

USC

UNIVERSITY
OF SOUTHERN
CALIFORNIA

Foundation for
Cross-Connection
Control and
Hydraulic Research

CROSS TALK

AUTUMN 2002

AWWARF Update

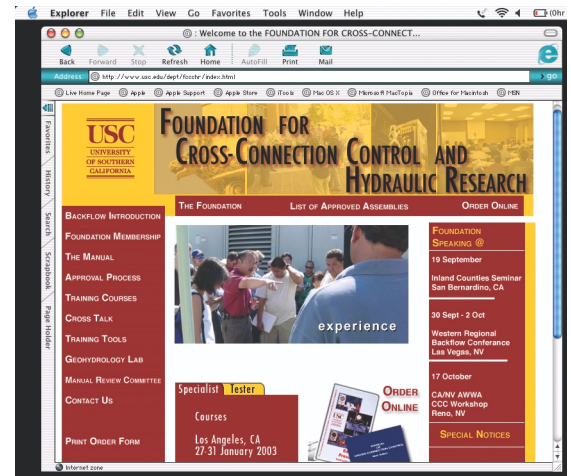
In late 1999, the Foundation was charged with the challenge of developing a comprehensive study of the impact of cross-connections on North American water supplies. This study required approximately 18 months and is now completed, but has yet to be published by the American Works Works Association Research Foundation. The assessment consisted of two primary objectives. Firstly, with the help of over 700 North American water utilities, the Foundation surveyed and documented the findings of the actual impact of cross-connections upon the utilities. Secondly, the Foundation developed a computerized model of small, medium and large water systems to determine the effect of hydraulic conditions imposed upon piping networks in a transient rather than a steady state environment. Following is a general synopsis of the results the Foundation found during this project.

No geographic trends were found in North America in relation to the type of cross-connections being experienced. Indirect cross-connections account for 65% of the cross-connections; while 35% are direct cross-connections. The North American survey data indicates that more and more agencies developed cross-connection control programs over the last three decades. As more agencies developed programs, more incidents were reported. Therefore, the reporting of incidents has continually increased since 1970. It is important, however, to note that the average

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New Website Released

For the last several weeks the Foundation has been redesigning its website to meet the needs of our members better. We are happy to announce that as of September 23, 2002 the Foundation unveiled its revamped website (<http://www.usc.edu/fccchr>). We encourage everyone to visit the website and provide us with feedback that could help it become



even more useful for the needs of any Cross-Connection Control program.

The website boasts new and enhanced features, including the ability to browse *Cross Talk* archives dating back to November 1994. Furthermore, manufacturers now have the ability to download the appropriate forms to have their assemblies tested by the Foundation. It is now more accessible to purchase Training Tools, and you also have the opportunity to view selected products before purchase. The site also includes the introduction of the newest Foundation labora-

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

The Geohydrology Lab • Tester Course Modifications
Household Cross-Connections Study

Foundation Membership

The Foundation's Membership Program continues to add new Members. We would like to welcome the Members listed below:

ACS

Agbayani Const. Corp.
Alpine SAP, Inc.
AMFLO Co.
APHCC of Texas
APS - Cholla Power Plant
Arlington, City of
Aulson & Sky Co.
City of Aurora
Automatic Sprinkler Controls
B & L Backflow
Backflow Bob
Bently Nevada Corp.
BFP Testing
Bill's Landscaping
Blackhawk Sprinklers, Inc.
Blaze-X Sprinkler Corp.
Boulder, City of
Brenham, City of
Broadbent & Associates, Inc.
BWXT Y-12
CA Dept of Forestry - OVCC
CA-NV AWWA
Cape Environmental Management
Carolina Cross Connections
Casitas Municipal Water District
Chem Pro Laboratory, Inc.
Clive, City of
Colorado State University
Compton Water Dept.
Cons RWD No. 6, Jo Co
County of San Diego-DEH
Dancing Dog Enterprises
Death Valley N.P.S.
DeSoto, City of
Differential Pressure Plus
Donald L. Jones
Douglas County Utilities
ECS Company, Inc.
El Toro Water District
Elmer Ostling
Flaming Arrow Publishing
Flathead County Water & Sewer
FloSafe Consulting
Francis W. Tromblay
Gallo Glass Co.
Gary Iizumi
Georgia Rural Water Assoc.
Glendale, CA, City of
Grays Harbor PDA
GV Jones & Associates
Hilton Head No. 1 PSD
I Fix
J.R. Cardenas Construction, Inc.
Jack's Plumbing Inc.
James E. Wehinger, Sr.
JATC Local 467
Kennedy Valve

