Water Act, primacy, states are required to adopt regulations that are at least equal to the federal regulation in protecting the public's health. The states must adopt and implement adequate surveillance and enforcement procedures, provide variances and exemptions that

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(1) General program requirements.

(f) The purveyor shall ensure that cross-connections between the distribution system and a consumer's water system are eliminated or controlled by the installation of an approved backflow preventer commensurate with the degree of hazard.

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meet federal regulations, provide an adequate plan for providing safe drinking water under emergency circumstances, and keep the EPA fully informed of its activities through record-keeping and reports. State rules and regulations require public water systems to adopt adequate plumbing ordinances, regulations, or service agreements with provisions for proper enforcement, including surveys and inspections, to prevent cross-connections between the safe potable water system and any unsafe nonpotable water.

At the local level, a cross-connection control ordinance usually is adopted by the municipality or private water authority. **Legal authority to conduct cross-connection control surveys is established as a subdivision of this ordinance.** Authority to establish a survey inspection program also may be included in local water department written policies or service contracts.

AHJ's

Legal authority to perform cross-connection control surveys, as stated in Chapter 16, Program Development, may also lie in adopted plumbing codes. Through these codes, legal authority is established for local health and code enforcement departments to conduct surveys for cross-connection control. In many cases, the plumbing code implies this authority rather than specifically stating the right to conduct surveys. For example, the *2015 Uniform Plumbing Code* states:

102.3 Maintenance. The plumbing and drainage system, both existing and new, of a premises under the Authority Having Jurisdiction shall be maintained in a sanitary and safe operating condition. Devices or safeguards required by this code shall be maintained in accordance with the code edition under which installed.

The owner or the owner's designated agent shall be responsible for maintenance of plumbing systems. To determine compliance with this subsection, the Authority Having Jurisdiction shall be permitted to cause a plumbing system to be reinspected.

103.4 Right of Entry. Where it is necessary to make an inspection to enforce the provisions of this code, or whenever the Authority Having Jurisdiction has reasonable cause to believe that there exists in any building or upon any premises any condition or violation of this code that makes the building or premises unsafe, insanitary, dangerous, or hazardous, the Authority Having Jurisdiction shall be permitted to enter the building or premises at all reasonable times to inspect or to perform the duties imposed upon the Authority Having Jurisdiction by this code, provided that if such building or premises is occupied, the Authority Having Jurisdiction shall present credentials to the occupant and request entry. If such building or premises is unoccupied, the Authority Having Jurisdiction shall first make a reasonable effort to locate the owner or other person having charge or control of the building or premises and request entry. If entry is refused, the Authority Having Jurisdiction has recourse to every remedy provided by law to secure entry.

When the Authority Having Jurisdiction shall have first obtained a proper inspection warrant or other remedy provided by law to secure entry, no owner, occupant, or person having charge, care, or control of any building or premises shall fail or neglect, after proper request is made as herein provided, to promptly permit entry herein by the Authority Having Jurisdiction for the purpose of inspection and examination pursuant to this code.

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The surveyor must be familiar with all types of cross-connections and the methods, devices, and assemblies used to control or protect the potable water supply. Surveyors also must demonstrate knowledge of the application and installation of all backflow prevention methods, devices, assemblies, and other backflow prevention related products along with their performance characteristics. They also should demonstrate knowledge of plumbing and backflow prevention terminology. See Chapter 2.

The surveyor must know the proper technique for performing cross-connection control surveys, including steps such as notification, documentation, identification of safety hazards, system and component identification, and cross-connection identification and remedy. See Section 15.5 of this chapter.

It is highly recommended that individuals attain the following credentials before attempting the surveyor certification: journeyworker or master plumbing license, plumbing inspector's certification, plumbing or mechanical contractor's license, health department inspector certification, or professional water distribution system design engineer certification.

Those involved in backflow prevention should endeavor to achieve the proper level of knowledge to provide the proper backflow protection to avoid the hazards associated with a backflow incident. These hazards include damage to property or domestic water systems, the spread of disease, and the death of users of contaminated systems.

15.3 HAZARD PRIORITIZATION

Before a survey program is implemented, a systematic procedure that identifies backflow hazards and their remedy utilizing containment, isolation, or both types of backflow prevention should be established. One of the first steps taken when initiating a program is to list and prioritize establishments according to the degree of hazard present.

