

# USC

UNIVERSITY  
OF SOUTHERN  
CALIFORNIA

Foundation for  
Cross-Connection  
Control and  
Hydraulic Research

# FRD

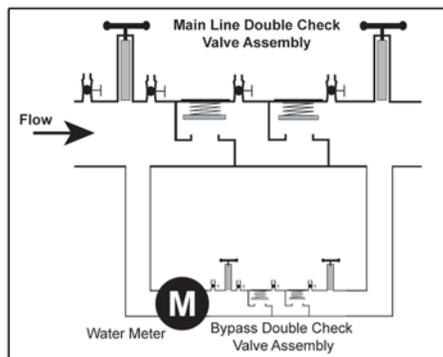
# CROSS

Summer 2004

## New Backflow Preventers

Although the Tenth Edition of the Manual is still under revision, there are several items that have been discussed by the Manual Review Committee and approved for publication. One of these items is the creation of a new type of backflow prevention assembly. Actually, there will be two new types of backflow prevention assemblies: the double check detector assembly, II; and the reduced pressure principle detector assembly, II. The Standard for the DCDA-II and the RPDA-II will be published in Chapter 10 of the *Manual of Cross-Connection Control*, 10<sup>th</sup> Edition.

The DCDA-II will consist of a main-line double check and, like the double check detector assembly; a bypass arrangement will be part of the assembly. The difference is in the bypass arrangement. With the DCDA, the bypass arrangement is plumbed from the region between the No. 1 shutoff valve and the No. 1 check valve to the region between the No. 2 check valve and the No. 2 shutoff valve. The

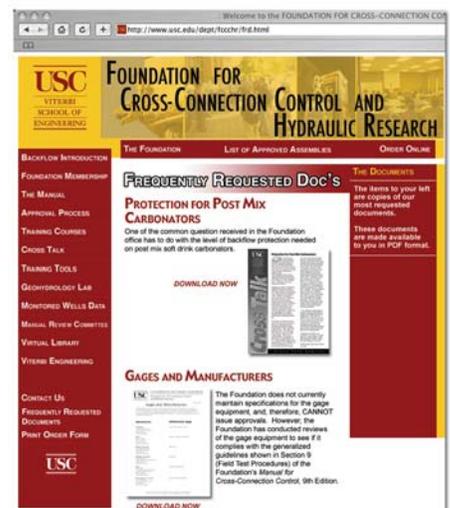


DCDA

*continued on page six*

## Frequently Requested Documents

Over the years the Foundation has been dedicated to supplying its members with up-to-date information in the area of backflow and cross-connection control. The Foundation website ([www.usc.edu/fccchr](http://www.usc.edu/fccchr)) has become an effective means for the Foundation to communicate any crucial information with its members.



On the Foundation website, members can find a link, located on the left hand side of the Foundation homepage, entitled 'Frequently Requested Documents' ([www.usc.edu/fccchr/frd.html](http://www.usc.edu/fccchr/frd.html)). There, members can find some of the more important documents pertaining to backflow training and cross-connection control. Lately, the Foundation has received several requests for the *Prevalence of*

*continued on page three*

### Inside Cross Talk

Foundation's 60th Anniversary  
New Backflow Preventers • Frequently Requested Documents

## Foundation Membership

The Foundation's Membership Program provides many benefits to the Members of the Foundation. These include: a twenty percent discount on Foundation Training Courses for any employee of the Member company/organization, the *List of Approved Backflow Prevention Assemblies*, printed quarterly, and access to the up-to-the-minute version of the List for those Members with Internet access.

Members are encouraged to call the Foundation with technical questions. 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.