Kevin Mathies
LAC Utilities
Louis E. Schmitz Plumb Backflow Test & Repair
McVeigh's Rooter & Plumbing
Millersburg Water Works
Monroe, City of
Muscatine Power and Water
MWH
Nanette Seman
Northwest Fire Protection, Inc.
NSWC Crane
Orange County Backflow
Pacific City Joint Water Sanitary Authority
Parker Pacific
Portola, City of
Portsmouth Water & Fire District
Puu Waa Waa Water Works
Quality Mechanical
Randy Goodell
Raywright & Assoc.
Rick Nelums
Rightway Backflow Prevention Service
Robert Kuhn
Robert's Landscaping
Roto Rooter
S. McCullough Plumbing Co.
Safe Flow
Safewater, Inc.
SAIC
San Diego #2, City of
Seattle Area Pipe Trades
Sergent Systems, Inc.
Shelbyville Water System
Skyland Metro District
Specification Sales
Spokane Regional Cross Conn Control Comm
Sprinkler Fitters UA Local 483
St. Cloud, City of
Sullivan Love
Technical Learning Consultants
Tennessee Dept. of Env. & Cons.
Texas Water Utilities Association
The Plumberologist
Total Plumbing
TRW
Tulare City School District
TW Cooper, Inc.
UAF
URS Corporation
USFilter
Vandenberg Village CSD
Village Backflow Prevention Service
Virginia Sprinkler Co
Water Specialties, NH
West View Water
Westinghouse TRU Solutions LLC
William Vogel
W-S/FC Utilities

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EPA project on Household Cross-Connections

Residential cross-connection control has been a subject of debate for years. Although many believe that residences do not pose the level of threat that industrial facilities do, little research has been done to determine what the potential threat of residential cross-connections may be. This project promises to shed light on the issue, ascertaining the prevalence of cross-connections in residences and determining the potential threat these cross-connections pose to the household plumbing system as well as the potable distribution system.

Contacting the Foundation

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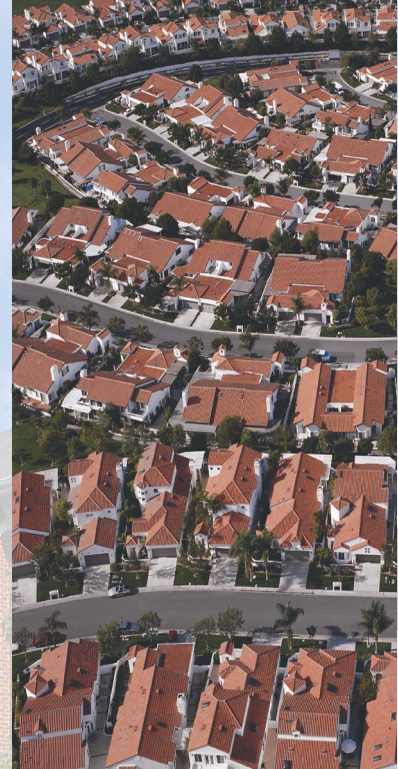
The Foundation accepts checks via mail, Purchase Orders via mail or fax and credit card orders (Visa, MasterCard, Discover) via telephone and the Web.

Last year the Foundation received a grant from the United States Environmental Protection Agency to assess the prevalence of cross-connections in household plumbing systems. The Foundation is currently of conducting site surveys of 200 homes to determine if cross-connections exist, and if they do, what type of cross-connections they are, and what is the degree of hazard involved.

The surveys will continue to be conducted through the rest of the year. The data obtained from the surveys will be recorded on survey forms created for this project. Three members of the Foundation's Research team will analyze the forms independently to determine if there are cross-connections present, if they are protected and what the degree of hazard is for each cross-connection. The results will be compiled and forwarded to a Research Team at the University of California at Berkeley.

