Cross Talk

USC

UNIVERSITY OF SOUTHERN CALIFORNIA

FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH

Volume 11 / Number 3 / July 1993

Shut-Off Valves Added to the *List*

The Foundation's *List of Approved Backflow Prevention Assemblies* beginning with the last List issued (May 1993), indicates which shut off valves are acceptable as replacement shut-off valves for each backflow preventer on the List. The purpose of this listing is to allow field personnel to replace shut-off valves in the field while maintaining Foundation Approval of the assembly.

Should field personnel come across an assembly with one or two leaking shut-off valves it is possible for him or her to look on the Foundation's *List of Approved Backflow Prevention Assemblies* and determine exactly which types of shut-off valves may be used as replacement valves for the assembly. Both of the shut-off valves do not need to be replaced in order to maintain the Foundation's Approval. Either one or both of the shut-off valves could be replaced as long as they are replaced with those shown on the List as acceptable for that particular model and size of assembly.

Assemblies which are being used for an initial installation must be shipped from the manufacturer completely assembled with the proper shut-off valves attached. This is specifically stated in Section 10 of the *Manual of Cross-Connection Control*. Section 10.1.1.6 states *"...all backflow prevention assemblies shall be delivered for installation completely assembled by the original manufacturer with all components as Approved. Resilient seated shut-off valves and testcocks are considered an integral part of the assembly."* This means it is not possible to replace the body of a backflow preventer while leaving the shut-off valves in line, even though the shut-off valves may be listed as Approved shut-off valves for the specific assembly.

The Foundation continues to test the flow characteristics of various shut-off valves. As these characteristics are known and as manufacturers request, additional shut-off valves may be added to the listing for specific models and sizes of backflow prevention assemblies. It should not be assumed that a shut-off valve is acceptable simply because it is resilient seated. Any shut-off valve which is shown on the Foundation's *List of Approved Backflow Prevention Assemblies* has not only shown that it meets certain flow characteristics in the Foundation Laboratory, but also has successfully completed the field evaluation as part of a complete backflow prevention assembly. There are many shut-off valves on the market which have not demonstrated their ability to hold up

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What is a Certificate of Compliance?

Many manufacturers of backflow prevention assemblies have their assemblies approved or listed by other agencies in addition to being Approved by the Foundation. Currently, the Foundation is the only testing entity which performs both a laboratory and field evaluation. Many other agencies require laboratory tests for their acceptance. In most cases the Foundation will complete the necessary paperwork and submit it to the certifying or approving agency to show that the backflow preventer meets their requirements. Often a Certificate of Compliance is issued by the Foundation to confirm that the backflow preventer complies with *another agencies requirements.*

A certificate of compliance should be examined carefully. Some

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Welcome! ...New Members

Quite a large number of agencies and companies decided to join the Membership program of the Foundation in the first quarter of 1993. With the Membership's continued growth, the Foundation is constantly seeking to serve the Member better. Members should contact the Foundation office with any ideas they may have. The following are those which joined the ranks of the Membership Program in the first quarter of this year.

A B.E.S.T. Service
A. E. Staley Manufacturing Company
A.A.A. Testing, Inc.
Arkansas Environmental Academy SAU-Tech
Army National Training Center, Ft. Irwin
Black & Veach
C.W.W.O.A.
CAMO Pollution Control, Inc.
Carmel Utilities Water Distribution
Town of Castle Rock
Clark County School District
Conbraco Industries
Corona Plumbing
Diversified Education Company
E. R. Cimino Plumbing & Heating
Eaton Corporation
EG & G Rocky Flats, Systems Engineering
City of Gering
Globe, City of
Hilton Head Plantation Utilities
Industrial Cross-Connection Prevention
Lawrence Livermore National Laboratory
Lohrbach, Jon
Mirage Horticulture Dept.
Navy Public Works SFBay, Code 626
North Georgia Consulting
Olympia, City of
Peru, City of Water Department
Pipeco
Plumber's Local Union #299
Pro Marketing, Inc.
Reese Mechanical Contractors
Richard K. Gingras
Sarasota County Utilities
Saudi Arabian Oil Company (Saudi ARAMCO)
Schaefer & Bratton, Engineers
Service Tech
Shasta Dam Area Public Utility District
Southwest Backflow
St. Francis Medical Center, Dept. 835
The Plumbing Company
TriState Fire Protection
Walnut Valley Unified School District
City of Wasilla
Wayne Howard and Associates
City of Wilson Water Distribution Dept.
Winters, City of