Below is a list of those who've become members of the Foundation this past quarter:

Apache Junction Water Company  
Armour Plumbing & Well Service, Inc.  
BackFlow Prevention Services  
Canniff Plumbing  
Cape Environmental Management  
CNC Engineering  
Mount Airy, City of  
Old Faithful Fire Sprinklers, Inc.  
Pinedale County Water District  
Plumbers & Pipefitters JATC  
Prescott, City of  
Richard Wun  
RMB Residential / Com. Service  
RWPSID2 Inc. - Russellville  
Texas Health Resources - Corporate  
Texas Health Resources - Dallas Campus  
The Sea Ranch Water Company  
URS Corporation

### Contacting the Foundation

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Foundation for Cross-Connection Control and Hydraulic Research  
**University of Southern California**  
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#### Phone:

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213 740 2032

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213 740 8399

#### e-mail:

[fccchr@usc.edu](mailto:fccchr@usc.edu)

#### Web Site:

[www.usc.edu/fccchr](http://www.usc.edu/fccchr)

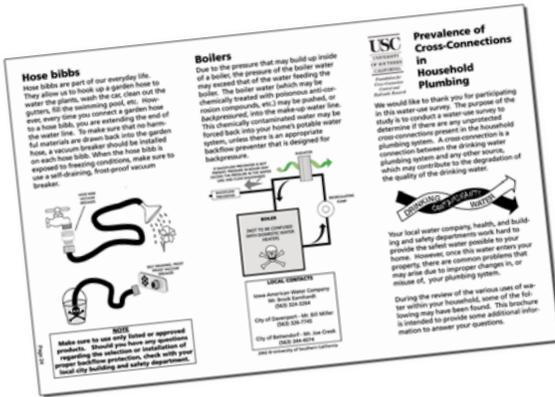
The Foundation accepts Purchase Orders via mail or fax and credit card orders (Visa, MasterCard, Discover) via telephone and the Web.

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# Frequently Requested Documents

continued from page one

*Cross-Connections in Household Plumbing Systems* study that it conducted in conjunction with the US Environmental Protection Agency (EPA). The Foundation received a grant in 2001 from the EPA to assess the prevalence of cross-connections in household plumbing systems. On-site surveys were conducted in 188 homes in the US Mid West. The surveys indicated that 9.6% of the homes were found to have direct cross-connections to a health hazard. On average, 73% of water uses were unprotected, constituting cross-connections. The entire study can be found on the Foundation's website.



gauge equipment to see if it complies with the generalized guidelines shown in Section 9 (Field Test Procedures) of the Foundation's *Manual for Cross-Connection Control*, 9<sup>th</sup> edition. That list can be found on the Foundation's 'Frequently Requested Documents' portion of the website.

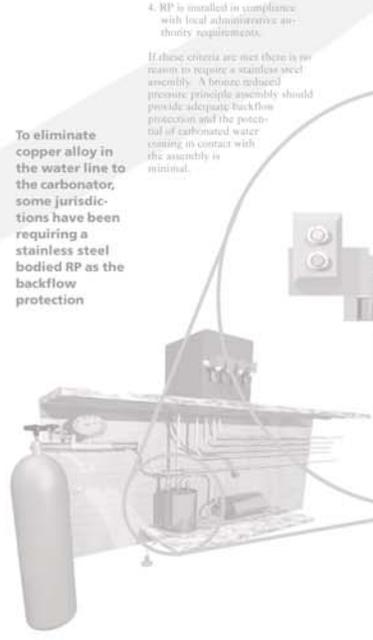
In addition to studies and specifications, members can also find information on hosting a Foundation training course. All members are welcome to submit a request for a training course to be taught by the Foundation at any designated area of the member's choosing. If the request is possible, the Foundation will be more than happy to comply. It is

important to remember that there are several guidelines that must be met before conducting a course and those can be found on the website. There are two different sets of guidelines, one for those interested in hosting a Tester Training Course and another for those interested in hosting a Specialist Training Course.

All the above-mentioned documents are available in PDF (Adobe Acrobat) format and are free-of-charge. The Foundation encourages all its members to visit the website and if there are any particular documents you would like to become available, you are welcome to e-mail us at [fcchh@usc.edu](mailto:fcchh@usc.edu).