The information obtained by the Foundation survey team will be added to a database created at the University of California at Berkeley. Researchers at Berkeley have been tracking illnesses in homes. These homes had either an actual water treatment unit or a placebo water treatment unit installed. The cross-connection survey results will be factored into the data to determine if illnesses may be

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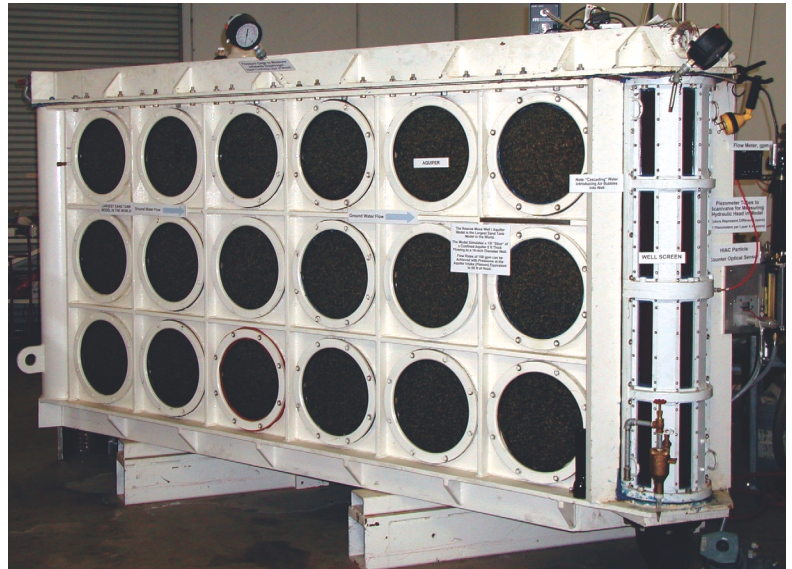
The New Geohydrology Lab

Groundwater is a vital source of water supply in some parts of the country. The development of groundwater resources is important for the well being of the society. Even though theories involving groundwater flow are relatively easy when compared with surface water flow (the former being laminar flow in nature as compared with turbulent flow for surface water). The economic assessment associated with groundwater development requires a clear understanding of the nature of flow as well as the characterization of the medium comprising the groundwater basin. Lack of physical facilities for groundwater modeling has been a major handicap for the continuing advancement of science and engineering associated with groundwater. This situation is now being remedied at USC. The Foundation had been asked to

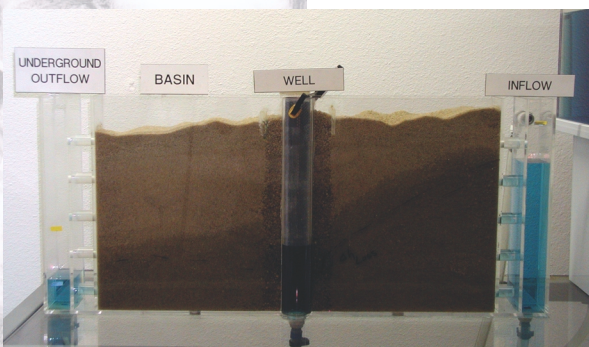
Angeles donated the centerpiece of the well/aquifer model to USC. The original Roscoe Moss well/aquifer model (first developed in 1978) has been completely refurbished and equipped with modern instrumentation.

Mr. Christopher Harich, an advanced Ph.D. student under the supervision of his thesis advisor Dr. J. J. Lee and Research Professor Dr. Dennis Williams, has been given the responsibility of operating the Geohydrology

The Foundation expanded its endeavors in the summer of 2001, opening a Geohydrology Laboratory



The Roscoe Moss Well/Aquifer Model



Flow Through Basin, Model

administer and operate a Geohydrology laboratory in Upland, California where a very large-scale well/aquifer model has been housed.

The Roscoe Moss Company of Los

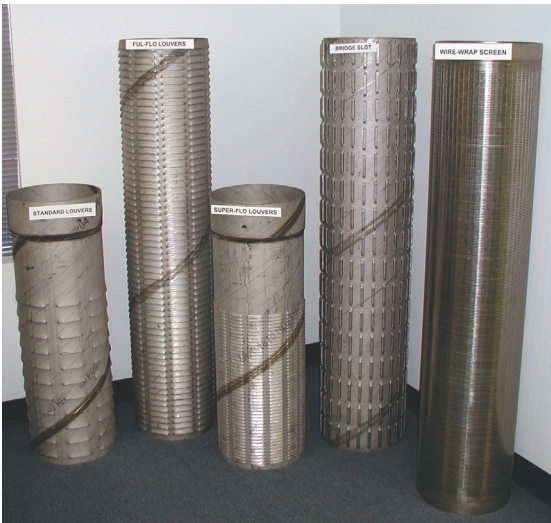
laboratory. This large-scale model can accurately simulate many field conditions in the laboratory. The work currently underway includes well screen testing, development of filter packs as well as tracer movements in the groundwater medium. The solutions to problems of vital practical interest are actively being sought, so that wholesome potable groundwater may be provided to everyone.