In containment-only programs, make a list of the types of facilities in the jurisdiction. By examining this list, it can be determined which facilities usually contain high or low health hazards, the manner in which the potable water system is used, and the potential for a backflow incident to occur. An initial determination of the type of backflow protection to be installed at the facility can be made at this time, and preparations for installation can begin. Before installation, however, an inspection of the facility should be made to verify the type of hazard represented. Once establishments are listed, those containing high hazards would be surveyed first, followed by less hazardous facilities.

The following is a list of several types of facilities that usually contain high health hazards where backflow protection will be required. These facilities should receive the highest priority for backflow prevention installation.

Aircraft Plants	Beverage Bottling Plants	Canneries
Amusement Parks	Boilers (large) or Hot Water Systems	Car Wash Facilities
Automotive Plants	Breweries	Centralized Heating and Air-Conditioning Plants
Autopsy Facilities	Buildings with Sewer Ejectors	Chemical Plants Using a Water Process
Auxiliary Water Systems	Buildings with Water Storage Tanks, or Nonpotable Water Sources	Chemical Plants – Manufacturing, Processing Compound, or Treatment

Table 13
and
Severe High
Health
Hazard Sites

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Civil Works	Manufacturing Plants	Plating Plants
Clinics	Medical Buildings	Power Plants
Cold Storage Plants	Metal Plating Industries	Processing Plants
Colleges	Metal Processing	Radioactive Materials or Substances – Plants or Facilities Handling
Commercial Laundries	Metal Manufacturing or Cleaning Facilities	Reclaimed Wastewater Areas
Convalescent Homes	Metal Fabricating Plants	Recreational Facilities Using Water (Swimming Pools, Water Slides, etc.)
Creameries	Missile Plants	Reduction Plants
Dairies	Morgues	Restricted, Classified, or Other Closed Facilities
Dental Buildings	Mortuaries	Rubber Plants – Natural or Synthetic Sand
Dye Works	Motion Picture Studios	Sanitariums
Fabricating Plants	Nursing Homes	Schools
Gas Production Properties, Storage, or Transmission	Oil Storage Facilities, Properties, Production Facilities, or Transmission Facilities	Tanneries
Gravel Plants	Packing Houses	Wastewater Pumping Stations/ Wastewater Treatment Plants
Hospitals	Paper and Paper Products Plants	Water Treatment Plants
Laboratories	Petroleum Storage Plants, or Processing Facilities	Waterfront Facilities and Industries
Laundries	Piers and Docks	

Once the public water supply is protected, each facility should be surveyed to determine whether isolation backflow protection is warranted. Each system, fixture, and appliance outlet should be inspected and the degree of hazard established, listed, and the remedy determined. Of course, the high-hazard conditions should be controlled first. The following is a short list of common locations where cross-connections have been documented:

Air-Conditioning Systems	Aspirators	Below-the-Rim or Inverted Supply Water Inlets
Air Compressors	Autoclaves	Bidets
Air-Conditioning Chill Water	Auxiliary Systems	Bird Baths
Air Liners	Baptismal Fonts	Boiler Industrial Feeder Lines
Air-Conditioning Cooling Tower	Baptisteries	Boilers
Air Washers	Bathing Tanks	Bottle Washers
Air-Conditioning Condenser Water	Bathtub	Brine Tanks
Aquariums	Bedpan Washers	Carbonators