A common question received in the Foundation office has to do with the level of backflow protection needed on post mix soft drink carbonators. On the Foundation's 'Frequently Requested Documents' page, members will find an earlier *Cross Talk* article entitled *Protection for Post Mix Carbonators*. The article outlines the need for backflow protection and the possible risks if proper protection is not installed. The article also contains illustrations of the inner workings of a post mix carbonator that becomes very helpful in explaining possible scenarios in this equipment.

The Foundation does not currently maintain specifications for gage equipment and, therefore, cannot issue approvals. However, the Foundation has conducted reviews of the



UNIVERSITY OF SOUTHERN CALIFORNIA  
**USC** Foundation for Cross-Connection Control and Hydraulic Research  
 Gages and Manufacturers

- The Foundation does not currently maintain specifications for the most equipment (MANGOT) issue approvals. However, the Foundation has conducted reviews of the equipment if it complies with the generalized guidelines shown in Section 9 of the Foundation's *Manual for Cross-Connections Control*, Ninth Edition. The current gages acceptable are listed below.
- | Manufacturer   | Differential  |
|--|---|
| ITT Baker<br>300 Lombard Street Road<br>Cincinnati, OH 45211<br>Duke<br>PO Box 16407<br>Irvine, CA 92713<br>(714) 801,2340<br>FAX (714) 352-9308 | Model 220 (Steel) only, 240, 240-1, 240-2, 240-3, 240-4, 240-5, 240-6, 240-7, 240-8, 240-9, 240-10, 240-11, 240-12, 240-13, 240-14, 240-15, 240-16, 240-17, 240-18, 240-19, 240-20, 240-21, 240-22, 240-23, 240-24, 240-25, 240-26, 240-27, 240-28, 240-29, 240-30, 240-31, 240-32, 240-33, 240-34, 240-35, 240-36, 240-37, 240-38, 240-39, 240-40, 240-41, 240-42, 240-43, 240-44, 240-45, 240-46, 240-47, 240-48, 240-49, 240-50, 240-51, 240-52, 240-53, 240-54, 240-55, 240-56, 240-57, 240-58, 240-59, 240-60, 240-61, 240-62, 240-63, 240-64, 240-65, 240-66, 240-67, 240-68, 240-69, 240-70, 240-71, 240-72, 240-73, 240-74, 240-75, 240-76, 240-77, 240-78, 240-79, 240-80, 240-81, 240-82, 240-83, 240-84, 240-85, 240-86, 240-87, 240-88, 240-89, 240-90, 240-91, 240-92, 240-93, 240-94, 240-95, 240-96, 240-97, 240-98, 240-99, 240-100 |
| Cleveland, OH 44102<br>(216) 291-1100<br>FAX (216) 291-0228  | Model 850   |
| Mid West Instrument<br>1000 13 <sup>th</sup> Street<br>Cincinnati, OH 45202<br>(513) 763-1100<br>FAX (513) 763-1100                              | Model 850   |
| Alora<br>PO Box 808<br>3525 Old County Road, Suite 101<br>Newbury Park, CA 91320<br>(805) 774-4444<br>FAX (805) 774-4444                         | Model 15, 100, 100E, 100D, 100E, 100F, 100G, 100H, 100I, 100J, 100K, 100L, 100M, 100N, 100O, 100P, 100Q, 100R, 100S, 100T, 100U, 100V, 100W, 100X, 100Y, 100Z, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200   |
| North Shoreline, MA 01949<br>(508) 668-1811<br>FAX (508) 794-1800  | Model 15, 100, 100E, 100D, 100E, 100F, 100G, 100H, 100I, 100J, 100K, 100L, 100M, 100N, 100O, 100P, 100Q, 100R, 100S, 100T, 100U, 100V, 100W, 100X, 100Y, 100Z, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200   |

## In addition to studies and specifications, members can also find information on hosting a Foundation training course

UNIVERSITY OF SOUTHERN CALIFORNIA  
 Foundation for Cross-Connection Control and Hydraulic Research

