

Survey Report on The Cross-Connection Control Program

#5400070

MEMORANDUM

SUBJECT: Survey Report on the
Cross-Connections Control Program
Report No. E1HWG4-01-0091-5400070

FROM: Michael Simmons
Deputy Assistant Inspector General
for Internal and Performance Audits

TO: Cynthia C. Dougherty
Director, Office of Ground Water
and Drinking Water

This report presents the results of our survey on cross-connection controls. Cross-connections have resulted in significant and dramatic public health adverse effects in certain states and local communities, but we cannot conclude these incidents were representative of a national problem.

We were told by 29 of the 45 states we contacted that they have some type of a cross-connection program and that the responsibility for administration and enforcement of the program is generally at the local level. The results showed that the comprehensiveness or scope of these programs varies among states. All but one of the states that do not have programs, advised that a state-level program was appropriate or needed. Also, the level of some state administered cross-connection programs may be reduced in intensity due to federal mandates taking precedence over state initiatives and requirements.

Additionally, our survey of industry experts indicated that the contamination of the potable water supply by cross-connections is largely undetected, not investigated, or not sufficiently reported due to the difficulty in identifying cross-connections as the source of the contamination.

The recent Unfunded Mandates Reform Act of 1995, signed by the President on March 23, 1995, and the strong Congressional support for this historic bill, redefines the relationship between the federal government, states, and local partners. We encourage EPA to work with the states to identify the most cost effective approaches for measuring the public health significance of cross-connections at the state and local levels. Also, when EPA and a state determines that it is in the best interest of the public health to establish or improve an existing cross-connection control program, we believe EPA should assist the state in developing an acceptable solution. This would be an opportunity to put into practice some of the Administration's guiding principles for reinventing environmental regulation announced on March 16, 1995.

We encourage EPA to include in its sanitary survey guidelines a step to reexamine cross-connection activities in state priority guidance to elevate the visibility of the level of cross-connection programs implemented by water suppliers. We suggest that the Safe Drinking Water Information System (SDWIS), which is a system modernization initiative currently in process and system replacement for the Federal Reporting Data System (FRDS), be designed with the ability to identify those public water suppliers that have implemented cross-connection programs and those that have not. We suggest also that when EPA establishes its program intended to help identify and study emerging environmental problems, under Reinventing Environmental Regulation, EPA address cross-connections.

We are closing this survey upon issuance of this report and no response is required by your office.

BACKGROUND

This survey was requested by the Director of the Program Implementation Division within the Office of Groundwater & Drinking Water (OGWDW). The Director was concerned that cross-connection control, which is not federally mandated, may not receive the attention it deserves since state and local government funding shortages hamper implementation and enforcement of current drinking water regulations.

Cross-Connections Program

The Office of Water defines cross-connections as any actual or potential connection between a drinking (potable) water system and an unapproved water supply or other source of contamination. For example, if you have a pump moving nonpotable water and hook into the drinking water system to supply water for the pump seal, a cross-connection or mixing between the two water systems can occur. This mixing may lead to contamination of the drinking water. ([footnote 1](#))

EPA's Cross-Connection Control Manual states cross-connections are the links through which it is possible for contaminating materials to enter a potable water supply. The contaminant enters the potable water system when the pressure of the polluted source exceeds the pressure of the potable source. The action may be referred to as backsiphonage or backflow. A "backflow" is the flow of water or other liquids, mixtures, or substances into the distributing pipes of a potable supply of water from any source or sources other than its intended source. Backsiphonage is one type of backflow. A "backsiphonage" results from negative pressures in the distributing pipes of a potable water supply.

This manual provides several cases where cross-connections have been responsible for contamination of drinking water. For example, water from a heating boiler entered a high school's drinking water system. Chromium used in the heating system boilers to inhibit corrosion of metal parts entered the potable water supply as a result of backflow through leaking check valves on the boiler feed lines.

Presently, there are no federal reporting requirements for potable water contamination caused by cross-connections problems. Consequently, there are no national statistics available which show the actual number of instances where water source contamination was caused by cross-connection problems. EPA does not have a regulation mandating a cross-connection control program. EPA does, however, indirectly recognize the importance of cross-connection controls in Section 141.63 (d) (3) of its Total Coliform Rule (TCL). In this rule, EPA identified proper maintenance of the distribution system as one of the best techniques for achieving compliance with the maximum contaminant level (MCL) for total coliform. In a memorandum, "Clarification of Issues Concerning the Revised Total Coliform Rule", the Director of the Office of Drinking Water explained that the rule was intended to include a cross-connection control program as part of proper maintenance. It is the states responsibility to ensure that local water suppliers have proper maintenance programs.