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Cheese Tanks	Fish Ponds	Medical Condensers
Chemical Feeders	Floor Drains	Medical Equipment
Chiller Tanks	Flush Tanks	Photo-Lab Equipment
Chlorinators	Flushing Rims	Pipette Washers
City Water and Sewer Pumps Direct Connections	Food Mixing Tanks	Pneumatic Ejectors
Coffee Urns	Foot Tubs	Ponds
Commercial Pressure Cookers	Fountains	Potato Peelers
Commercial Dishwashing Machines	Garbage Can Washers	Prime Lines
Compressors	Garbage Disposals	Private Wells
Condensate Tanks	Holding Tanks	Processing Tanks
Cooking Kettles	Hose Faucets	Pumps
Cooling Systems	Hospital Laundry Machines	Recirculated Water
Cooling Towers	Hospital Digesters	Rubber Hoses Equipped with Hand Controls or Faucets
Culture Vats	Hot Tubs	Serrated Faucets
Cuspidors (gym)	Hot Water Heaters and Tanks	Sewer, Sanitary, and Storm (bypass, sump pumps, blow offs)
Dairy and Stable Watering Troughs	Humidifier Tanks and Boxes	Shampoo Basins
Degreasing Equipment	Hydraulic Equipment	Showers
Demineralizer Systems	Hydro-Therapy Baths	Sinks
Dental Cuspidors	Ice Makers	Siphon Flush Tanks
Dental Saliva Ejectors	Industrial In-Plant Plumbing Systems and Condensers	Sitz Baths
Developing Tanks	Irrigation Systems	Sizing Vats and Cones
Dishwashers	Janitor Closets	Slop Sinks
Drain Lines	Kitchen Equipment	Solar Heating Systems
Drinking Fountains	Laboratory Equipment	Solution Tanks
Dye Jiggs, Washers, Vats, and Tanks	Laundry and Other Tubs	Spring-Loaded Glass Washers
Etching Tanks	Lavatories	Starch Tanks
Extractors	Lawn Sprinkler Systems	Steam Tables
Fire Standpipes	Liquid Handling Systems	Steam Cleaners
Fire Drain Lines	Make-Up Tanks	Steam Lines
Fire Protection Systems	Medical Aspirators	Sterilizers

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Stills	Ultrasonic Baths	Water Closets, Tanks
Suction Side Pump Chlorinators	Urinals (trough or siphon jet blowout)	Water Trough with Vaccine or Other Substances Added for Poultry or Other Livestock
Swimming Pools	Vacuum Systems	Water Closets, Flush
Tanks	Vats	Water-operated Ejectors
Therapeutic Baths	Vegetable Peelers	Water Street Mains Draining to Sewers or Storm Drains
Threaded Hose Bibbs	Wash Tanks	Water Softening Systems
Toilets (flush tank, ball cock, flush valve, siphon jet)	Water Treatment Tanks	Water Jacketed Tanks, Vats and Pots

In many instances, a containment and an isolation survey will be required. A cross-connection control survey that includes both containment and isolation is much more extensive, and should only be performed by professionals thoroughly familiar with water distribution system applications. This survey will begin at the service piping entering the property and follow through to every water outlet or usage connection.

15.4 PRELIMINARY INSPECTION REQUIREMENTS

Prior to initiating a survey, the following actions should be taken:

- Plans of the facility should be reviewed,
- Notifications sent out, and
- Property owner's questionnaire completed.

Plan Review

Plan review is an important aspect of a cross-connection control program. The plan review familiarizes the surveyor with the facility, identifies areas where cross-connections may exist, and alerts the surveyor to the types of hazards associated with the use of the potable water supply system. Cross-connections will occur throughout the potable water supply system within a facility. Review of new construction plans helps eliminate cross-connections before they are created and establishes that protection against backflow is provided where cross-connections are found. Review of existing facility plans helps the surveyor identify potential areas where backflows could occur and helps in planning the survey.

During plan review, each and every water outlet indicated on the plans must be noted for visual inspection. All physical connections to fixtures, equipment, or water-using appliances must be examined to ensure that connections to the potable water system are protected against backflow. The plan reviewer identifies existing cross-connections and spots areas where cross-connections conceivably could be created and makes professional recommendations.

A thorough review of either new construction blueprints or an existing facilities plans or as-builts also will help identify other conditions that may affect backflow prevention such as:

- Closed systems may be identified.
- Areas where thermal expansion or water hammer exists can be identified and remedied.



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- Water pressures may be documented and possible pressure losses be calculated and provided for.
- Interconnections of other potable water supplies can be identified and kept separate.
- Adequate clearances for backflow devices or assemblies can be calculated and provided for.
- If there is discharge from the assembly, an adequately sized floor drain can be provided for.
- It can be determined whether the backflow preventer will be accessible and whether a failure will be detected by the property owner.
- It can be determined whether the assembly is installed above a location that may result in a hazardous condition.
- It can be determined whether any flow from an RPZ's relief valve needs to be directed to industrial pre-treatment, or if it can be piped to the sanitary sewer.

Depending on the water distribution system's complexity, these drawings will provide a good map for a surveyor's inspection strategy.