Tester Course

USC Campus
12 - 16 July 1993
The Foundation Laboratory
4 - 8 October 1993
3 - 7 January 1994
Incline Village, NV
2 - 6 August 1993

Non-Members $750.00
Members $600.00

Program Specialist Course

USC Campus
19 - 23 July 1993
10 - 14 January 1994

Monterey, CA
20 - 24 September 1993

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.

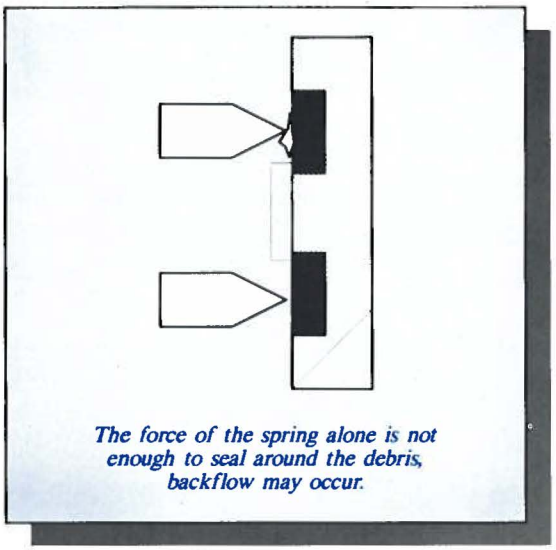
A Purchase Order may be sent via FAX to the Foundation office at (213) 740-8399 or call (213) 740-2032 for more information.

USC RECYCLED PAPER

Cross Talk is published by the University of Southern California's Foundation for Cross-Connection Control and Hydraulic Research for its Members. Additional Copies are available to the Members upon request. (213) 740-2032

Changes in the 9th Edition

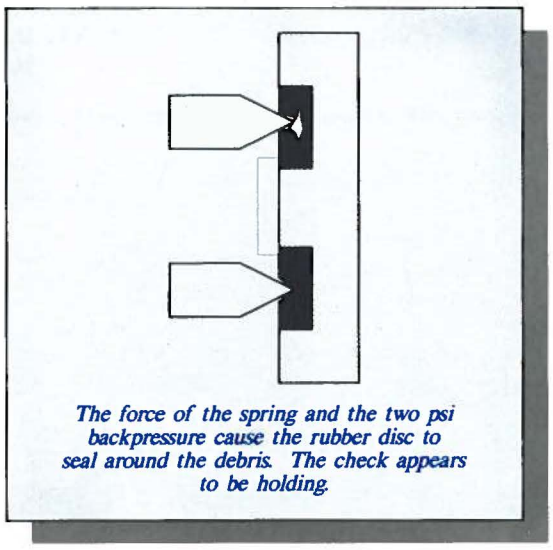
Many Members have asked for the reasons behind the change in test procedures for the double check valve assembly taking place in the Ninth Edition of the *Manual of Cross-Connection Control,* which have been discussed in previous issues of *Cross Talk.* This particular subject has been discussed in the Manual Review Committee meetings for almost two years. Both testing methods (the two psi {pounds per square inch} backpressure test and the one psi direction of flow test) have advantages and disadvantages.



The force of the spring alone is not enough to seal around the debris, backflow may occur.

The Foundation has used the direction of flow test in situations where readings were unsure for several years. For the last three years the Foundation has been using the direction of flow test in addition to the backpressure test on all assemblies under field evaluation. Through this, it has been determined, in several cases, that the direction of flow test indicated the assembly was not holding the one psi in the direction of flow even though the backpressure test showed the assembly working properly. It has been a requirement for the double check valve assemblies to hold a one psi differential in the direction of flow since the first edition of the Manual in 1960. So, any assembly currently Approved should meet this requirement, since this is not a new requirement However, the new method of testing will test for this design specification.