In the July 29, 1994, Federal Register (page 38832), EPA sought public comment on or before May 30, 1996, on whether EPA should amend the Surface Water Treatment Rule (SWTR) to provide additional protection against disease-causing organisms in drinking water. The statutory authority cited for the SWTR is the Safe Drinking Water Act, as amended in 1986, which requires EPA to publish a "maximum contaminant level goal" for each contaminant which, in the judgement of the EPA Administrator, "may have any adverse effect on the health of persons and which are known or anticipated to occur in public water systems." The goals are to be set at a level at which "no known or anticipated adverse effects on the health of persons occur and which allows an adequate margin of safety." EPA also sought public comment on whether it should require states and/or water systems to have a cross-connection control program; what specific criteria, if any, should be included; and how often such a program should be evaluated. In addition, the Agency requested the public to identify other

regulatory measures EPA should consider to prevent the contamination of drinking water already in the distribution system (e.g. minimum pressure requirements in the distribution system). The responses to this request may be useful to EPA and individual states in evaluating and targeting the need for additional attention on cross-connection controls.

Reinventing Environmental Regulation

On March 16, 1995, the President announced the establishment of 10 principles for reinventing environmental regulation. Under these principles, federal, state, tribal, and local governments must work as partners to achieve common environmental goals, with non-federal partners taking the lead when appropriate. Under the Administration's strategy to reinvent environmental protection, drinking water treatment requirements should be refocused on highest health risks. EPA will reorder its priorities for drinking water regulations based on a careful analysis of public health risks and discussions with stakeholders. Also, EPA will establish a program to help identify and study emerging environmental problems. EPA will commission an independent study that will provide recommendations to improve data collection and management at EPA. These recommendations will be used to design a center for environmental information and statistics.

Unfunded Mandates Reform Act of 1995

On March 22, 1995, the President signed into law the Unfunded Mandates Reform Act of 1995, which requires federal agencies writing new regulations to carefully study their economic impacts before issuing the rules. This law is historic because it redefines the relationship between the federal government, states, and local partners and provides that Congress must have Congressional Budget Office estimates for the cost of the mandates it imposes on state and local governments and the private sector. This law allows members of Congress to object to consideration of any legislation that imposes a cost of more than \$50 million on state and local governments or more than \$100 million on the private sector, unless the costs are covered in the bill.

The Unfunded Mandates Reform Act requires federal agencies to (1) analyze the effects of their rules on state, local, and tribal governments and the private sector and to prepare written statements detailing the costs and benefits of rules expected to cost over \$100 million and (2) select the least costly or most cost-effective rule where possible. Within 30 days of the beginning of the fiscal year, federal agencies must inform Congress that it has sufficient funds to implement a mandate or provide legislation recommendations to scale back an underfunded mandate in order to meet a partial level of funding. Both of these determinations must be ratified by Congress within 60 days of its submission by the federal agency. If the Congress fails to act within this 60-day time period, then the mandate shall be ineffective for that fiscal year.

Data Management

EPA's "PWSS Priority Guidance," dated June 24, 1992, encourages states to maintain a data management system that accurately and timely identifies inventories, maintains water quality monitoring information, and calculates monitoring and Maximum Contaminant Level (MCL) violations. The guidance requires regions to work with states to incorporate this guidance into their workplans. States are expected to aggressively develop adequate funding to oversee the entire Public Water System Supervision (PWSS) Program. EPA recognized that states might need to temporarily use manual systems, but expects all states to ultimately use automated systems by fiscal 1998.

In 1992, the OGWDW formulated its plan to automate public water system information and began developing the Safe Drinking Water Information System (SDWIS). The development efforts focused on responding to information needs and performing functions necessary to achieve success. SDWIS will provide a comprehensive automated data system for EPA and states to manage public drinking water programs. SDWIS is intended to replace the Federal Reporting Data System (FRDS), which is the current national data base for EPA for tracking public water systems violations and enforcement actions. EPA has held several conferences with

state managers to ensure that SDWIS will meet states' data needs. As of April 1995, the OGWDW indicated that 19 states have communicated their intent to adopt SDWIS as partner states. An additional 5 states are currently evaluating SDWIS for potential adoption.

The SDWIS Project Team is currently working on four projects at the EPA Systems Development Center (SDC): the Inventory Business System (IBS) Reengineering Project, the FRDS-II Conversion Project (FCP), the Sampling Business System (SBS) Project, and the Total Coliform Rule (TCR) Non-Compliance Determination Business System Project. All four projects will increase the capabilities of the SDWIS to assist EPA and the states in managing public drinking water programs. The FCP is being conducted to convert the existing Federal Reporting Data System (FRDS-II) System 2000 data base to a DB2 data base. According to the OGWDW, it plans to implement this conversion on June 1, 1995.