Notification

Before a survey is conducted, determine whether the inspection is to be prearranged or unannounced. If the inspection is prearranged, send notification to the property owner or his agent via an inspection notification letter or appointment letter. The letter should include the date and time of the inspection and identify who will be conducting the inspection.

Notification also may be required by the various authorities who may have jurisdiction over the premises, including the water purveyor, building or code enforcement departments, health departments, and fire marshal. If the facility includes residences, the occupants of the facility should also be notified in advance of the survey.

Property Owner's Questionnaire

Along with the notification of impending inspection, the notification letter also should include a request for building plans and the owner's questionnaire. See **Figure 15-1**. The questionnaire should contain questions that will help the surveyor assess the facility for the degree of hazard present and the probable locations of cross-connections or potential cross-connections that would require protection from backflow. Examples of possible items and questions to include on the questionnaire are:

- Are as-built plans of the facility available?
- Is there more than one source of water serving the facility?
- List the sources of water for the facility.
- Are air-conditioning cooling towers with chemical additives in use?
- Is the potable water used for boiler feed lines?
- Are pumps installed in the potable water system?
- List locations of existing pumps.

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- What processes is the potable water supply utilized for?
- Are backflow prevention devices or assemblies installed in the potable water system?
- List the locations of existing backflow prevention devices and assemblies.
- Are ejectors used in your operation?
- Are water supply lines submerged in vessels, vats, tanks, etc.?
- Are toxic chemicals used in your operation?

Cross-Connection Control Questionnaire

Date: _____ Customer: _____

Address: _____

Service Account No: _____ Phone: _____

1. Is the public water supply system the only water supply source for the property?
YES___ NO___
2. List all sources of water for the property.

3. Are air-conditioning cooling towers with chemical additives in use?
YES___ NO___
4. Is the potable water line used for boiler feed lines?
YES___ NO___
5. Are backflow protection devices installed in your potable water system?
YES___ NO___
6. List locations of all existing backflow preventers.

7. Are ejectors used in your operation?
YES___ NO___
8. Are water supply lines submerged in vessels, vats, tanks, etc.?
YES___ NO___
9. Are toxic chemicals used in your operation?
YES___ NO___
10. List the location of all pumps used in your operation.

Remarks: _____

Figure 15-1



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15.5 CONDUCTING THE CROSS-CONNECTION CONTROL SURVEY

Often owners are uneasy and feel intimidated by the presence of inspection officials on their premises. **It is best if the cross-connection survey is conducted with a team of at least two members.** These professionals should present credentials that identify them as authorized to perform the survey. During the inspection, one member of the team can converse with the owner, answering questions and addressing any concerns the owner may have. This inspector would explain the corrective action required if unprotected cross-connections or other violations are found. The second member of the team would conduct the inspection.

Once at the property, meet with the owner and/or a representative who is familiar with the facility and its plumbing and mechanical system, and explain the purpose of the visit. Advise them about the need for the survey and why it will benefit them. Explain what to expect from the survey, and that it will be followed up with a detailed inspection report of all actual and potential cross-connections. At this time, it is helpful to ask if they are aware of the ordinance and plumbing codes and to hand out educational brochures, including pictures of what you are talking about to help the customer better understand the importance of the program.

Equipment taken by the team on the survey should include a hard hat, eye and ear protection, a flashlight, clipboard, and sketch paper, and a digital camera to aid in documentation. Hand tools and testing equipment also may be necessary to conduct the survey.

Start the survey where the potable water supply enters the property, in most cases, at the water meter. Then, proceed with the internal survey if total internal protective devices and fixture outlet protective devices are desired. The extent of the survey will depend on whether it is a containment or isolation-only survey.

If the main objective of the survey is containment, follow these five steps:

1. Identify the type of hazard inherent within the facility.
2. Inspect the potable water entrance to the facility or immediately downstream of the meter installation for the correct protection method, device, or assembly, based on the type of hazard present within the facility.
3. Record the location of existing methods, devices, or assemblies. Include sketches of the installation.
4. Notify, in writing, the owner of any required corrective action.
5. Schedule a follow-up inspection to verify required corrections have been completed.

If the main objective of the survey is isolation, follow these six steps:

1. Survey the facility, looking at all potable water piping, outlets, and fixtures, as well as their drainage connections.
2. Record all areas requiring backflow protection.
3. Record the type of hazard associated with any cross-connections that are found.
4. Record locations of all existing backflow protection methods, devices, and assemblies.

