

USC

UNIVERSITY
OF SOUTHERN
CALIFORNIA

*Foundation for
Cross-Connection
Control and
Hydraulic Research*

TALK
CROSS

The Essentials of a Cross-Connection Control Program

The Essential Elements of a Cross-Connection Control Program. There are several elements necessary for a valid cross-connection control program. These elements can be summarized under the following headings.

- Authority
- Backflow Preventers
- Certified Testers and Specialists
- Defensible and Detailed Records
- Education and Training



Authority

Authority is essential to carry out any type of a cross-connection control program. The administrative authority must have the legal authority in place to implement policies, conduct site surveys and require protection. This authority is usually in the form of a local ordinance or law of some type. Of course, this will depend on the administrative authority and the type of regulations under which they fall. For example, a county health organization would have a different type of legal authority

than would a municipal water agency.

The legal basis for a cross-connection control program must be specific in several ways and yet flexible in others. For example, the administrative authority must have the specific right to enforce the program through fines, termination of water service, etc. The adoption of sources, however, may need to be more flexible. For example, if an administrative authority decides to make the requirement that backflow preventers installed in their system are Approved by the Foundation, they may specify that such assemblies must appear on the List of Approved Backflow Prevention Assemblies. This can be done in two ways. One administrative authority may site the List of Approved Backflow Prevention Assemblies dated 1 January 1999. This would be fine, except that there may be additions to the List on 2 January 1999. Another possibility is to state assemblies must appear on "the most current List of Approved Backflow Prevention Assemblies." This would ensure that assemblies are Approved at the time they are installed and also allow for additions to the List without having to go through the entire legal process of changing the ordinance or law. Some agencies may want to include a statement which allows them to make more specific requirements. Such a statement may state, "assemblies

Continued on page three

I n s i d e C r o s s T a l k

Special Edition: The Essentials of a Cross-Connection Control Program

Foundation Membership

The Foundation's Membership Program provides many benefits to the Members of the Foundation. These include the following items. Members receive twenty percent discounts on Foundation Training courses for any employee of the Member company/organization. This means that one company may send several employees to the training courses saving \$150.00 to \$160.00 per employee on the course registration fee. Members also receive the *List of Approved Backflow Prevention Assemblies*. The List is printed quarterly, and the up-to-the-minute version of the List is available on the Internet for those Members with Internet access. This version of the List contains the most up-to-date information available. This is where the Foundation staff goes to check the status of an assembly. To access the List on the Internet, please visit <http://www.usc.edu/fccchr/list/>

Members receive twenty to twenty five percent discount on all Foundation Training tools as well. This includes a twenty-five percent discount on additional copies of the *Manual of Cross-Connection Control*. The first copy of the Manual is provided to Members as part of the Membership Program. As new Editions are released, the Member will automatically receive a complimentary copy of each new edition.

Members may also call the Foundation at any time with technical questions they may have. The Foundation's Engineering Staff is available to assist Members with the various aspects of field testing backflow preventers, installing backflow preventers, and administering their cross-connection control program. Members are encouraged to contact the Foundation's Engineering Staff whenever there is a question regarding the Approval status of an assembly, whether it be due to orientation, components or other questions that may arise.

Contacting the Foundation

Mailing Address:

Foundation for Cross-Connection Control and Hydraulic Research
University of Southern California
Kaprielian Hall 200
Los Angeles, CA 90089-2531

Phone:

213 740 2032

FAX:

213 740 8399

e-mail:

fccchr@usc.edu

Web Site:

www.usc.edu/fccchr

The Foundation accepts Purchase Orders via mail or fax and credit card orders (Visa, MasterCard, Discover) via telephone and the Web.