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The New Geohydrology Lab

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More information regarding the Geohydrology lab may be found on the Foundation's website (<http://www.usc.edu/fccchr/>). From the Geohydrology website, you can submit questions or request information on submitting proposals to the laboratory. We welcome input regarding any problems, for which the Geohydrology lab should be seeking a solution.



A Selection of Well Screens



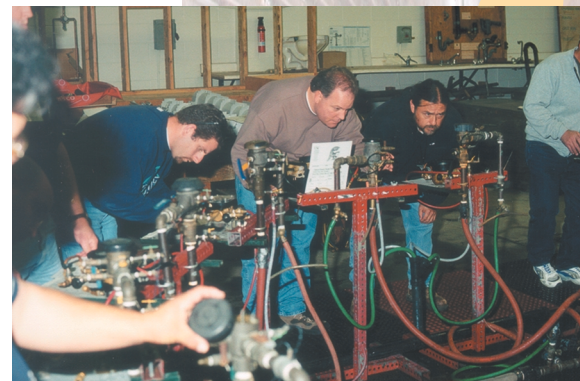
Filter Pack Selection

Tester Course Changes

Since January 2001, the Foundation's Tester Courses have been teaching the field test procedures for not only the reduced pressure principle assembly, the double check valve assembly, and the pressure vacuum breaker assembly, but also the spill-resistant vacuum breaker assembly. There was some concern during the initial planning of the modification to include the SVB about whether there would be sufficient time available during the five-day course to add the SVB to the curriculum. The Foundation staff made some minor adjustments to the course agenda and the SVB was successfully integrated into the course.

The Foundation welcomes input from the course attendees and students have the opportunity to offer an appraisal of the course at the conclusion of the training sessions. Course appraisals have indicated that the time allotment for the course is appropriate. So, the Foundation staff is pleased to see that the course adjustments have been successful and benefited the students.

For those interesting in hosting a tester or specialist course at their location, information may be found on the Foundation website under, "Frequently Requested Documents."



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AWWARF Project

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number of incidents being reported per agency does not significantly change. This suggests that the number of incidents per utility isn't necessarily changing over time, but that reporting and documenting are becoming more prevalent as agencies develop cross-connection control programs.

Across all sizes of water utilities, the average annual cost of administering a cross-connection control program is \$44,835. On the average 3.65% of the agencies' operations and maintenance budget was directed towards cross-connection control.

The data analysis demonstrated that those utilities with higher maximum elevation differences experienced a greater number of backflow incidents. Analyzing a combination of nominal system pressure and maximum elevation difference indicated that systems with lower nominal pressure and higher elevation differences experienced more incidents than systems with higher nominal pressure and lower elevation differences. This conclusion is also demonstrated in the computer modeling.

Ninety-one percent of the utilities responding to the North American survey indicated that they did have a cross-connection control program. The survey data shows that 43% of the utilities surveyed administered system protection programs (their goal is to protect the water system at the user's water connection). Survey participants ranked the establishment of a legal authority as the most effective element of a cross-connection control program. This was followed

by the presence of an authoritative list of approved backflow preventers and then a requirement to field-test the backflow preventers.

Results from the computer modeling clearly indicate that sudden changes in the water demand, such as a hydrant opening, caused drastic transient flow conditions resulting in significant

