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FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH

## Testing the Double Check Backpressure Test vs. Direction of Flow Test

Some have raised concerns over the new direction-of-flow test for the double check valve assemblies published in the *Manual of Cross-Connection Control - Ninth*

double check valve assembly to two pounds per square inch (psi) of backpressure. If the check valve had a small piece of debris or deposits on the check valve disc, the two psi backpressure may force the elastomer disc to seal around the debris. In this case the tester would note that the check valve is holding.

If the test is performed on the same check valve with the direction-of-flow test, different results could occur. Since the direction of flow test determines how much pressure is being held upstream of the check valve due to the force of the spring on the check valve, a small amount of debris could keep the check valve from holding the full 1.0 psi in the direction of flow. Even though the check valve may be holding at 0.5 psi, it does not meet the requirements of the *Manual*

of *Cross-Connection Control - Ninth Edition*.

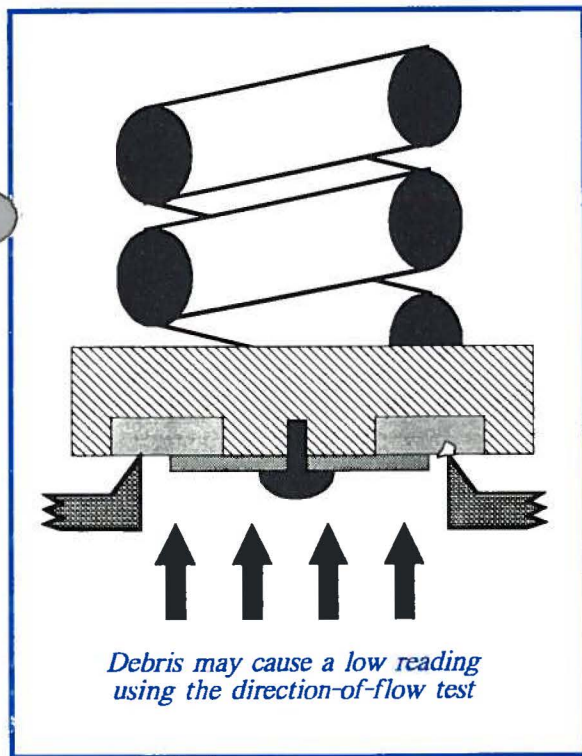
There are two points that are important to know in this case. First, the requirement for the check valves of the double check valve assembly to hold 1.0 psi in the direction-of-

## Using Portions of the Manual

The *Manual of Cross-Connection Control - Ninth Edition* has been a very popular tool among training institutions. Additionally, many administrative authorities have adopted the field test procedures as the required method of testing under their jurisdiction. The Foundation receives requests regularly for permission to reproduce sections of the *Manual*. Many of these requests come from water agencies or health departments wishing to use the installation guidelines from Section 8 (Figures 8.1 through 8.4). In some cases the Model Ordinance from Section 8 is desired. In most of these cases, the Foundation will grant permission for use of these portions, depending upon the intended use of the material.

The field test procedures from Section 9 of the *Manual* (in the fully illustrated version) may not be reproduced under any circumstances. The Foundation has not and will not

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Edition. The concern is that there may be a large number double check valve assemblies which have been passing the backpressure test (8th Edition) for years and yet would fail the new direction-of-flow test. This is due to the nature of the tests.

The backpressure test subjects each of the check valves of the

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### Highlights

- 💧 50th Anniversary Celebration!
- 💧 Does the RV Open Fully
- 💧 Historical Highlights - Training Courses

# Membership

The Foundation Membership grew again in this last quarter. The newest Members are listed below. The Foundation encourages Members to take advantage of the many benefits of Foundation Membership. Additional copies of the *Manual of Cross-Connection Control* are available to Members at a 25% discount. Members receive a 20% discount on training courses and 25% discounts on the Training Tools. Members are also encouraged to contact the Foundation office with any questions regarding cross-connection control.