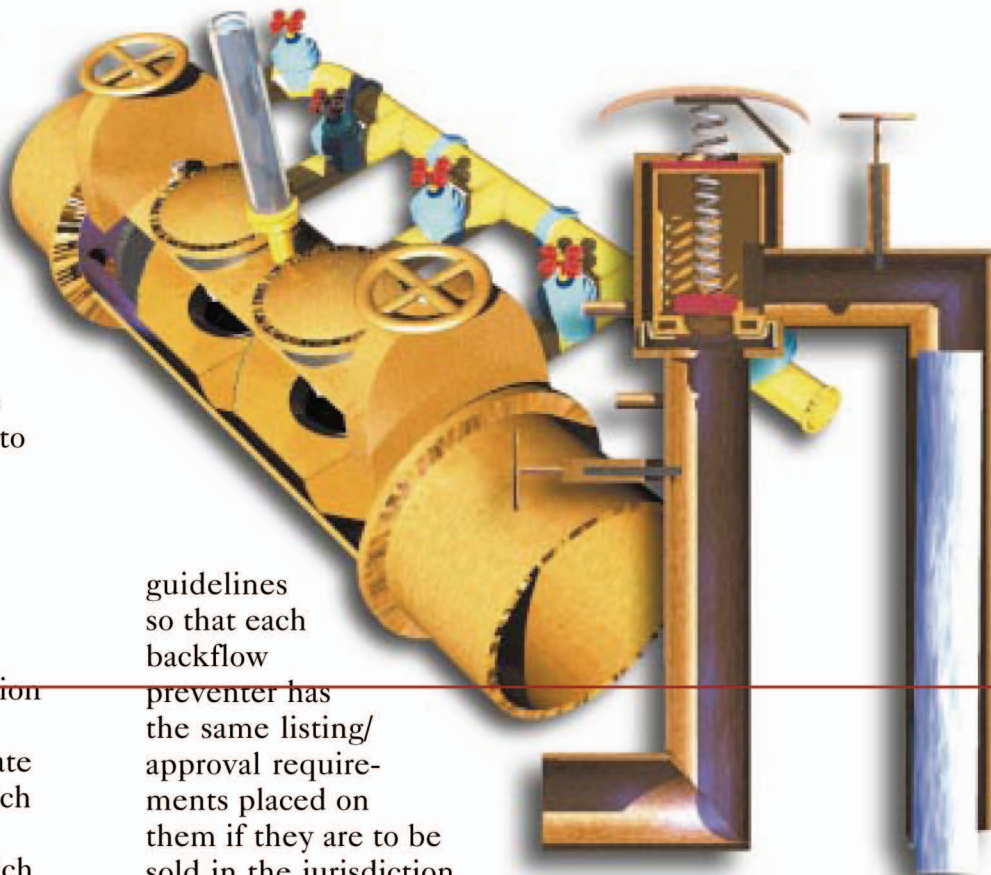
Cross Talk is published by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California for Foundation Members. Limited additional copies are available to Members upon request. (213) 740-2032 1999 © University of Southern California. All rights reserved.

The Essentials of a Cross-Connection Control Program

continued from page one

approved by this department must be listed on the most current List of Approved Backflow Prevention assemblies, published by the University of Southern California and meet any additional requirements deemed necessary by the Agency.” Whatever type of statement is used it is necessary for the administrative authority to have all the authority they need to effectively carry out their cross-connection control program, so that all “reasonable and prudent” actions are taken to prevent backflow.

may be a relative. This is one reason there needs to be clear



guidelines so that each backflow preventer has the same listing/approval requirements placed on them if they are to be sold in the jurisdiction of the administrative authority.

Backflow Preventers

Of course for any cross-connection control program to be effective one needs to have the appropriate means to prevent backflow, which includes mechanical backflow preventers. The concern is which backflow preventers will be acceptable to the administrative authority. Obviously the Foundation encourages administrative authorities to require assemblies Approved by the Foundation. There are, however, other listing and approval agencies which may be used.