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5. Review all findings with the owner and inform the owner in writing of required corrective actions.
6. Schedule a follow-up inspection to verify required corrections have been completed.

Premise / In-Premise

If the objective is total protection, both the containment and isolation approaches must be implemented. An in-depth survey from the public water supply to the last free-flowing outlet must be conducted. This is done by visually inspecting the entire water distribution system including each fixture outlet and recommending protective devices for those requiring backflow protection. Steps must be taken to ensure that all cross-connections are protected and verify that containment and isolation devices are installed, consistent with the cross-connection control ordinance and plumbing codes, to obtain total protection.

The cross-connection control survey inspector must be on the lookout for numerous hazards. Some common hazards the survey inspector will find and the recommended protection to prevent backflow are:

- Cross-connections between the consumer's potable water system and reservoirs, cooling towers, or circulating systems contaminated by bird droppings, vermin, algae, bacterial slime, toxic water treatment chemicals, and other biological and chemical contaminants. The recommended protection is an airgap or an RPZ.
- Cross-connections between the consumer's potable water system and water cooled equipment that is connected to the building drain or sewer. Examples include heat exchangers, air compressors, vacuum producers, and air-conditioning equipment. The recommended protection is an RPZ and an airgap on all indirect waste piping.
- Cross-connections between the consumer's potable water system and plumbing fixtures connected to the building drain or sewer. Examples include fixtures with a submerged water supply outlet, flush valve water closets and urinals without approved vacuum breakers, and tank type water closets without approved anti-siphon water control valves. The recommended protection is an airgap for the submerged outlet, an approved vacuum breaker for the flush valve water closet and urinal, and an anti-siphon water control valve for the tank type water closet.
- Cross-connections between the consumer's potable water system and sewage pumps or water operated sewage ejectors. Potable water systems are connected to sewage pumps for priming, cleaning, flushing, and unstopping purposes. The recommended protection is an airgap or an RPZ. Also, the water service connection shall be equipped with backflow protection on any premises where a sewage ejector or pumping station is located and systems that are connected to auxiliary water supplies. Examples of auxiliary water supplies are systems that are not under the direct control of the water purveyor that are supplying water to a facility that can include industrial water systems, systems utilizing water from pools, water wells, rivers, bays, and oceans. These auxiliary water supplies may become contaminated by industrial processes, chemicals, and contact with people, animals, vermin, and other sources of contamination. The method, device, or approved assembly used to protect against backflow will be determined by the quality of the auxiliary water supply. An approved RPZ or an airgap shall be



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installed at the service connection when the auxiliary supply is a health hazard. When the auxiliary supply system is a non-health hazard, an approved double check valve assembly, installed at the service connection, is recommended.

- Cross-connections between the consumer's potable water system and steam generated facilities and steam connected equipment, and piping systems. Examples include autoclaves, sterilizers, cookers, and other equipment used for washing, cooking, flushing, storing, and for the transmission of food fertilizers or waste products. Protection shall be provided to prevent steam from backing up into the potable water supply system causing a health hazard. The recommended protection is an airgap separation or an approved RPZ.
- Cross-connections between the consumer's potable water supply and laboratory equipment. The hazards associated with laboratory equipment may be in the form of chemical, biological, or bacteriological contaminants. Equipment connected to the potable water supply system includes pipette and glass washers, specimen tanks, sterilizers, film processing machines, aspirators, stills, and other unspecified laboratory equipment. The recommended protection for potential high health hazards is an airgap separation or an approved RPZ.
- Cross-connections between the consumer's potable water supply and firefighting systems. Hazards include connections to auxiliary water sources, connection to storage tanks and reservoirs allowed to remain in a nonpotable condition, and the addition of foaming agents and chemicals, such as antifreeze solutions. The recommended protection will be determined by the water supply source, the quality of auxiliary water supply sources, and the arrangement of the piping system. An airgap or an approved RPZ is required if the potential for a high health hazard backflow exists. An approved double check valve assembly is permitted only if the potential backflow is a low non-health hazard. See Chapter 13 for more information on fire sprinkler backflow prevention.