Anderson & Assoc., Inc.  
 Backflow Prevention Services Ltd.  
 BATS  
 Baxter Health Care  
 California Dept. of Parks  
 & Recreation  
 City of Cave Junction  
 Cedar Rapids Water Department  
 Dona Ana Branch Community  
 College  
 Educorp Career College  
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 Tom Higham  
 Keyes Community Services District  
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Mariposa County  
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 City of Phoenix  
 Porter Memorial Hospital  
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 Extension  
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 Watts Industries (Canada) Inc.  
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## Special Notice

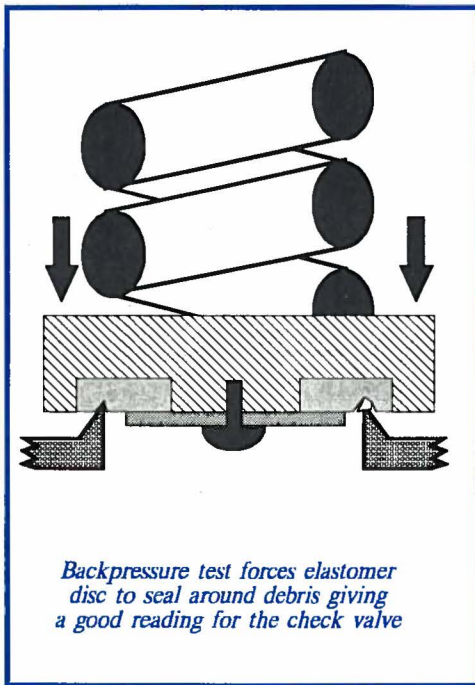
The Foundation has **added a Tester Course** to the 1994 Schedule. This course will be held in **Merced, CA** during the week of **14-18 November 1994**. For more information, please contact the Foundation Office at (213) 740-2032.

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## Testing the DC

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flow is not a new requirement. This has been a design requirement for double check valve assemblies since the Foundation's original specifications were published as *Paper No. 5* in April of 1948. This design re-



*Backpressure test forces elastomer disc to seal around debris giving a good reading for the check valve*

quirement itself, existing for forty-six years, is not new. The field testing of this design requirement is new with the publication of the Ninth Edition in December of 1993.

Second, when a double check valve assembly fails to meet the requirements of the Ninth Edition field test, it does not necessarily mean that the assembly will allow backflow. For example, if a double check valve assembly has both check valves holding a differential of 0.5 psi in the direction-of-flow, the assembly does not pass the field test, but the assembly is still preventing backflow since the check valves are holding. The problem is that the

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## Testing the Relief Valve

### Does it open fully?

Some backflow prevention assembly testers have been concerned with the field testing of the relief valve of the reduced pressure principle backflow prevention assembly. Once the relief valve has opened and the opening point has been determined some testers want to make sure that the relief valve opens fully. This is to assure the relief valve will discharge the necessary volume of water in an extreme backflow condition with one or both of the check valves leaking.

Although this may sound like a good idea, it is not as practical as it sounds. First of all, the term "fully open" must be defined. Does this mean the relief valve must flow the

minimum amount required by Section 10.2.2.3.7 of the *Manual of Cross-Connection Control*? If this is the case the tester must have some method of measuring the flow rate through the relief valve. This is not easily done in the field.

Some testers have stated that they look at the relief valve to make sure that it strokes fully open. This presents a couple of problems.

In many of the relief valve designs it is not even possible to see the relief valve stroke to the open position. In some cases it may be possible to see the motion of the relief valve stroking open through the relief valve port, but one would need the engineering drawings to determine exactly what the length of the

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### Tester Course

#### The Foundation Laboratory

23-27 January 1995  
8-12 May 1995  
10-14 July 1995

#### Merced, CA

14-18 November 1994

#### Las Vegas, NV

20-24 February 1995

#### Incline Village, NV

31 July-4 August 1995

**Non-Members \$750.00**

**Members \$600.00**

### Program Specialist Course

#### USC Campus

30 January -  
3 February 1995  
17-22 July 1995

#### Incline Village, NV

13-17 March 1995

#### Phoenix, AZ

5-9 June 1995

**Non-Members \$800.00**

**Members \$640.00**

Courses may be added throughout the year. Please contact the Foundation office for information on courses in your area or for an application for the next USC Training Course. You may also send a hard copy of a purchase order or a check to the Foundation office to reserve a space. Please be advised that some of these courses fill six to eight weeks in advance.

