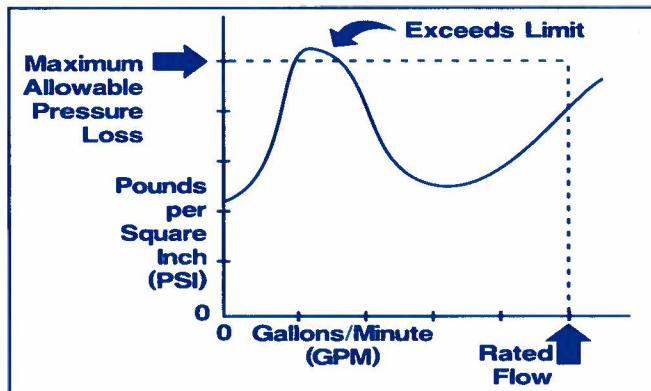


## Foundation Pressure Loss vs. Flow Rate Curves

As part of the evaluation process for backflow prevention assemblies the Foundation generates flow curves. These curves show the pressure loss across the entire assem-

possible for the assembly to exceed the maximum allowable pressure loss at some point below rated flow. For example, the flow curve shown in Figure 1 has an acceptable pressure



**Figure 1**

*The Foundation generates flow curves showing the pressure loss across the backflow preventer at all flow rates up to and including rated flow. In this case the pressure loss exceeds the maximum allowable limit.*

loss at rated flow. But, at lower flows, the pressure loss exceeds the maximum allowable loss. This assembly may not be acceptable if the most commonly used flow rate is at the point where the pressure loss is above the maximum allowable.

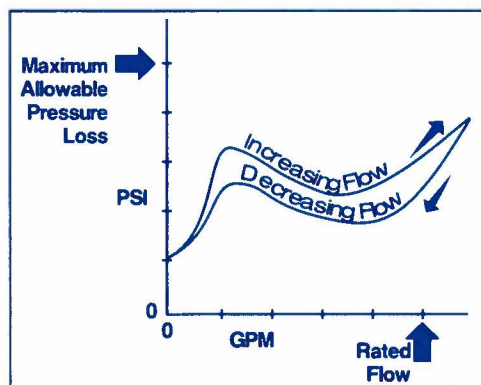
*continued on page 6*

## Public Water Supplies as a Heat Sink?

Several States are considering allowing the installation of heat exchangers which use the public water supplies as a heat sink. In this type of system, water is taken from the potable water main, cycled through a single-walled heat exchanger, and returned into the water main. The water which is returned into the potable water main is approximately 4°F higher in temperature than the water which entered the heat exchanger.

*continued on page 7*




bly up to and including rated flow. This is different from other listing agencies in that the entire curve is generated. Some agencies require a certain size assembly not to exceed a set amount of pressure loss at rated flow. However, in this case, it would be



**Figure 2**

*As the flow increases the pressure loss may be different than when the flow is decreasing. This hysteresis is shown here. The curve generated during increasing the flow rate should be used when calculating hydraulic design requirements.*

### Highlights

-  Heat Exchangers Using Potable Water Systems
-  Hosting a Foundation Training Course
-  Special Notice on Unapproved Backflow Preventers

# Welcome!<sup>2</sup>

## ...New Members

The Foundation continues to see a growth in Membership. This growth allows the Foundation to provide better service while maintaining the Membership fee schedule. Following is a list of the most recent additions to the Foundation's Membership Program. Thank you for your support of the Foundation and welcome to the Membership Program.