15.6 DOCUMENTING THE CROSS-CONNECTION CONTROL SURVEY

The cross-connection control survey should be documented by a survey report. The survey report should have two parts—a survey checklist and a survey report. The checklist will assist the surveyor in inspecting the facility. The survey report will document the findings and recommendations found as a result of the survey.

The checklist will include items or areas where cross-connections are commonly found. It will include lists of fixtures and appliances that will be inspected in normal surveys. It will contain an area where special conditions will be noted and the backflow protection recommended can be listed. Each area of the checklist should be inspected and checked off. See **Figure 15-2** for an example of this checklist.

The *cross-connection control survey report* will record the physical location condition and identification of each existing backflow prevention device or assembly. This also will include the manufacturer, model, and serial numbers, size, type of shutoff valves, and type of device or assembly.

The survey report also will document all unprotected cross-connections. It will include the location, type of hazard, and type of device or assembly required.

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INSPECTION CHECKLIST

NAME OF FIRM _____

MAILING ADDRESS _____

TIME _____ DATE _____ WATER PRESSURE _____ PH _____ CHLORINE RES. _____

- | | |
|---|---|
| <input type="checkbox"/> Air Conditioning _____ | <input type="checkbox"/> Condensate Tank _____ |
| <input type="checkbox"/> Air Washers _____ | <input type="checkbox"/> Demineralized System _____ |
| <input type="checkbox"/> Air Conditioning, Chilled Water _____ | <input type="checkbox"/> Dishwasher _____ |
| <input type="checkbox"/> Air Conditioning, Condenser Water _____ | <input type="checkbox"/> Drinking Fountain _____ |
| <input type="checkbox"/> Air Conditioning, Cooling Towers _____ | <input type="checkbox"/> Degreasing Equipment _____ |
| <input type="checkbox"/> Air Compressors _____ | <input type="checkbox"/> Dye Vats & Tanks _____ |
| <input type="checkbox"/> Autopsy Tables _____ | <input type="checkbox"/> Developing Tanks _____ |
| <input type="checkbox"/> Aspirator, Medical _____ | <input type="checkbox"/> Dairy Barn Equipment _____ |
| <input type="checkbox"/> Aspirator Weedicide and Root Feeders _____ | <input type="checkbox"/> Etching Tanks _____ |
| <input type="checkbox"/> Autoclave & Sterilizer _____ | <input type="checkbox"/> Stills _____ |
| <input type="checkbox"/> Boiler Feed Line _____ | <input type="checkbox"/> Starch Tanks _____ |
| <input type="checkbox"/> Baptismal Fountain _____ | <input type="checkbox"/> Sitz Bath _____ |
| <input type="checkbox"/> Bathtub Below Rim Filler _____ | <input type="checkbox"/> Sprinkler System, Fire Protection _____ |
| <input type="checkbox"/> Bedpan Washer, Flushing Rim _____ | <input type="checkbox"/> Shampoo Basin Hose, Rinse, Beauty Shop _____ |
| <input type="checkbox"/> Bidet _____ | <input type="checkbox"/> Sinks, Wash-up _____ |
| <input type="checkbox"/> Brine Tank _____ | <input type="checkbox"/> Serrated Faucets _____ |
| <input type="checkbox"/> Bottle Washer _____ | <input type="checkbox"/> Sizing Vats & Boxes _____ |
| <input type="checkbox"/> Chemical Feeder Tanks _____ | <input type="checkbox"/> Solution Tanks _____ |
| <input type="checkbox"/> Chlorinator _____ | <input type="checkbox"/> Urinal, Siphon Jet Blow-out _____ |
| <input type="checkbox"/> Coffee Urn _____ | <input type="checkbox"/> Urinal, Trough _____ |
| <input type="checkbox"/> Cuspidor, Dental _____ | <input type="checkbox"/> Fountain, Ornamental _____ |
| <input type="checkbox"/> Chiller Tanks _____ | <input type="checkbox"/> Detergent Dispenser _____ |
| <input type="checkbox"/> Cooking Kettles _____ | <input type="checkbox"/> Floor Drains, Flushing _____ |

Cross-Connection Inspection Checklist

Figure 15-2



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INSPECTION CHECKLIST (continued)