A Purchase Order may be sent via FAX to the Foundation office at (213) 740-8399 or call (213) 740-2032 for more information.

## Testing the Relief Valve


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stroke should be to fully open the relief valve. Then the practicality of making the measurement would be another problem altogether. Although it may be helpful to determine if the relief valve opens "substantially," it is not practical to require the relief valve to stroke fully open during the routine field test.

To get the relief valve to fully open would require the tester to close the No. 1 shutoff valve, and depressurize the assembly by opening the No. 2 test cock. Once the pressure on the inlet side of the first check valve is relieved, the relief valve will begin to open. Only after the pressure at the No. 2 test cock is dropped to

## Using the Manual

*continued from page 1*

grant permission for use of the fully illustrated version of the field test procedures. These are available only in the Ninth Edition of the Manual of the Cross-Connection Control. The *Non-illustrated Field Test Procedures for Backflow Prevention Assemblies* may be available to certifying entities if these procedures are required by the administrative authority. Permission to use or reproduce the procedures may be requested from the Foundation office. The administrative authority making the request must agree to use the *Non-illustrated Field Test Procedures for Backflow Prevention Assemblies* in its entirety with no editing. Additionally, they may not be distributed at random, but may be distributed upon request only. For more information please contact the Foundation office. The procedure is quite simple and many administrative authorities have taken advantage of the Foundation's *Non-illustrated Field Test Procedures for Backflow Prevention Assemblies*. 

atmospheric pressure will the relief valve be fully open. The tester would have to repressurize the assembly, and retest it. Due to the relief valve being fully drained, it is likely that the relief valve could be fouled by flushing debris laying in

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***It is not practical to require the relief valve to stroke fully open during the routine field test.***

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the body or upstream piping into the relief valve. Therefore, this draining process could cause a much larger number of problems due to the fouling.

If an administrative authority requires the relief valve of reduced pressure principle backflow prevention assemblies to open "substantially," the passing of the field test becomes subjective to the backflow prevention assembly tester. One

tester may consider a certain amount of opening or stroke, although not measured, sufficient, however, another tester may not consider the opening or stroke adequate.

This creates problems in the cross-connection control program when the field testing results cannot be assessed objectively. The question of fairness to the consumer arises when one tester is failing assemblies that another tester would pass. It is best to maintain a testing program which uses objective criteria to determine the acceptable operation of the backflow preventers. Should a reduced pressure principle backflow prevention assembly pass the field test of Section Nine of the *Manual of Cross-Connection Control - Ninth Edition*, there is no reason to doubt the assembly's ability to discharge the required amount of water should a backflow incident occur. 

## Manual Available

**The Ninth Edition of the Manual of Cross-Connection Control is available for purchase. Foundation Members receive a 25% discount from the list price of the Manual. Manual Pricing is as follows:**

<b>Members</b>	<b>\$36.00</b>
<b>Non-Members</b>	<b>\$48.00</b>

**To order Manuals a purchase order or check may be sent to the Foundation office. To expedite the order a purchase order may be sent via FAX. If next day or second day shipping is required, there is an extra fee.**

## Backpressure vs. Direction-of-Flow

*Continued from page 3*

check valves are not holding at the design requirement, which is 1.0 psi or greater. This indicates that there is a problem which should be investigated. It could be the check valve seat or disc is dirty and a simple cleaning will bring the reading back up to design requirements.

A similar situation occurs during the test of the reduced pressure principle assembly. Should the differential pressure relief valve open at a value of 1.5 psid, this is a failing value since it is below 2.0 psid. The relief valve would, in fact, open, but

at a value below the design requirement. So, even though the assembly


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*the requirement for the check valves of the double check valve assembly to hold 1.0 psi in the direction-of-flow is not a new requirement...this has been a design requirement for double check valve assemblies since the Foundation's original specifications were published as Paper No. 5 in April of 1948*

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fails the field test requirements, the assembly would not permit backflow

to occur since the relief valve does open and discharge the water from between the two check valves.