The first point is that the administrative authority must have a non biased means of determining which backflow preventers may be installed in the system. The administrative authority needs to avoid any potential conflict of interest, such as accusations of corroborating with a particular sales representative because, for example, the sales representative

Additionally, it is very important that the requirements placed on the backflow preventers are valid. For example, the color of the assembly is not a technically valid reason for not accepting it in your area of jurisdiction. This is why it is best to rely on the approval of a backflow preventer by an entity that specifically lists/approves backflow preventers. As mentioned previously in this article the Foundation encourages use of its List of Approved Backflow Prevention Assemblies by its Member agencies. The Foundation's Approval Program is unique in that backflow prevention assemblies

The Foundation can not make statements about the operation of the assembly when there is no data to back up the statement

continued on page four

The Essentials of a Cross-Connection Control Program

continued from page three

must, not only pass a stringent laboratory evaluation, but also a twelve month field evaluation. The field evaluation requires that three of each size and model of assembly is installed in actual field conditions. They must provide twelve months of trouble free service. At the end of the twelve months the assemblies are disassembled to determine if there are any problems with the assembly.

The Foundation conducted a survey to determine how often assemblies passing the Laboratory Evaluation phase of the Approval Program did not pass the Field Evaluation the first time through. The results showed that over one-third of the assemblies which passed the Laboratory phase of the Approval Program did not pass the Field Evaluation phase the first time through. This is one of the reasons the Foundation is convinced of the necessity for the Field Evaluation.

Whatever method is used, the administrative authority must make sure to have a standard impartial means of determining what backflow preventers are acceptable in their system.

Certified Testers and Specialists

Certified Testers

Once backflow prevention assemblies are properly installed, they must be periodically tested and maintained properly. Who will test these assemblies? That will be

up to the administrative authority. There are some very important issues that need to be considered when determining who will be permitted to field test the backflow preventers in a particular jurisdiction.

First of all, what method of testing is to be used? Some may assume if certain test cocks are opened with shut off valves closed the condition of the assembly may be ascertained by whether or not water comes out of a test cock. This is not likely to be the type of field testing any administrative authority would want to see in their area of jurisdiction. The Foundation recommends the field test procedures found in the current edition of the *Manual of Cross-Connection Control*. These procedures enable the tester to accurately determine the condition of the backflow preventers, even with shutoff valve leaks. But, there are other field test procedures available and the administrative authority must make the determination as to what field test procedure is to be used in the jurisdiction.

Once the field test procedure is determined there must be some means of determining if a tester is qualified to test using these field test procedures. This is where training and certification come in. While the Foundation offers training courses to train individuals on the intricacies of testing and ascertaining problems on the various backflow prevention assemblies. Those passing the Foundation's courses are not certified. They are issued a certificate of completion which states

Whatever method is used, the administrative authority must make sure to have a standard impartial means of determining what backflow preventers are acceptable in their system.

The Essentials of a Cross-Connection Control Program

that the individual did successfully complete the course. But a certification is usually a voluntary process instituted by a non-governmental agency in which individuals are recognized for advanced knowledge and skill. The certification of backflow prevention assembly testers typically requires a retest or recertification every so many years (typically every two to three years), to assure that the tester maintains their proficiency with the current field test procedures.

Many administrative authorities

tion program was hinted at in the previous paragraph; that is recertification. Recertification is necessary to ensure that testers testing in the jurisdiction, know what they are doing and continue to know what they are doing. Without recertification, one doesn't know if the tester actually knows how to test. For example, if an administrative authority does not have a certification program, but only requires training. A tester could come in to the administrative authority and show them a USC

continued on page six

Whether the administrative authority conducts their own certification program, or adopts one already in operation it is imperative that the program requires recertification with both a written and performance examination.



conduct their own certification program. Others adopt those of another organization or even another administrative authority. What the administrative authority needs to determine is, "what is essential to a certification program." One of the most important aspects of a certifica-



continued on page six

The Essentials of a Cross-Connection Control Program

continued from page three

Who is to determine when and if a backflow preventer is to be installed in the first place.

certificate of completion from 1975. The tester meets the qualifications, if those qualifications only state that the tester must have attended an acceptable training course. It is possible that they haven't tested a backflow preventer since 1975. If they did, they are probably continuing to use outdated methods. This is why recertification is so important. Of course recertification may take on many forms. For some types of certification only a renewal fee is necessary. However, for backflow prevention assembly testing it is essential that an examination be required. Not only a written

examination, but also a performance examination. There is no way to tell if a tester can actually test and ascertain the condition of an assembly if they do not demonstrate this fact to an impartial proctor. So, whether the administrative authority conducts their own certification program, or adopts one already in operation it is imperative that the program requires recertification with both a written

and performance examination.