Survey Form

Survey Location  
 Name: \_\_\_\_\_ No. \_\_\_\_\_  
 Street Address: \_\_\_\_\_  
 City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
 Phone: (\_\_\_\_) \_\_\_\_\_ FAX: (\_\_\_\_) \_\_\_\_\_  
 Contact person upon arrival to the site: \_\_\_\_\_  
 Arrival Time: \_\_\_\_\_ am/pm Departure Time: \_\_\_\_\_ am/pm

Service Connection(s) & Number Water Meter Size

Domestic \_\_\_\_\_  5/8"  1"  1 1/2"  2"  3"  4"  6"  8"  10"  12"  14"  16"  18"  20"  24"  30"  36"  42"  48"  54"  60"  66"  72"  78"  84"  90"  96"  102"  108"  114"  120"  126"  132"  138"  144"  150"  156"  162"  168"  174"  180"  186"  192"  198"  204"  210"  216"  222"  228"  234"  240"  246"  252"  258"  264"  270"  276"  282"  288"  294"  300"

Fire \_\_\_\_\_  5/8"  1"  1 1/2"  2"  3"  4"  6"  8"  10"  12"  14"  16"  18"  20"  24"  30"  36"  42"  48"  54"  60"  66"  72"  78"  84"  90"  96"  102"  108"  114"  120"  126"  132"  138"  144"  150"  156"  162"  168"  174"  180"  186"  192"  198"  204"  210"  216"  222"  228"  234"  240"  246"  252"  258"  264"  270"  276"  282"  288"  294"  300"

Building Height - Number of Stories:  One  Two  Three  Four  Five  Six  Seven  Eight  Nine  Ten  Eleven  Twelve  Thirteen  Fourteen  Fifteen  Sixteen  Seventeen  Eighteen  Nineteen  Twenty  Twenty One  Twenty Two  Twenty Three  Twenty Four  Twenty Five  Twenty Six  Twenty Seven  Twenty Eight  Twenty Nine  Thirty  Thirty One  Thirty Two  Thirty Three  Thirty Four  Thirty Five  Thirty Six  Thirty Seven  Thirty Eight  Thirty Nine  Forty  Forty One  Forty Two  Forty Three  Forty Four  Forty Five  Forty Six  Forty Seven  Forty Eight  Forty Nine  Fifty  Fifty One  Fifty Two  Fifty Three  Fifty Four  Fifty Five  Fifty Six  Fifty Seven  Fifty Eight  Fifty Nine  Sixty  Sixty One  Sixty Two  Sixty Three  Sixty Four  Sixty Five  Sixty Six  Sixty Seven  Sixty Eight  Sixty Nine  Seventy  Seventy One  Seventy Two  Seventy Three  Seventy Four  Seventy Five  Seventy Six  Seventy Seven  Seventy Eight  Seventy Nine  Eighty  Eighty One  Eighty Two  Eighty Three  Eighty Four  Eighty Five  Eighty Six  Eighty Seven  Eighty Eight  Eighty Nine  Ninety  Ninety One  Ninety Two  Ninety Three  Ninety Four  Ninety Five  Ninety Six  Ninety Seven  Ninety Eight  Ninety Nine  One Hundred

Basement:  Yes  No

Water Usage	Cross-Connection? No Yes - Direct or Indirect	Dir	Ind	Protection: AG, AVB, PVE, SVB, RP, DC, DuCl, DCAP (1)	Imp. An.
<input type="checkbox"/> Auxiliary water supply	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Water well - pressure tank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Storage tank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Fire Sprinkler System	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Anti-freeze	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Storage tank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Irrigation System	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Chemical injection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Booster Pumps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Three

# The Foundation's 60th Anniversary

With the continued support of its members, the Foundation, part of the University of Southern California, will be celebrating its 60th Anniversary. In 1944 the Board of Trustees of the University of Southern California established the Foundation and it has been in continuous operation since that day. The Foundation's membership program has grown to more than 900 members and it has become one of the world's foremost authorities in the backflow field.