A. M. Engineering, Inc.  
Allen Miller Plumbing  
Danny Allen  
Apprenticeship & Journeymen  
Training Trust  
Ardent Plumbing  
Burlington County PHCCC  
Association  
California Fire Protection

Campbell Backflow  
Doonwood Engineering, Inc.  
EG & G Energy Measurements,  
Inc.  
Steve Govero  
High Desert Backflow Testing  
Jim Downs Construction  
City of La Mesa  
John McNally

NV Landscape, Inc.  
Palmdale Water District  
City of Perryton  
Plumbing Inspection Services,  
Inc.  
Quality Backflow Testing, Inc.  
Town and Country Plumbing  
Town of Salem  
Zincon Professionals

### *Tester Course*

#### **The Foundation Laboratory**

**FULL** 5 - 9 October 1992  
4 - 8 January 1993  
10 - 14 May 1993  
12 - 16 July 1993

**Non-Members \$750.00**  
**Members \$600.00**

### *Program Specialist Course*

#### **USC Campus**

11 - 14 January 1993  
19 - 23 July 1993

#### **Monterey, CA**

7 - 11 December 1992

**Non-Members \$800.00**  
**Members \$640.00**

# HAPPY BIRTHDAY

## *Professor Springer*

Professor E. Kent Springer, P.E., who served as director of the Foundation from 1965 to 1985, enjoyed his 80th Birthday on September 17th. Happy Birthday and thanks for everthing!



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.

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

A Purchase Order may also be sent via FAX to the Foundation office  
at (213) 740-8399

*Cross Talk* is published by  
the University of Southern  
California's Foundation for Cross-  
Connection Control and Hydraulic  
Research for its Members. Addi-  
tional Copies are available to the  
Members upon request.  
(213) 740-2032 Copyright 1992 ©  
University of Southern California.  
All rights reserved.

# Hosting USC Training Courses

Hosting a Foundation Tester or Specialist course is surprisingly easy and can be advantageous for any Foundation Member. Hosting a course gives any Member the opportunity to have employees involved with cross-connection control and backflow prevention informed about the latest developments in the field. There is no cost for the hosting agency to host a Foundation Training Course. The hosting organization will also receive complimentary registration for two.

---

*There is no cost for the hosting agency to host a Foundation Training Course. The hosting organization will also receive complimentary registration for two.*

---

## **The Tester Course**

The Foundation's *Short Course for the Training of Backflow Prevention Assembly Testers* is designed to train the attendees in the intricacies of field testing the double check valve assembly, the reduced pressure principle backflow prevention assembly and the pressure vacuum breaker. Some basic hydraulics and concepts of backflow are discussed, but the main focus of this course is on testing and troubleshooting the backflow prevention assemblies. Following are the main items to consider in the decision to host a Foundation **Tester** Course:

### **Meeting Place:**

The morning meeting area should be in a room large enough to accommodate at least twenty (20)

attendees of the five-day course. The room should have a blackboard with chalk or a grease-board with pens for the lectures. The room should also be suitable for showing motion pictures and slides. The afternoon sessions should be held in a suitable place where the course attendees can test, disassemble and re-assemble backflow prevention assemblies. An adequate water supply with several connections will be necessary for the testing of the backflow prevention assemblies.

### **Registration:**

Registration will be handled directly by the Foundation office. Prior to the announcement of the course, the hosting agency may be asked to recommend local accommodations for those not in the immediate area. Course attendees must submit a registration application along with a purchase order or check; the Foundation will mail a confirmation letter to all course participants.

### **Course Materials:**

The Foundation will provide, for each student, a binder containing a syllabus, a time schedule for the week and several reference materials. Also provided, for each student, will be a current copy of the *Manual of Cross-Connection Control*.

Backflow prevention assemblies of various manufacturers will be shipped to the location of the course by the Foundation. The assemblies will be set-up with garden hose connections, therefore, an adequate source of water will be necessary. In addition, tools and gages will be provided by the Foundation.

The Foundation will provide a "certificate of completion" for each

member of the class who successfully completes the written and performance portions of the final examination.

## **The Specialist Course**

The Foundation's *Short Course for the Training of Cross-Connection Control Program Specialists* is designed to train the attendees in the various aspects involved in administering a cross-connection control program. Main topics discussed are: Rules & Regulations, Policies and Procedures, Record Keeping, Plan Checks, Public Relations and Site Surveys. Much of the course is dedicated to the site survey to help the attendee assess the degree of hazard at any water using facility. The course includes a short survey of a facility as part of the examination.