Certified Specialists

Approved backflow preventers being tested by certified testers are essential to any cross-connection control program. But, who is to determine when and if a backflow preventer is to be installed in the first place. This is where the certified cross-connection control program specialist comes in. The specialist is trained to administer a cross-connection control program. They must be very familiar with all of the essentials of any program. One of their most critical tasks is conducting site surveys. This is where the specialist determines the degree of hazard, then what type of backflow preventer is necessary and where it must be installed.

How they go about this will depend on which type of protection the administrative authority is responsible for, meter protection, or internal protection (sometimes called containment and isolation respectively). If the administrative authority has a containment or meter protection program, it is their responsibility to determine if there are cross-connections on the premises which may pose a threat to the quality of the water distribution system. If there is a hazard, the administrative authority must require the appropriate type of backflow preventer at the meter in order to protect the potable water distribution system.

If, however, the administrative authority is responsible for internal protection, the assessment of which type of backflow preventer is



The Essentials of a Cross-Connection Control Program

necessary, if any, must be made at each point of water use. (A summary of how this is done may be found in the article, "Three Questions," found in the Autumn, 1998 issue of Cross Talk.) A trained specialist will need to conduct a site survey to make the determination. The administrative authority will need to have a thorough understanding of the various hydraulic conditions which allow backflow to occur. Additionally, it will be necessary to have a good understanding of the degree of hazard. Knowledge in both of these areas is necessary in order to make a determination as to which type of backflow protection, if any, would be needed at the various points of use.

Defensible and Detailed Records

Another important aspect of a cross-connection control program is record keeping. Records must be retained for a specific period of time. Some states have specific requirements for this. Other areas go by the statute of limitations on any action which may be brought against the administrative authority for failing to administer a viable cross-connection control program. But retaining the records for a certain period of time is only one aspect of record keeping. Records must be detailed and defensible.



The records must contain specific information which supports the actions of the administrative authority. A sample of some of the items which must be maintained in the records follows: Service address, owner address, degree of hazard on property, location of assemblies on property, manufacturer, make and model of assemblies, sizes, field test results of the assemblies, types of equipment on the premises. This is obviously just a small sample of some of the items needed to be maintained in the records. More detail is better than less.

The records must be "defensible." That means the records should be sufficient to show that the administrative authority is doing all they can to carry out an effective cross-connection control program. Should, for example, there be a backflow incident in the jurisdiction, the administrative authority needs to be able to show through their records, that they have done all they could to survey sites, installation of approved backflow preventers and required regular

The records should be sufficient to show that the administrative authority is doing all they can to carry out an effective cross-connection control program.

continued on page eight

The Essentials of a Cross-Connection Control Program

continued from page seven

Education and Training

testing of these assemblies. If the records are insufficient to do this, it could leave the administrative authority in a difficult position. Education and Training are probably two of the most important aspects of any cross-connection control program. As these are discussed it will be evident why these are so important.

Education

Education will be discussed first. Education is important to every aspect of the cross-connection control program. First of all the staff of the administrative authority must be educated. Specific training for specific personnel will be discussed in the following text, but education of all personnel in a general manner is very important. The concepts of backflow, what a cross-connection is, how water from a customer's premise can get into the potable water supply are important concepts to, at least, introduce to all personnel. This isn't so that all personnel can become experts and handle all sorts of cross-connection problems. But it certainly helps when personnel are familiar with some concepts and know to whom people should be referred when certain situations arrive. This is also helpful in the overall aspects of carrying out a cross-connection control program. Here is an example. Personnel in a particular water agency are briefly introduced to some of the concepts of cross-connection control. The meter readers, repair personnel, and anyone having a field job are