One problem with the backpressure test is the possibility of getting a reading which shows the check valve is holding, when it might not during an actual backflow incident. This may occur when the check valve is slightly fouled. A direction of flow test would show the check valve as not holding. However, the backpressure created during the test could force the rubber disc to seal around the debris which is causing the check valve to leak. This would be indicated on the gage as a good check valve. If, however, a backflow condition existed, the reverse differential may be less than two psi, allowing backflow to occur since the



The force of the spring and the two psi backpressure cause the rubber disc to seal around the debris. The check appears to be holding.

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Recertification

One of the most important parts of a certification program for backflow prevention assembly testers is the *recertification.* Testers should be recertified at least every three years. This should include, not only a written examination, but also a practical exam. This practical exam should require the tester to test each of the backflow prevention assemblies. The tester should also be able to determine what is wrong or could be wrong with each of the assemblies.

Double Check Valve Assembly

A tester being certified or recertified should be able to determine several items during the test of the double check valve assembly.

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The Essentials of Cross-Connection Control
A Graphic Slide Presentation

This set of sixty color graphic slides can be used for any length or type of presentation. The slides come with a three-ring binder which includes explanations of each slide. Your own photographic slides can be added at the appropriate points to help explain certain details or to relate theoretical concepts to specific local situations.

For shorter presentations, slides can be removed so you can cover only the information you want to convey in the time allotted.

Member Price
$100

Non-Member Price
$135

Changes in the Ninth Edition

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reverse differential is not enough to cause the check valve to seal around the debris.

Although there are advantages and disadvantages to both methods, the Manual Review Committee, after months of discussion, opted for the direction of flow test.

Other changes in the Manual include an optional direction of flow test for the second check valve of the reduced pressure principle assembly (RP). Many people felt that the second check valve of the RP should also be tested in the direction of flow to determine if the check valve will hold the one psi in the direction of flow. However, this was not incorporated as a standard test for the RP. It is given as an optional test in the appendix so those testers working under jurisdictions which require a differential reading on the number two check valve will be able to determine the reading. This test is very simple. Once the RP has been tested using the current method, and the actual reading of the first check valve has been determined the number two testcock is closed. If the reading drops to zero or rises above the actual reading of the number one check valve, the number two shut-off valve is leaking and the differential test on the number two check valve cannot be completed. If the reading remains steady then the tester may proceed. The testcocks are closed and the hoses are removed from the assembly. Then, the high side hose is attached to the number three testcock and the low side hose is attached to the number four testcock. The air is bled from the hoses, bleeding the low side last. The point at which the gage reading settles is the differential across the number two check valve. If this is above one psi the check valve is within the specifications and passes. If the reading is less than one psi, the reading is considered low and the second check valve needs to be repaired.

There will also be an optional test for backpressure on the pressure vacuum breaker (PVB). This test will be contained in the appendix also, and is quite simple. Once the current test for the PVB is complete, the number two shut-off valve is opened. (The number two test cock remains open.) If water continues to discharge from the number two test cock, then the assembly is under backpressure. This pressure is evident by the water flowing out of the number two testcock. This is added in the appendix for those testers in jurisdictions which require the test for backpressure on PVBs.

The Ninth Edition of the *Manual of Cross-Connection Control*

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Cross-Connection Control Informational Brochures

The informational brochure entitled *Working Together for Safe Water* is a great complement to the slide presentation *The Essentials of Cross-Connection Control* or the film *Working Together for Safe Water*. You'll be able to explain all the concepts of cross-connection control to your audience using the slide presentation. Then, 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 periodic testing requirements. The drawings on this brochure have recently been regenerated, so if you've seen a copy in the past you may wish to request a sample of the brochure with new artwork. To request a sample of the brochure with an order form, contact the Foundation office at:

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and Hydraulic Research
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KAP-200 University Park MC-2531
Los Angeles, CA 90089-2531
(213) 740-2032
FAX (213) 740-8399