Following are the main items to consider in the decision to host Foundation **Specialist** Course:

### **Meeting Place:**

The meeting place should be a room large enough to accommodate approximately thirty (30) course participants. The room should have a blackboard with chalk or a grease-board with pens, along with being suitable to show motion pictures and slides.

### **Registration:**

Registration will be handled directly by the Foundation office. Prior to the announcement of the course, the hosting agency may be asked to recommend local accommodations for those not in the immediate area. Upon receipt of the course application, along with a purchase order or check by the individual

## Special Notice Issued Regarding Approvals

The Foundation has issued a special notice to its Members. Notice 92-001 specifies certain backflow prevention assemblies which are NOT Approved by the Foundation.

***Notice 92-001 specifies certain backflow prevention assemblies which are NOT Approved by the Foundation.***

Much of the literature produced by the manufacturers of backflow prevention assemblies may include statements which might imply Foundation Approval of certain backflow preventers which are, in fact, not Approved. The notice lists several backflow prevention assemblies which are not Approved by the Foundation but which may be included in literature which uses the Foundation's name in some manner.

Members are constantly contacting the Foundation office because a piece of literature states an assembly is Approved, but the assembly is not listed on the Foundation's *List of Approved Backflow Prevention Assemblies*. Although it is possible for an assembly to become Approved after the latest edition of the *List* is issued, the Member should not rely on literature produced by the manufacturers of the backflow preventers or the assurance of sales personnel. Many Members have commented that a sales representative has assured them that a particular assembly will be Approved on a certain date, thus, convincing the customer to purchase the assembly. In such cases many problems could occur. Since the backflow preventer is never Approved until the completion of the field evaluation, when it is disassembled and inspected, it is never

possible to predict an Approval date. If a problem is discovered during the field evaluation or at the final inspection, the assembly may need changes in design and an additional year of field evaluation after the changes are made.

Members requiring backflow preventers installed in their system to be Approved by the Foundation are encouraged not to accept any backflow preventers which are "scheduled" to become Approved in the near future. If there are ever any questions, Members are encouraged to contact the Foundation office to determine the Approval status of any backflow prevention assembly.

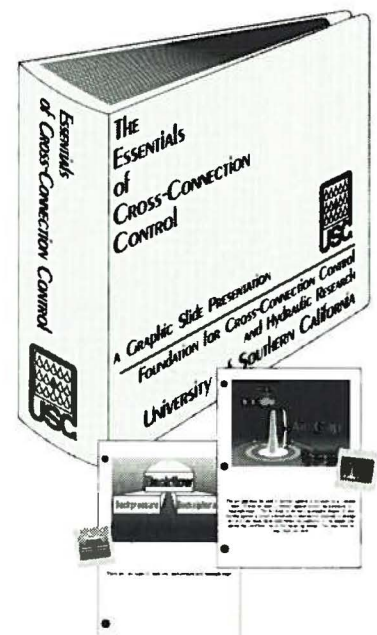
Members should also be aware of the fact that assemblies are only Approved for vertical installation if this is specifically spelled out on the *List of Approved Backflow Prevention Assemblies*. Additionally, assemblies may not be rotated on their axes. If this is done, the Foundation's Approval is invalidated.

The Foundation does not have Specifications for dual checks or dual checks with atmospheric ports. It should be noted that none of these appear on the *List*.

Literature can also be found for testing equipment such as differential and duplex gages referencing the Foundation. The Foundation does not currently have specifications for such equipment and does not publish a list of "approved gages." There are some minimum recommendations for gage equipment noted in the *Manual of Cross-Connection Control*, but there are no specifications currently. 💧

### Slide Presentation

It has come to the attention of the Foundation office that there have been two missing black & white representation pages (46 & 47) in some of the slide presentation packages which have been shipped recently. The Foundation staff has since printed extra copies of the pages to complete any of those packages previously sold. If you have purchased the *Essentials of Cross-Connection Control* graphic slide presentation and are missing the representation pages 46 and 47, please contact the Foundation to receive the missing pages and complete your set. If you have not ordered this 60 color slide presentation package, contact the Foundation office, to receive a brochure describing this new training and educational tool, at (213) 740-2032.