requested to inform the cross-connection control program specialist of any potential hazards they happen to notice at facilities that may warrant a cross-connection control field survey. Someone on a repair job notices that a facility seems to be changing and large pieces of equipment are being brought into the facility. When the program specialist makes inquiries, it is determined that the facility has totally changed the type of work being conducted, and will now be using contaminants under pressure for various processes and now needs to have a reduced pressure principle assembly. This is just one example, and hopefully, this type of change would be picked up through permitting process for any remodeling or modification to the plumbing system.. However, one must be aware that permits are not always pulled on every change that is made, even if it is a sizable change.

Education is also a very important public relations tool. As those who have been involved in cross-connection control for any length of time will testify, public relations is a big part of the job. Whenever a customer is going to be required to spend money on anything, even if it is to protect the public health, public relations are necessary to help the process go smoothly. When requiring a customer to install a backflow preventer, it may not be easy to convince the customer of the need for the assembly. Some administrative authorities have taken the position of, "well, fine, if you don't want to install a backflow preventer, then get your water from someone else, because you're not getting any more from

Education and Training are probably two of the most important aspects of any cross-connection control program.

The Essentials of a Cross-Connection Control Program

me.” Although it may be one way of expressing the importance of the program, this method does not generally help build up public support for the program.

Education, on the other hand, will certainly help convince the customer of their need to reduce their risk and increase their ability to help protect the potable water system. As the customer has a better understanding of what cross-connection control is all about, they can become an ally in preventing further cross-connections from being created at their facility and also in helping other customers in the jurisdiction accept the program. The fifteen minute video, *Working Together for Safe Water* and the informational brochure by the same title are great tools for the administrative authority to use in providing the



public and their own personnel a general education on cross-connection control.

Training

Although training and education sound very similar, there is a distinct difference. Training is used to train personnel in how to carry out specific tasks. While discussing the certification process training was briefly discussed. As mentioned in that section the Foundation's training courses do not grant the attendee "certification." They do, however, provide for a great training



continued on page ten

The Essentials of a Cross-Connection Control Program

continued from page nine

The training for a cross-connection control program specialist must include information and instruction on such items as policies and procedures, rules and regulations, record keeping, public relations, and site surveys.

experience. Those individuals that are being certified to test backflow preventers must first be given some sort of training. This is not just to “pass the exam,” but to know how to test and diagnose problems with each of the backflow preventers. Just as in the certification exam, hands-on experience is necessary. Whatever type of training is used it is important that the individuals have the opportunity to learn the actual testing procedure with a backflow preventer in front of them. They also need the opportunity to practice the field test themselves with operating backflow preventers. Obviously the level of instruction is critical to the value of the course. Instructors must be extremely well versed in all aspects of materials covered in the course. They must also be effective communicators.

The training for a cross-connection control program specialist must include informa-

tion and instruction on such items as policies and procedures, rules and regulations, record keeping, public relations, and site surveys. Actual site surveys as a training exercise will help any student understand the significance of a site survey. There is really no substitute for this type of real world experience.

Many Members of the Foundation avail themselves of the Foundation's training courses. The Foundation has put a tremendous amount of effort into creating these courses to meet the recommendations listed above.

With these five elements in place, a cross-connection control program is going to be very effective.



Tools for your Cross-Connection Control Program

The Foundation Staff is always available to help Members in any of these areas. A great amount of time and energy is spent in developing the right tools that help Foundation Members carry out their cross-connection control program. If there are certain tools that Members would like to see developed they are encouraged to contact the Foundation Staff and make any recommendations. The items below and on the back cover are available by calling the Foundation office at (213) 740 2032, or from the Web at www.usc.edu/fccchr/



The Manual currently in its Ninth Edition is designed to provide the engineer, water purveyor, health agency, plumbing official and other persons responsible for the public and in-plant potable water supply with information and procedures for the development, implementation and enforcement of backflow prevention practices which will meet Federal, State, and local regulations governing cross-connection control. This includes: recommended practices for the protection of the public potable water supply; responsibility of the health agency, water purveyor, consumer, and the backflow prevention assembly tester; cross-connections or water uses which may endanger the public water supply; backflow prevention assembly field test procedures; specifications for backflow prevention assemblies. The Manual is \$36.00 for Foundation Members (\$48.00 otherwise).