So it is important to differentiate between an assembly failing the field test criteria and failing in such a way as to allow backflow to occur through the assembly. The direction-of-flow field test will enable the tester to identify a failure before backflow is able to occur. 

### Cross-Connection Control Informational Brochures

The informational brochure entitled *Working Together for Safe Water* is a great complement to *Essentials of Cross-Connection Control* or the film *Working Together for Safe* all the concepts of cross-connection control to your audience using you can hand out the brochure. This gives those in attendance something to take with them which will help them to comprehend fully the topics discussed.

The brochures come with the name, address and telephone number of the ordering agency, so those who desire more information or have questions, can call you directly.

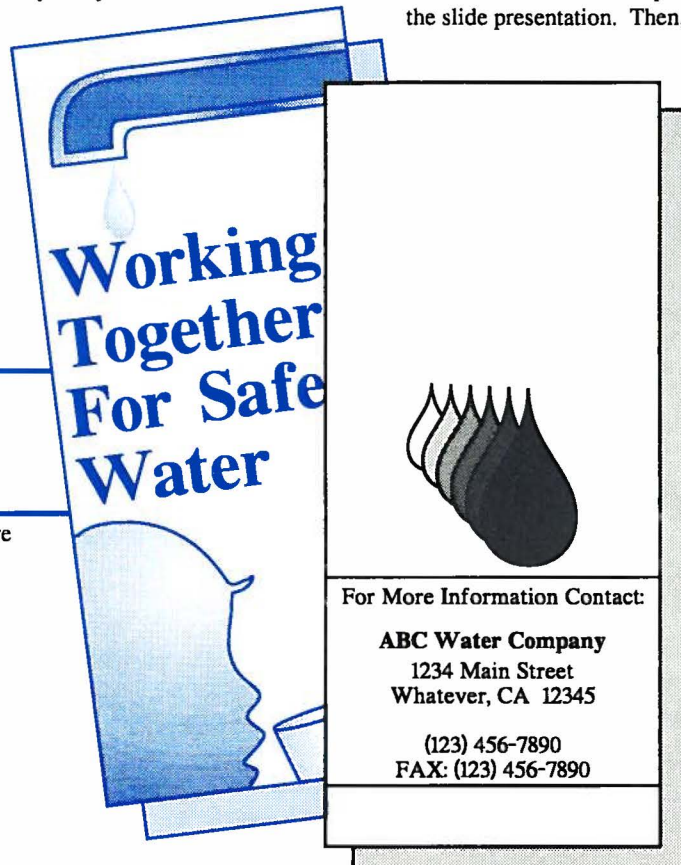
This brochure can be used to explain the basic concepts of cross-connection control, helping water users understand why they may need to install a backflow preventer or comply with

***Your Name, Address  
and Phone Number  
Printed on the Back***

periodic testing requirements. To request a sample of the brochure with an order form, contact the Foundation office at:

Foundation for Cross-Connection Control  
and Hydraulic Research  
University of Southern California  
KAP-200 University Park MC-2531  
Los Angeles, CA 90089-2531  
(213) 740-2032  
FAX (213) 740-8399

the slide presentation *The Water*. You'll be able to explain the slide presentation. Then,



For More Information Contact:

**ABC Water Company**  
1234 Main Street  
Whatever, CA 12345

(213) 456-7890  
FAX: (213) 456-7890

## Historical Highlights

### 1970 - Tester Course Established

In 1970 the Foundation offered its first *Course for the Training of Backflow Prevention Assembly Testers*. The Foundation had just moved to its current laboratory facility two years before offering this first of many courses. Professor E. Kent Springer, Director of the Foundation from 1964 to 1985 taught the course with the assistance of Mr. Ernest J. Havlina of the Los Angeles Department of Water and Power. The Fourth Edition of the *Manual of Cross-Connection Control* was used for this course which had nineteen students from California, Idaho, Missouri, Oregon, Pennsylvania, and Washington.



From the first year this course was introduced, the Foundation offered the course in various locations to help train personnel throughout the country. Originally Professor Springer handled all of the away courses with the help of some local personnel.