# Hosting a Training Course

*continued from page 3*

attendees, the Foundation will mail confirmation letters to all course participants.

## *Course Materials:*

The Foundation will provide, for each student, a binder containing a syllabus, a time schedule for the week and several reference materials. Also provided, for each student, will be a current copy of the **Manual of Cross-Connection Control**. In addition, the contact for the hosting agency should provide the Foundation office with local and state regulations so that the instructors can adjust the course to the legal requirements of the region.

The Foundation will provide a "certificate of completion" for each member of the class who successfully completes the written and performance portions of the final examination.

## *Field Survey:*

The hosting organization needs to locate a facility which will be suitable for a field inspection on Thursday morning of the class. The facility should be located nearby the classroom and should have several water uses. There should be at least three separate, diverse, water usages located at the facility. Before the site is finalized and the proper permission

is sought for the inspection, the hosting organization contact should call the Foundation office and discuss the facility with a member of the Foundation's Engineering Staff. After all the preparations are finalized, the students will then be required to inspect the locations to determine the uses of water, whether there are any actual or potential cross-connections and ultimately determine the degree of hazard.

Both of the Foundation Courses are acceptable to the CA/NV Section of the AWWA's Voluntary Certification Program. Should a registrant wish to become certified through the CA/NV Section of the AWWA, the Foundation exams at the end of the courses qualify as acceptable to AWWA. Those wishing to be certified as a Specialist through AWWA, however, must hold a current AWWA Tester certificate to apply.

The Foundation office is currently in the process of scheduling courses for 1993. If any Member is interested in hosting one of the Foundation training courses, please contact the Foundation office to obtain a detailed hosting outline or discuss the possibility with one of the Foundation's Engineering staff.

---

***The Foundation office is currently in the process of scheduling courses for 1993. Members interested in hosting a course should contact the Foundation***

---

Locations will be selected based on the amount of interest in the training courses in those areas under consideration. 💧

## ***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**. 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. 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.



# Pressure Loss Curves

continued from page 1

Flow curves from the Foundation evaluation process are generated by taking pressure loss readings at

various flow rates. The assembly under evaluation

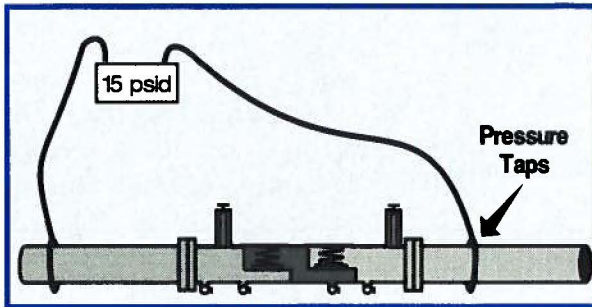
is installed in the test line with pressure taps upstream and downstream of the assembly. The pressure loss is measured first with no flow conditions. Then the flow rate is gradually increased in small increments, with pressure loss readings taken at each point. The pressure loss is measured as the flow increases as well as while the flow decreases back to a static condition. For practical purposes the pressure loss taken as the flow rate increases should be used for pressure

loss calculations for hydraulic systems. Figure 2 shows a *hysteresis*, meaning the pressure loss is different for increasing flow rates than it is for decreasing flow rates.

Two pressure loss tests are run for each backflow preventer being evaluated. This is done in order to compare both tests and assure that

there are no deviations or errors.