Recertification

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These include: the condition of the first and second check valves (leaking or holding tight), and the condition of both shut off valves. In the testing procedures which will be introduced in the Ninth Edition of the *Manual of Cross-Connection Control*, the tester will need to determine the static pressure drop across each of the check valves which should be greater than one pound per square inch, in the direction of flow. The most common problem encountered by those testers tested by Foundation personnel revolve around the confirmation test (Eighth Edition procedure). The tester should know that the check valve is leaking only if the two needle valves come together, indicating pressure equalizing across the check valve. If there is a bad leak across the check valve the needles will not separate during the confirmation test. (See Section 9.3, step No. 1, step k, of the Eighth Edition.) If only one of the needles moves this indicates a shut-off valve leak, but the check valve is holding.

Reduced Pressure Principle Assembly

The most common mistake made by those testers being tested on the reduced pressure principle assembly occurs while ascertaining the actual reading across the number one check valve. (See Section 9.2, Test No. 2, step e.) After opening the bypass needle valve, it can be determined if the number two check valve is holding. Then the tester should bleed the low side bleed needle valve to compensate for any disc compression. The mistake normally comes at this point. Testers often close the bypass needle valve before bleeding the low side bleed needle valve. Then the actual reading of the first check valve is determined. However, if the bypass needle valve is closed, the tester is reading only the apparent reading across the number one check valve. In order to get the actual reading across the number one check valve, *the tester must leave the bypass needle valve open during the remainder of the test.* This is a common mistake. Testers should be sure to avoid closing the bypass needle valve in order to obtain the proper actual reading on the number one check valve.

Pressure Vacuum Breaker

Although the pressure vacuum breaker is normally considered to be the most simple assembly to test, it may come as a surprise that most testers which do not pass the performance exam don't pass on the pressure vacuum breaker. This is normally due to the fact that the tester assumes the procedure is so simple they don't bother to spend much time practicing on the assembly. The problem occurs while testing the differential pressure across the check valve. (See Section 9.4, Test No. 2, step c.) Once the tester opens the number two testcock he or she should be waiting for the needle on the gage to settle to give the differential pressure across the check valve. However, many testers open the number two testcock and record the point at which the air inlet valve opens instead of waiting for the needle on the gage to settle. This can be a major mistake if the air inlet valve opens properly (above one psi) and yet the check valve is not holding. The tester, if testing improperly, could record the check valve as holding at a point above one psi.

Another common mistake made by the tester is not holding the gage (or hoses not being used) at the same level as the assembly. The pressure created by the elevation of water in the hose can change the readings on the gage significantly and thus render inaccurate readings.

All testers (not only those coming up for recertification) should review the test procedures periodically to make sure they are using the proper procedures. Foundation personnel have found many times that testers who make these mistakes state they have always tested this way, thus getting inaccurate readings consistently.

Changes in the *List of Approved Assemblies*

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in the field to the Foundation's satisfaction.

It should also be noted that the Foundation's List includes the model number of bypass assemblies used on the detector assemblies. This listing is not meant to be used in the same manner as the shut-off valve listing. Although from the outside of the bypass assembly it may look the same as a stock backflow preventer, the internal components may be different. This is done in order to meet the requirements for a detector assembly. Each detector assembly, whether the double check detector assembly or the reduced pressure principle detector assembly, must be designed such that all water flows through the bypass *only*, and registers accurately on the bypass meter, while the flow rate is three gallons per minute or less. At some point above three gallons per minute the main line assembly will begin to operate allowing flow to pass through. The bypass meter will still register, but not accurately, since most of the water will be flowing through the main line assembly during large flow situations.

This design concept is also the reason detector assemblies cannot be "field assembled," meaning adding a bypass assembly and a meter to a currently existing double check valve assembly or reduced pressure principle assembly. The mainline assembly may also not be a stock backflow preventer, having different internal components to meet the flow requirements necessary for a detector assembly. It is also not permissible to rearrange the bypass piping since this will cause a change in the pressure loss characteristics of the bypass arrangement. Some field personnel have added piping to move the meter to a location which is more accessible to the meter reader. In these cases it may be easier for the water to flow through the mainline backflow preventer than to overcome the additional resistance caused by the extra piping needed to move the meter. This is another reason detector assemblies must be delivered completely assembled from the manufacturer. Should Members of the Foundation have any questions regarding the installation of a detector assembly or the modifications which may have taken place, they are encouraged to contact a member of the Foundation's Engineering Staff to discuss the specific arrangement.