The Essentials of Cross-Connection Control is a color graphic slide presentation. This 35mm slide presentation package contains 60 color graphic slides. The slides cover some basic hydraulics, definitions of the various terms such as Backflow, Backpressure, Backsiphonage, Cross-Connection, etc. Generic graphics of each of the acceptable means of backflow prevention are shown. The applications of each of the backflow preventers is discussed as related to the hydraulic condition of the installation and the degree of hazard involved.

This package comes in a three-ring binder with a description of each slide, along with a black and white representation of the slide.

This slide presentation package is available to Members of the Foundation for \$100.00. (The non-Member price is \$135.00.)

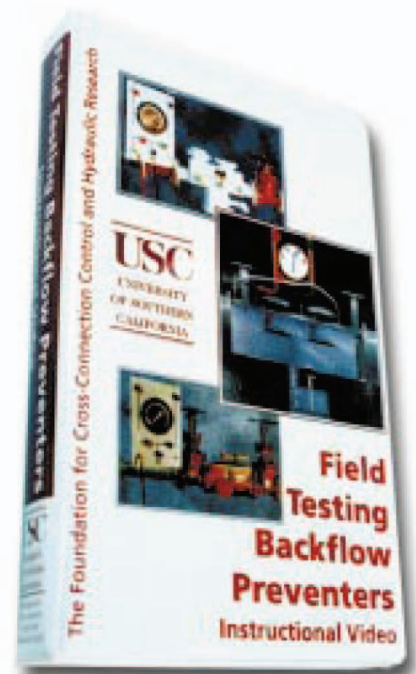


The Foundation offers an informational brochure on cross-connection control, entitled *Working Together for Safe Water*, which is used to explain the concepts of cross-connection control in a simple written format. This is an ideal compliment to the film/video *Working Together for Safe Water*, as it allows those viewing the film to take a written explanation away with them for later perusal. The Foundation imprints the name and address of the ordering agency or company on the brochure so that the reader can contact the agency or company directly for more information on the cross-connection control program. The brochure is priced in groups of 500 1000, and 2500. The pricing for Foundation Members is \$115.00, \$190.00, \$375.00 respectively. The non-Member rates are \$145.00, \$240.00, and \$475.00



In order to aid companies and agencies in their cross-connection control programs the Foundation offers the film *Working Together for Safe Water* which uses a combination of live footage and animation to explain the concepts of backflow and cross-connection control. The film explains how backflow can occur and how cross-connections can be controlled with the various types of backflow prevention assemblies. Also discussed are some of the aspects of an effective cross-connection control program. This video is available to Members for \$60.00. (The non-Member price is \$80.00.)

The video *Field Testing Backflow Preventers* clearly demonstrates the field test procedures for the double check valve assembly, the reduced pressure principle assembly and the pressure vacuum breaker assembly in accordance with the ninth Edition of the *Manual of Cross-Connection Control*. testing of a properly working assembly is included for each assembly, along with troubleshooting. The troubleshooting techniques are enhanced by the use of computer animation, which allows the viewer to see what is happening inside the assembly when external observations are made. For Example, while testing a double check, once sees the water in the sight tube recede. The computer animation will show exactly where that water is going, thereby helping the tester remember what causes the receding water. The demonstration for the reduced pressure principle assembly includes methods using the two, three and five needle valve gauges. The Foundation presents *Field Testing Backflow Preventers* for the Membership price of \$25.00, or \$35.00 for non-Members.



**Foundation for Cross-Connection
Control and Hydraulic Research
School of Engineering**

University of Southern California
Kaprielian Hall 200
Los Angeles, California 90089-2531