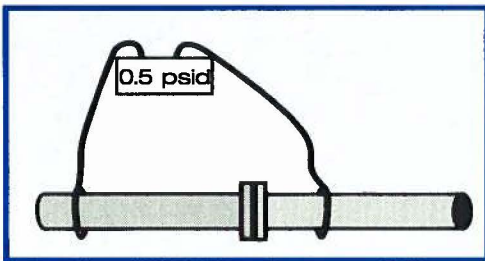
Once the pressure loss curve is complete it must be corrected for pressure losses in the Laboratory piping system upstream and downstream of the backflow preventer. Figure 3 shows the arrangement for testing the pressure loss across a



**Figure 3**

*The apparatus shown here measures the pressure loss across the backflow preventer and the laboratory piping between the pressure taps.*

backflow prevention assembly. A differential pressure transducer is used to measure the difference in pressure. The pressure loss is determined for the same piping *without* the backflow preventer installed to generate a correction curve. Figure 4



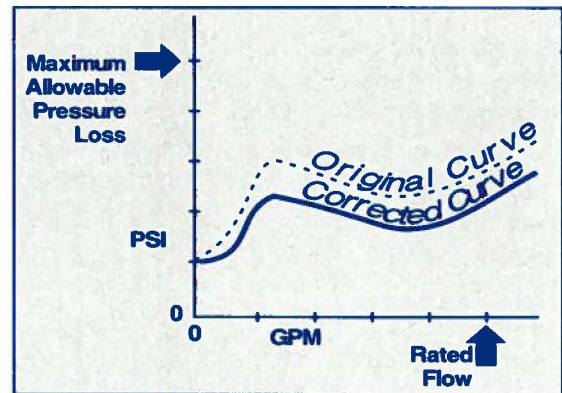
**Figure 4**

*This apparatus is used to create a correction curve. The pressure loss across the piping only is subtracted from the pressure loss of the backflow preventer and the lab piping to determine the pressure loss across the backflow preventer only.*

shows the arrangement for generating a correction curve. The same flow test is run from static conditions through the rated flow. The correction curve is then subtracted from the original uncorrected pressure loss curve to produce a corrected pressure loss curve only for the backflow prevention assembly itself.

Figure 5 shows the uncorrected pressure loss curve as an assembly was originally tested, and the cor-

rected pressure loss curve for the backflow preventer only. This procedure is quite involved, but it produces an accurate flow curve which allows one to pick an assembly which will meet the system design requirements at a specific flow rate. The Foundation often receives inquiries regarding the accuracy of the flow curves found on some literature produced by backflow preventer manufacturers. In order to assure that one has accurate flow



**Figure 5**

*This shows the original flow curve (dashed line) as measured using the apparatus shown in Figure 3 and the corrected curve showing the pressure loss across the backflow preventer only.*

curves, it is suggested that the manufacturer of the assembly be contacted. A copy of the Foundation's flow curve, which is included in the evaluation report, may be requested from the manufacturer. The Foundation cannot release these curves directly, as the information contained in them is considered proprietary to the manufacturer. However, most manufacturers are quite willing to provide a copy of the flow curves which were generated by the Foundation during the evaluation process. 💧

# Heat Exchangers

## Using Potable Distribution Systems

*continued from page 1*

The Foundation is opposed to such systems for several reasons. Using this type of system would require the water purveyor to allow *used water* to be returned to the potable distribution system. Water which leaves the potable distribution system is no longer under control of the water supplier. Once the water is cycled through the heat exchanger system, it is returned to the potable distribution system. This makes it impossible for the water supplier, which is responsible to maintain the quality of the water, to assure that the water has not become contaminated. A maintenance crew could view this loop between the distribution system and the heat exchanger as just another source of water. Thus, interconnections could be put into this loop creating direct cross-connections to the potable distribution system. It is not possible to protect the system by using back-flow prevention assemblies, since the system is looped with the water coming from and returning to the distribution system.

Not only could the quality of the water become defiled by unauthorized taps to the loop, but the heat exchangers in these systems are single-walled heat exchangers. This

means that the wall of the heat exchanger could leak without being detected and the potable distribution system could become contaminated by the heat exchanger fluid.