- | | |
|---|---|
| <input type="checkbox"/> Garbage Can Washer _____ | <input type="checkbox"/> Potato Peeler _____ |
| <input type="checkbox"/> Garbage Disposers _____ | <input type="checkbox"/> Processing Tanks _____ |
| <input type="checkbox"/> Hydro-Therapy Baths _____ | <input type="checkbox"/> Re-circulated Water _____ |
| <input type="checkbox"/> Humidifier Tank & Boxes _____ | <input type="checkbox"/> Sewer, Sanitary _____ |
| <input type="checkbox"/> Hose Faucets _____ | <input type="checkbox"/> Sewer, Storm _____ |
| <input type="checkbox"/> Hot Water Heater & Tanks _____ | <input type="checkbox"/> Swimming Pool _____ |
| <input type="checkbox"/> Ice Maker _____ | <input type="checkbox"/> Sewer, Flushing Manhole _____ |
| <input type="checkbox"/> Janitor Closets _____ | <input type="checkbox"/> Steam Cleaner _____ |
| <input type="checkbox"/> Lab Equipment _____ | <input type="checkbox"/> Steam Table _____ |
| <input type="checkbox"/> Laundry Machine _____ | <input type="checkbox"/> Digesters, Hospital _____ |
| <input type="checkbox"/> Lavatory _____ | <input type="checkbox"/> Ultrasonic Baths _____ |
| <input type="checkbox"/> Lawn Sprinkler _____ | <input type="checkbox"/> Vats _____ |
| <input type="checkbox"/> Boat, Marina _____ | <input type="checkbox"/> Showers _____ |
| <input type="checkbox"/> Make-up Tank _____ | <input type="checkbox"/> Water Closets, Tank _____ |
| <input type="checkbox"/> Pump, Prime Lines _____ | <input type="checkbox"/> Water Closets, Flush _____ |
| <input type="checkbox"/> Pump, Water Operated Ejector _____ | <input type="checkbox"/> Water for Cooling _____ |
| <input type="checkbox"/> Photo Lab Sinks _____ | <input type="checkbox"/> Water Operated Equipment _____ |
| <input type="checkbox"/> Photostat Equipment _____ | <input type="checkbox"/> Water Treatment Tanks _____ |
| <input type="checkbox"/> Pump, Pneumatic Ejector _____ | <input type="checkbox"/> Water Well, Secondary System _____ |
| <input type="checkbox"/> Pipette Washer _____ | <input type="checkbox"/> Wash Tanks _____ |

REMARKS:

Cross-Connection Inspection Checklist

Figure 15-2 (continued)



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The report must include the surveyor's name, signature, certification or identification number, and the date and the time the survey was conducted. It also will include the identification of cross-connections and describe the actions taken after completing the survey. An example of a survey report is given in **Figure 15-3**.

15.7 NOTIFICATION AND RE-INSPECTION

It is important that records be maintained of all inspections, surveys, and backflow preventer tests. Copies of these records shall be provided to the property owner and to the responsible authorities. The water purveyor shall be kept informed of all findings by all agencies having jurisdiction, including health or code enforcement agencies, in order for the purveyor to take appropriate action consistent with the degree of hazard to protect the water distribution system.

It is strongly recommended that these records be stored digitally so they are organized and readily accessible. It will be necessary to use this information for sending compliance letters, notices for assemblies to be tested, and other program announcements.

As stated earlier, most plumbing codes require backflow prevention assemblies be tested annually. As a part of the cross-connection control program, all devices and assemblies should be inspected and tested at least on an annual basis to ensure that the devices are functioning properly. This information should be utilized in notifying the owners of required testing of these assemblies.

If the surveyor is not authorized to correct the cross-connections, a schedule of repair and reinspections to ensure compliance should be discussed with the owner. Cross-connection control surveys should be conducted at intervals consistent with local cross-connection control ordinance provisions. In some areas annual survey inspections are recommended at a minimum. High hazard locations, facilities undergoing renovation and alterations to the water and/or drainage piping systems, and systems with alternate water sources require frequent surveys.

15.8 PROCEDURES FOR NON-COMPLIANCE

Compliance with rules, regulations, and laws demonstrates reasonable action to prevent contamination of potable water supply systems. Those involved in backflow prevention shall endeavor to achieve the highest level of protection to avoid the hazards associated with a backflow incident. These hazards include damage to property or domestic water systems, the spread of disease, and the death of users of contaminated systems.