In 1943, during World War II, a supply ship was discovered to have harbor water in its potable water tanks. An investigation revealed that this was caused by a cross-connection between the city water supply and the harbor water. A group of concerned individuals, believing that the unbiased efforts of an educational institution would better serve the ultimate aim of protecting potable water supplies, approached the University of Southern California asking that research be done in this area. After several conferences, this group worked out an agreement with the University; and, one of their members, who wished to remain anonymous, gave the University the sum of \$25,000 with which to establish a laboratory and employ a team of researchers.

For the next 20 years the Foundation made great strides in the field of cross-connection control. The Foundation began work in a laboratory located on the University campus. It was during these early days that the first Beeco, Crane, Hersey and Grinnell units were evaluated. In 1948, *Paper No. 5*, the Foundation's

first publication, included testing procedures and specifications for double check valve assemblies and reduced pressure principle assemblies was published. In 1960, the *Manual of Cross-Connection Control, Recommended Practice* was published.

In 1964, Professor E. Kent Springer was named Director of the Foundation and would continue to be for the next 20 years. During the late 1960's the Manual, in particular Section 10 covering the Specifications, was thoroughly reviewed by a committee representing water utilities, health departments and manufacturers, as well as the Foundation. This resulted in some major changes that were incorporated into the 4<sup>th</sup> Edition of the Manual which was renamed the *Manual of Cross-Connection Control*.

With an ever-growing number of state, local and other agencies becoming involved in the Foundation, the Southern California Water Utilities Association helped the Foundation establish the membership program in



*First Membership Check  
by SCWUA to the Foundation*

1967, ensuring a financial base for continued operations.

After several conferences, this group worked out an agreement

with the University; and, one of

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gave the University the sum of \$25,000

with which to establish a laboratory and employ a team of researchers.



First Edition of Cross Talk (circa 1967)

After the on-campus laboratory was torn down to make room for new engineering buildings at the University, the Foundation, in 1968, moved to an old pumping station previously run by the Los Angeles Department of Water and Power and makes its home there today.

The laboratory facility is where much of the Foundation's work takes place. This is where all the controlled evaluations of the backflow prevention assemblies are conducted. Not only can it be used to evaluate backflow prevention assemblies, but also to conduct specialized research, which may require the laboratory's specialized systems and large water flow capacity.

For the next 15 years the Foundation would publish three more editions of the Manual and begin offering the *Course for the Training of Backflow Prevention Assembly Testers*, focusing on helping students become proficient with testing several different types of backflow preventers.

In 1985, USC Professor J.J. Lee Ph.D., P.E. became the Director of the Foundation and continues to be to this day. The Manual has been

updated three more times since then and the Foundation eagerly awaits the release of the 10<sup>th</sup> edition of the



Prof. Springer and Prof. Lee at the Foundations 50th Anniversary Party

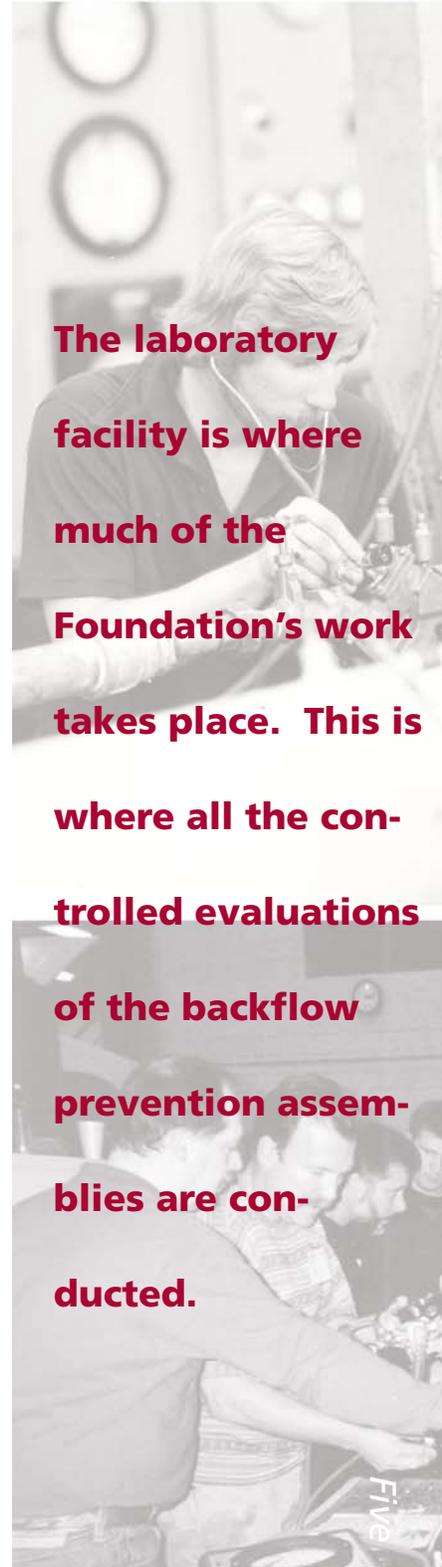
Manual expected to be ready for 2005.