Water purveyors have also expressed concerns about the change in temperature in the potable distribution system. If several of these

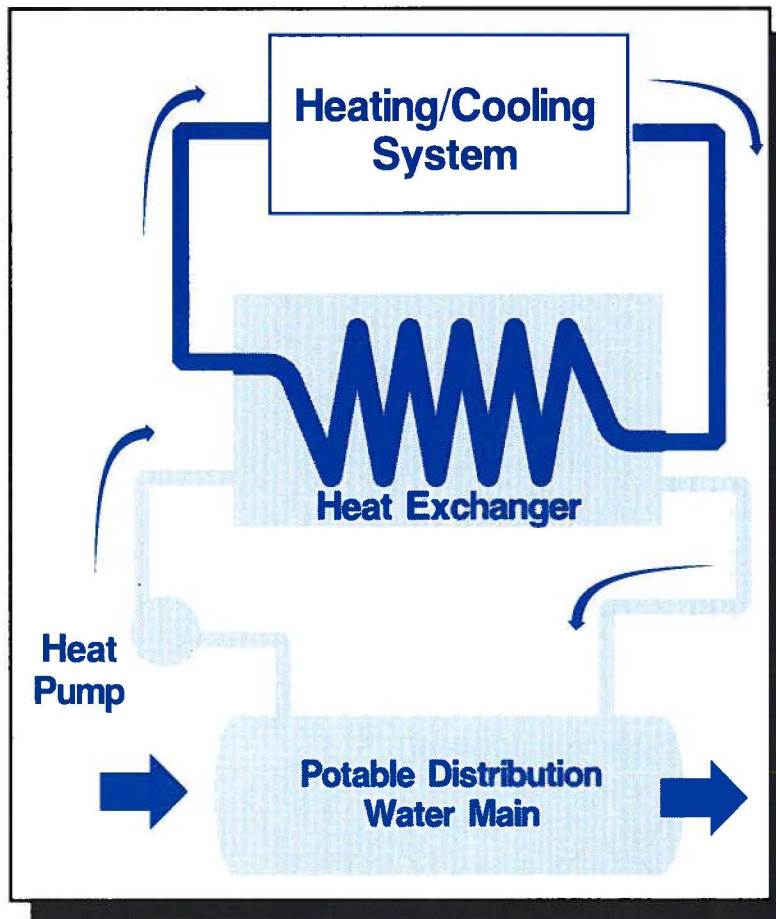
such as culdesacs or dead end mains, be increased to levels conducive to *Legionellia* multiplication? Concern has also been expressed that the change in temperature could affect the bacteriological water quality, corrosiveness, and maintenance of required chlorine residual.

Although the energy savings of these systems are considered to be great, one has to wonder if there are not other sources available to use as a heat sink without jeopardizing the quality of the potable water distribution systems.

The American Water Works Association has asked the Foundation to serve on an ad hoc committee to review the impact of these heat sink systems. The water quality and cross-connection concerns are to be carefully reviewed by this committee. Any experience which Members of the Foundation might have with these systems should be forwarded to the Foundation Office.

There also appears to be activity on the Federal level to encourage the use of these

systems because of the energy savings available. 💧



***Heat exchanger system using potable distribution water main as a heat sink.***

systems are used, might not the ambient temperature of the potable distribution system, in certain areas

# 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.

---

*5 - 9 October 1992* - Tester Short Course, Foundation Laboratory, Los Angeles, CA

*7 - 9 October 1992* - Ohio Chapter American Backflow Prevention Association Annual Conference, Cleveland, OH

*20 - 23 October 1992* - CA/NV Section AWWA Fall Conference, Burlingame, CA

*7 - 11 December 1992* - Program Specialist Course, Monterey, CA

*4 - 8 January 1993* - Tester Short Course, Foundation Laboratory, Los Angeles, CA

*11 - 15 January 1993* - Program Specialist Course, USC Campus, Los Angeles, CA

*11 - 12 January 1993* - American Backflow Prevention Association/TREEO Conference, Altamonte Springs, FL

*10 - 14 May 1993* - Tester Short Course, Foundation Laboratory, Los Angeles, CA



FOUNDATION FOR CROSS-CONNECTION CONTROL  
AND HYDRAULIC RESEARCH  
UNIVERSITY OF SOUTHERN CALIFORNIA  
KAP-200 University Park MC-2531  
Los Angeles, California 90089-2531

First Class Mail  
U. S. Postage Paid  
University of  
Southern California