Responsibility for the safety of individuals depending on potable water systems is shared by all of those involved in the production and distribution of potable water from the water source to the last free-flowing tap. These include water purveyors, plumbing or mechanical contractors and their employees, building owners, and governmental bodies.

Water purveyors are required to take reasonable action to protect the community water distribution system from hazards associated with domestic water systems located on the consumer's premises. Thus, cross-connection control and surveys of



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the consumer's domestic water system is accomplished through the rules, regulations, ordinances, and laws of local governing Authorities Having Jurisdiction. This will include provisions for non-compliance and resulting penalties.

The responsibility of the plumbing or mechanical contractor and all those who work for them is to comply with all codes and local ordinances. Included in sharing the responsibility of protecting domestic water systems are the property owners. Often property owners are unaware of code regulations that require them to maintain their domestic water systems in safe operating condition, including protecting against backflows. However, this does not preclude them from following the letter of the law.

The responsibility of governmental bodies is the promulgation and enforcement of regulations that mandate reasonable and prudent action to prevent cross-connections. Thus, these bodies, usually through the plumbing and health codes, provide for penalties for non-compliance. Earlier in this chapter you found that the Authority Having Jurisdiction has the right of entry to investigate non-compliance with the plumbing code and the penalties for non-compliance. That Authority Having Jurisdiction also has the right to stop work being done improperly and terminate water service to a property. For example, the *2015 Uniform Plumbing Code* states:

106.4 Stop Orders. Whenever any work is being done contrary to the provisions of this code, the Authority Having Jurisdiction shall be permitted to order the work stopped by notice in writing served on any persons engaged in the doing or causing such work to be done, and any such persons shall forthwith stop work until authorized by the Authority Having Jurisdiction to proceed with the work.

106.5 Authority to Disconnect Utilities in Emergencies. The Authority Having Jurisdiction shall have the authority to disconnect a plumbing system to a building, structure, or equipment regulated by this code in case of emergency where necessary to eliminate an immediate hazard to life or property.

106.6 Authority to Condemn. Where the Authority Having Jurisdiction ascertains that any plumbing system or portion thereof, regulated by this code, has become hazardous to life, health, or property, or has become insanitary, the Authority Having Jurisdiction shall order in writing that such plumbing either be removed or placed in a safe or sanitary condition, as appropriate. The order shall fix a reasonable time limit for compliance. No person shall use or maintain defective plumbing after receiving such notice.

When such plumbing system is to be disconnected, written notice shall be given. In cases of immediate danger to life or property, such disconnection shall be permitted to be made immediately without such notice.

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CROSS-CONNECTION SURVEY FORM

Date: _____

Name of Company, Corporation, or Business: _____

Address: _____

Name of Contact: _____

Type of Use: Industrial ___ Commercial ___ Governmental ___ Other ___

Location of Service: _____

Size of Service: _____ Inch(s) Metered? Yes No

Require non-interrupted water service? Yes No

Does boiler feed utilize chemical additives? Yes No

Is backflow protection incorporated? Yes No

Are air-conditioning cooling towers utilized? Yes No

Is backflow protection incorporated? Yes No

Is a water saver utilized on condensing lines or cooling towers? N/A Yes No

Is the make-up supply line backflow protected? Yes No

Is process water in use, and if so, is it potable supply water or "raw" water? N/A Potable
Raw Protected Unprotected

Is fire protection water separate from the potable supply? Yes No

Are containment devices in place? Yes No

Summary

Degree of Hazard: High Low

Type of device recommended for containment: RPZ DCV None

Fixture outlet protection required? Yes No

If so, where? _____

Cross-Connection Survey Form

Figure 15-3



Chapter 15 – Cross-Connection Control Surveys

CROSS-CONNECTION SURVEY FORM (continued)

Place: _____ Date: _____

Location: _____ Investigator(s): _____

Building Representative(s) and Title(s):

Water Source(s): _____

Piping System(s): _____

Points of Interconnection: _____

Special Equipment Supplied with Water and Source:

Remarks or Recommendations: _____

NOTE: Attach sketches of cross-connections found where necessary for clarity of description. Attach additional sheets for room-by-room survey under headings:

Room Number	Description of Cross-Connection(s)
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Cross-Connection Survey Form

Figure 15-3 (continued)

Backflow Prevention Reference Manual