pressure loss and flow reversal in a network system of any size. Many examples

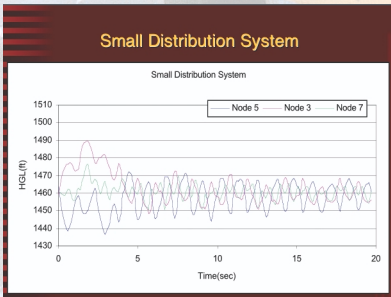
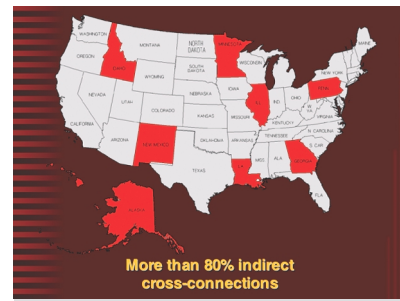
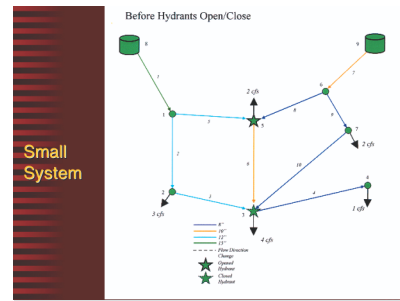
demonstrate that this loss could cause system pressure to drop below atmospheric pressure. Distribution systems that have greater variance in ground elevations will have greater possibility of creating sub-atmospheric pressure when drastic pressure reduction occurs. Slower hydrant opening rates significantly

reduce the impact of hydraulic transients created. The extent of the

affected area cannot be generalized. The affected area depends on the specific condition creating sudden changes and the particular system characteristics of the network.

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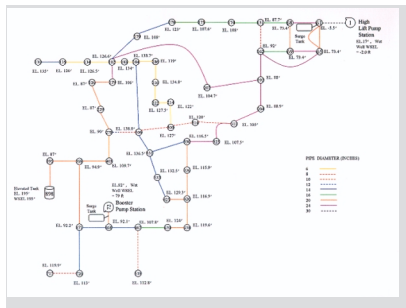
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AWWARF Project

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This is a very short synopsis of some of the general findings in the Foundation's assessment. The final and complete report is scheduled to be published by the American Water Works Association Research Foundation in early 2003.



EPA Study

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attributed to cross-connections.

When the on-site survey is conducted, the residents are given a brochure describing typical household cross-connections and what could be done to abate them. The Foundation is considering offering this brochure to Members for distribution to their customers. Should you have recommendations on how this information could be augmented to provide better information to your residential customers, please send your comments to the Foundation office at fcchr@usc.edu.

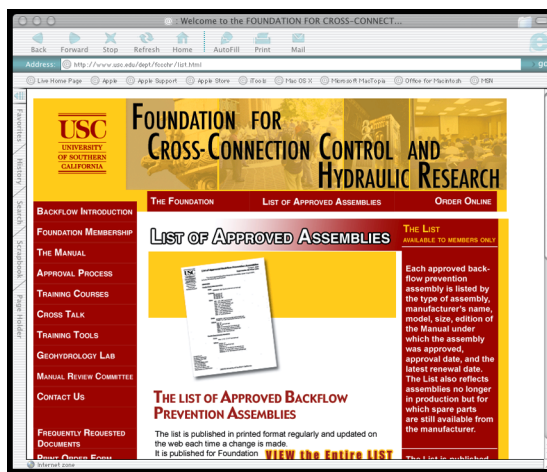
New Website

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tory, the Geohydrology Laboratory, which focuses on ground water and well research. Finally, *An Introduction to Training Courses Video*, is now available to download in either Real Streaming Media or QuickTime format to provide prospective students with information about Foundation courses.

As always, the List of Approved Backflow Prevention Assemblies is available to Members on the website. If you are a member and do not receive e-mail notification of updates and would like to, please sign up on the website. If your e-mail contact information is out of date, please email us with your old and new e-mail addresses.

The website also includes dates and locations of conferences and meetings



in which the Foundation will participate. We encourage everyone to attend these meetings. The Foundation hopes you will find the new website accessible and informative for all your cross-connection needs. We will continue to update it as the need arises. If you have any comments or suggestions about the new site, please e-mail us at fcchr@usc.edu.

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Training Courses

Tester Course

Los Angeles, CA
13-17 January 2003

Los Angeles, CA
12-16 May 2003

Los Angeles, CA
14-18 July 2003

Specialist Course

Los Angeles, CA
27-31 January 2003

Los Angeles, CA
28 July - 1 August 2003

Upcoming Events

*ABPA Southern California Chapter
9th Annual Conference*

- Ventura, CA
6 November 2002

*Manual Review Committee
General Meeting*

- Los Angeles, CA
14 November 2002

USC vs. UCLA- Football Game

- Pasadena, CA
23 November 2002

*Manual Review Committee
Open Meeting*

- Los Angeles, CA
23 January 2003



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