Identification of shut-off valves:

(aa)	American Figure 2 - Q
(bb)	American Figure 17 - NRS
(cc)	American Figure 37 - OSY
(dd)	Apollo Series 7B - QT
(ee)	AVK Series 23 - NRS
(ff)	AVK Series 23 - OSY
(gg)	Clow R/W F6102 - NRS
(hh)	Clow R/W F6136 - OSY
(ii)	Fortune Figure 601 - QT

private labeled as:
Buckner
Febco
Hersey
Watts
Wilkins

(jj)	Kennedy Ken Seal I - NRS
(kk)	Kennedy Ken Seal I - OSY
(ll)	Kennedy Ken Seal II - NRS
(mm)	Kennedy Ken Seal II - OSY
(nn)	Lee Brass - QT
(oo)	Matco 406 - NRS
(pp)	Matco 407 - OSY
(qq)	Mueller R/W HP NRS
(rr)	Mueller R/W HP OSY
(ss)	Toro/Orion Integral Ball Valve - QT
(tt)	Waterous Series 500 - NRS
(uu)	Waterous Series 500 - OSY
(vv)	Watts Figure FBV (Fortune) - QT
(ww)	Watts G4000FDA - QT
(xx)	Watts Series 6080 - QT

COMPANY	MODEL-SIZE	STATUS OF APPROVAL
ABC company	2000-G-DC - 10" (Formerly Model DC) (aa),(bb),(ff),(tt)	Approved 7th Ed. of Manual (4 July 1987) Renewed 4 July1993

Certificates of Compliance

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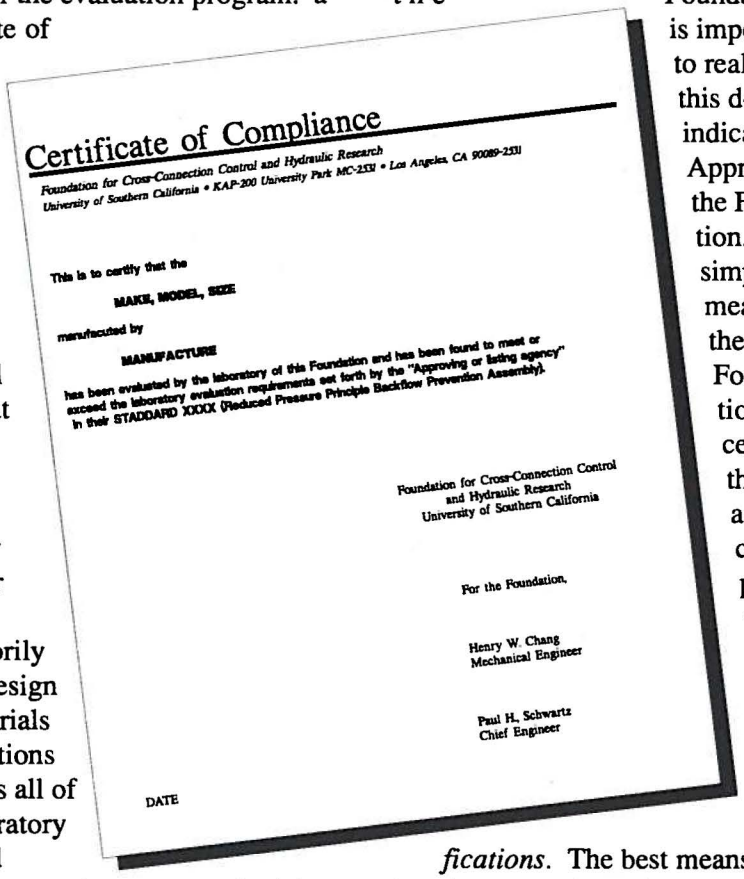
Members of the Foundation have been shown a copy of the Foundation's certificate of compliance, issued by the Foundation, and assumed that the assembly had been Approved. In reality, the assembly had not completed or, in some cases, even begun the field evaluation portion of the evaluation program. a Certificate of Approval issued by the Foundation for the Foundation's Approval states that a certain size and model of backflow preventer "...has satisfactorily met all design and materials specifications as well as all of the Laboratory and Field Evaluation requirements set forth in the 8th Edition of the *Manual of Cross-Connection Control.*" (The edition of the Manual under which the assembly was evaluated would be mentioned here.)