The Foundation also developed the *Course for the Training of Cross-Connection Control Program Specialists*, specializing in the administrative process of running a successful cross-connection control program.

In 1989 the Foundation released the video *Working Together for Safe Water*, an introduction to the fundamentals of backflow and cross-connection control. Eight years later the Foundation released the training video *Field Testing Backflow Preventers* and it has become one of the more popular training tools offered by the Foundation.

At the Foundation, one of our continuing goals is to provide our members with the most comprehen-

*continued on page seven*



**The laboratory facility is where much of the Foundation's work takes place. This is where all the controlled evaluations of the backflow prevention assemblies are conducted.**



It is



technologically possible to have the overall pressure loss across the assembly lower, since a lower pressure will now be needed

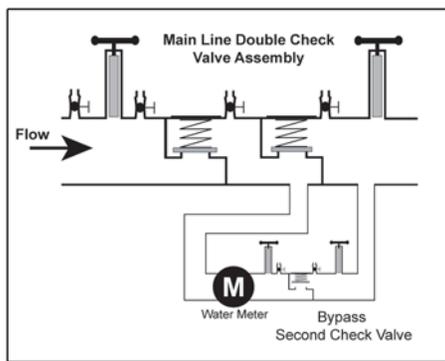


to open the mainline assembly.

# Backflow Preventers

*continued from page one*

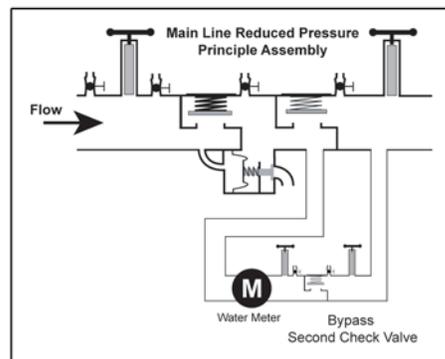
bypass arrangement with the DCDA includes a double check valve assembly and an acceptable water meter. It is required that all water flowing through the assembly up to at least three gallons per minute flow exclusively through the bypass arrangement, registering accurately on the water meter. Once flow reaches some point above three gallons per minute, the meter will no longer register the total flow through the DCDA.



DCDA II

Thus the water is going through two check valves providing double check valve level of protection. Once the water flows increase, water will start flowing through the mainline assembly, still providing the same level of protection (i.e., that of a double check), since water will be flowing through both of the check valves in the mainline body.

The RPDA-II follows suit with the DCDA-II. With the RPDA-II, water will still be required to flow through the No. 1 check valve and past the relief valve and then through either the mainline second check valve or the bypass second check valve. The level of backflow protection is exactly the same as it would be for a reduced pressure principle assembly.