This course has changed in many ways over the years. In fact, testing method changed again in January of 1994 when the Ninth Edition of the *Manual of Cross-Connection Control* changed to a direction-of-flow test for the double check valve assemblies.

### 1988 - Specialist Course Introduced

The *Course for the Training of Cross-Connection Control Program Specialists* was first offered in 1988. It had become evident by this time that a different form of training was needed to prepare those responsible for cross-connection control programs to effectively administer their programs. This course was not designed to train the students to perform any testing of backflow preventers, but rather to administer their cross-connection control program. The course includes sections on rules and regulations, policies and procedures, record keeping, plan checks, site surveys and public relations.

A major portion of this course is the site survey which takes place on Thursday of the course. During the first few days of the course, those in attendance are prepared for the site survey. During the survey, the attendees are divided into groups. These groups perform the survey of several facilities. The group works together, but each attendee prepares a written report. The purpose is to determine if cross-connections are present, what the degree of hazard is, if the cross-connections are properly protected, and, if not, what must be done to properly protect the cross-connections discovered. The emphasis is placed on the requirement for meter protection, although those in attendance must make a complete survey which would justify their position for meter protection.

Although it is not required for the attendee to attend a tester course first, it is highly recommended. Those wishing to obtain certification through the CA/NV Section of the American Water Works Association must hold a valid tester certificate from the CA/NV Section of AWWA before they may apply for the Specialist Certification.

# Foundation Celebrates Fiftieth Anniversary with Open House

The Foundation celebrated its Fiftieth Anniversary with an open house at the Foundation Laboratory. Approximately 200 guests were on hand to see the Foundation's facilities and a demonstration of the Foundation's field test procedures.



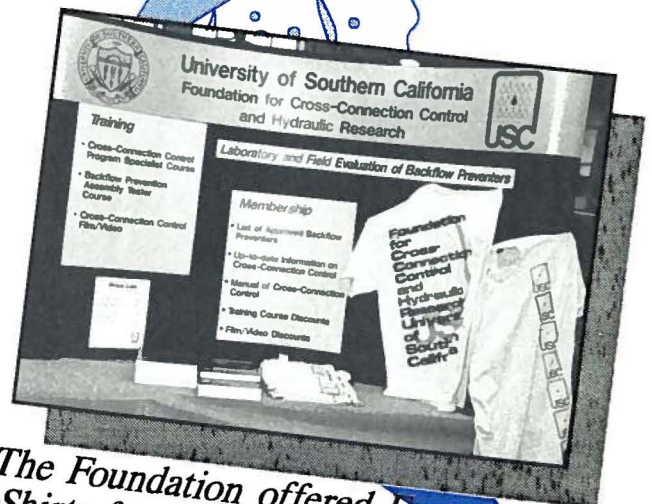
Foundation Director Dr. J. J. Lee introduces Emeritus Director, Professor E. Kent Springer, Foundation Director from 1965 to 1985.



Emeritus Director E. Kent Springer and Ernest J. Haylina, who was responsible for the Los Angeles Department of Water and Power's Cross-Connection Control Program for over 40 years before retirement.



Enjoying a buffet lunch, the guests look on as Dr. J. J. Lee introduces distinguished guests.



The Foundation offered Foundation T-Shirts for the first time at the Open House. These shirts are available from the Foundation Office. Call for details.

# Calendar of Events

*This calendar shows some of the activities in which the Foundation is currently planning on participating. For more information contact the Foundation office.*

*14-18 November 1994 - Tester Training Course, Merced, California*

*30 November 1994 - Western States Symposium Association, Bakersfield, CA*

*14 December 1994 - CA/NV AWWA Update Seminar, San Diego, CA*

*23 January 1995 - American Backflow Prevention Association Seminar - Texas*

*23-27 January 1995 - Tester Training Course, Foundation Laboratory, Los Angeles, CA*

*30 January - 3 February 1995 - Program Specialist Course, USC Campus, Los Angeles, CA*

*20-24 February 1995 - Tester Training Course, Las Vegas, NV*



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