Certificate of Compliance

Foundation for Cross-Connection Control and Hydraulic Research
University of Southern California • KAP-200 University Park MC-2531 • Los Angeles, CA 90089-2531

This is to certify that the

MAKE, MODEL, SIZE

manufactured by

MANUFACTURE

has been evaluated by the laboratory of this Foundation and has been found to meet or exceed the laboratory evaluation requirements set forth by the "Approving or listing agency" in their STADDARD XXXX (Reduced Pressure Principle Backflow Prevention Assembly).

Foundation for Cross-Connection Control
and Hydraulic Research
University of Southern California

For the Foundation,

Henry W. Chang
Mechanical Engineer

Paul H. Schwartz
Chief Engineer

DATE

The best means of determining whether an assembly is Approved by the Foundation is to determine if the assembly is shown of the latest *List of Approved Backflow Prevention Assemblies*, issued quarterly by the Foundation. There are times when an assembly will become Approved between the issuance of Lists. In these cases, it is highly recommended that the Member contact the Foundation office to determine if the assembly has, in fact, been Approved.

In the case a Member is shown a Certificate of Compliance issued by the Foundation, it is important to realize that this does not indicate Approval by the Foundation. It simply means that the Foundation certifies that the assembly complies with *a third party's standards or specifications*. The best means of keeping up-to-date with currently Approved Assemblies is to check your latest copy of the *List of Approved Backflow Prevention Assemblies*. The List is now published on a quarterly basis in February, May, August, and November. There is a possibility that an assembly has been Approved between the issuing of Lists. Should any question or doubt arise, please contact the Foundation office for verification from a member of the Foundation's Engineering Staff.

Ninth Edition

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promises to be a great improvement over the Eighth Edition. It is important for testers to realize that the changes made in the Ninth Edition may not take effect in the jurisdictional areas under which they work. Some administrative authorities may make changes to the Ninth Edition procedures immediately upon publication of the Ninth Edition. Others may opt not to make the changes in their area. Others may chose to phase the changes in over a period of time. It is necessary for the tester to be continually aware of the testing requirements and methods in the various jurisdictions in which they operate.

Corrections to the List

The May, 1993 edition of the *List of Approved Backflow Prevention Assemblies listed* the following assemblies on the cover sheet.

Conbraco DCs
Model 40-106-02 - 10"
Model 40-106-03 - 10"

Conbraco RPs
Model 40-206-02 - 10"
Model 40-206-03 - 10"

These model designations were incorrect, the should read:

Conbraco DCs
Model 40-10**G**-02 - 10"
Model 40-10**G**-03 - 10"

Conbraco RPs
Model 40-20**G**-02 - 10"
Model 40-20**G**-03 - 10"

Additionally, these assemblies were shown on the cover page, but omitted from the text of the List. These corrections will be made on the next List.

Calendar of Events

This calendar lists activities which the Foundation plans on participating in over the next few months. For more information contact the Foundation office.

12 - 16 July 1993 - Tester Short Course, USC Campus, Los Angeles, CA

19 - 23 July 1993 - Program Specialist Course, USC Campus, Los Angeles, CA

2 - 6 August 1993 - Tester Short Course, Incline Village, NV

25 August 1993 - Northern California Backflow Prevention Association Vendor Fair, Pleasanton, CA

8 - 9 September 1993 - Pennsylvania American Backflow Prevention Association,

13 September 1993 - Western Washington American Backflow Prevention Association Meeting, Bellvue, WA

20 - 24 September 1993 - Program Specialist Course, Monterey, CA

4 - 8 October 1993 - Tester Short Course, Foundation Office, Los Angeles, CA

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