RPDA II

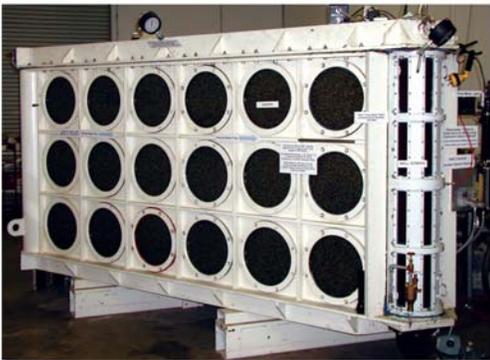
Since the same level of protection exists in both the DCDA-II and the RPDA-II as with the DCDA and RPDA respectively, one may wonder, “why create another assembly?” There are a couple of reasons. It is technologically possible to have the overall pressure loss across the assembly lower, since a lower pressure will now be needed to open the mainline assembly. Also, as is visible from the illustrations of the assemblies, the DCDA-II and the RPDA-II use only a single check valve in the bypass, thus they should be less expensive to manufacture. These will be good scenarios for the customer: the assembly should be less expensive (relatively), while providing the same level of protection and a slightly lower pressure loss.

These assemblies may not be available in the very near future. Once the 10<sup>th</sup> Edition of the Manual is published, manufacturers would need to submit these assemblies for evaluation. The evaluation includes a laboratory and one year field evaluation, so even if everything went perfectly, no DCDA-II or RPDA-II would be approved until, at least, one year after the publication of the 10<sup>th</sup> Edition. ■

# 60th Anniversary

*continued from page five*

sive knowledge of water resources possible. In the summer of 2001, the Foundation opened a Geohydrology Laboratory. The centerpiece of this lab is a well/aquifer model donated to the University of Southern California by the Roscoe Moss Company. The



*Well/Aquifer Model Donated to the University of Southern California*

opening of the Geohydrology Lab marked a step forward for the Foundation. Now, we are able to examine water resource issues from start to finish, from the time water is in the ground until it comes out of the faucet.

In 2002, the Foundation redesigned its website ([www.usc.edu/fccchr](http://www.usc.edu/fccchr)) to aid its members further in having access to the latest information in backflow and cross-connection control. On the Foundation website, members can receive the latest updates to the *List of Approved Backflow Prevention Assemblies*. In addition, all of the Foundation's products can be purchased on the website and have access to the most recent reports and studies of the Foundation. Visitors can also find the latest activities of the Manual Review Committee and send comments to the committee regarding the 10<sup>th</sup> Edition of the Manual. Questions can also be directed to the Foundation's technical

staff via the website. The website has become an essential tool in effectively communicating information between the Foundation and its members.

The Foundation encourages its members to visit the website for more information on any 60<sup>th</sup> Anniversary events that are planned for the coming year. Through research, development and testing, the Foundation will continue to seek out causes of backflow and devise and evaluate systems by which it may be prevented. ■

## FOUNDATION news & notes

The Foundation's Henry Chang was appointed as Chairman of the Certification Committee for the American Backflow Prevention Association.

The ABPA Certification Committee is charged with the responsibility to evaluate training needs in the



backflow industry and develop guidelines and need-to-know criteria as appropriate. Including, but not limited to, the responsibility for recommending and developing policy and procedures that determine the technical aspects of the American Backflow Prevention Association's Voluntary Backflow Prevention Assembly Tester Certification Program. ■

**The opening of the Geohydrology Lab marked a step forward for the Foundation. Now, we are able to examine water resource issues from start to finish, from the time water is in the ground until it comes out of the faucet.**

## Training Courses

### Tester Course

Honolulu, HI  
4-8 October 2004

Los Angeles, CA  
10-14 January 2005

Los Angeles, CA  
11-15 July 2005

### Specialist Course

Sandusky, OH  
1-5 November 2004

Los Angeles, CA  
24-28 January 2005

Los Angeles, CA  
25-29 July 2005

## Upcoming Events

*ABPA Hawaii Chapter  
Pacific Rim Conference*  
•Honolulu, HI  
29 Sept.- 1 Oct. 2004

*SCWUA Field Trip to  
Foundation Laboratory*  
•Los Angeles, CA  
26 August 2004

*BCA Football Classic  
USC vs. Virginia Tech*  
•Landover, MD  
28 August 2004

*CA/NV AWWA  
Fall Conference*  
•Sacramento, CA  
12-15 October 2004



### Foundation for Cross-Connection Control and Hydraulic Research

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