Sanitary Surveys

EPA's "PWSS Priority Guidance" encourages states to maintain some capability to perform sanitary surveys. A sanitary survey is an on-site review, evaluation, or inspection of the water sources, facilities, equipment, operations, and maintenance of a public water system for the purpose of determining its adequacy for producing and distributing safe drinking water. According to GAO in their report entitled Sanitary Surveys of Public Water Systems, dated April 1993, "a comprehensive sanitary survey can be a powerful tool for regulators to help ensure that a water system can deliver safe drinking water to consumers. As noted by EPA's sanitary survey course coordinator, evaluating all of the components and operations that the agency recommends be evaluated during a survey can significantly reduce the risk that consumers may ingest contaminated drinking water. EPA's guidance recommends, for example, that the water distribution system be checked for areas of stagnant water ("dead-ends") in which harmful bacteria may grow, and that "cross-connections" be monitored to decrease the chances that contaminated water and potable water will mix."

SCOPE OF SURVEY WORK PERFORMED

Eastern Audit Division

The Eastern Audit Division performed a limited scope survey of cross-connection control programs administered at the state level. The objectives of the survey were to determine whether: 1) the primacy states administer statewide cross-connection programs and 2) what, if any, assistance from EPA is needed regarding cross-connection prevention programs. In order to address our objectives we:

- reviewed the EPA's Cross-Connection Control Manual;
- interviewed EPA's Region I Water Supply Section staff;
- reviewed GAO's report titled "Drinking Water Key Quality Assurance Program Is Flawed and Underfunded";
- met with the GAO staff who performed the review, and reviewed their workpapers;
- interviewed the Commonwealth of Massachusetts' coordinator for the statewide Cross-Connection Control Program; and
- conducted a telephone survey of 45 primacy states.

Our telephone survey requested that the states identify whether or not they administered a statewide cross-connection control program; if not, whether one was needed; a description of the program; and what, if any, assistance is needed from EPA.

OIG's Engineering and Science Staff

The OIG's Engineering and Science Staff researched cross-connections to identify and review the data and studies available nationally. This research included telephone surveys of senior management officials from EPA's Office of Research and Development's Drinking Water Research Division, Risk Reduction Engineering Laboratory, and Health Effects Research Laboratory; Region 1's Water Management Division's Ground Water Management and Water Supply Branch; and Region 2's Water Management Division's Drinking/Ground Water Branch. Technical experts were interviewed from the (1) Department of Health and Human Services' Public Health Service's Centers for Disease Control; (2) University of Southern California's School of Engineering's "Foundation for Cross-Connection Control and Hydraulic Research; (3) American Water Works Association (AWWA) and AWWA's New England Water Works Association and the Pacific Northwest Section; (4) American Backflow Prevention Association; (5) Global Consulting for Environmental Health; (6) International Studies and Training Institute; (7) Missouri Department of Natural Resources; (8) Boston Water and Sewer Commission's Cross-Connection Program Office; (9) The York Water Company; and (10) Watts Regulator Company. The OIG's Engineering and Science Staff reviewed information on cross-connections provided by the survey respondents.

RESULTS OF REVIEW

Results of Telephone Survey

Our telephone survey found that the majority of states contacted do have some type of a cross-connection program. Twenty-nine of the forty-five states (64%) included in our survey have a cross-connection program. However, the comprehensiveness or scope of these programs varies from state to state. Some states have active programs requiring each water system to adopt the state's cross-connection policies and procedures, including yearly inspection of devices, annual permitting of devices by the state agency, and required surveys and inspections by the local water suppliers. While other state officials advised that their program consists of adopting a regulation prohibiting cross-connections and requires the local suppliers to establish a program. However, there is little follow-up or enforcement at the state level. The responsibility to administer and enforce the program is at the local level. All but one of the states that do not have a program, advised that a state-level program was appropriate or needed.

- The following summary of information on cross-connection control programs provided by the surveyed states illustrates the varying scopes of their programs:
- One state program requires all water authorities to adopt the state's cross-connection control requirements which includes obtaining a permit for each device and inspecting all devices annually by a state certified tester.
- Other state programs require the local water authorities to develop their own cross-connection control programs which may or may not need the state's approval. However, the emphasis on implementing and enforcing the program is left up to the local water authority.
- One program requires cross-connection control devices to be installed to protect both the public water system and the potable water within the premises of all buildings. Another state's program requires devices which only protect the public water source.

While one state requires that only systems serving 10,000 or more people have a program.

- One state's program requires that only facilities which are known to have cross-connection control devices must have a permit.

The most common type of assistance called for by the states in our telephone survey, was for a federal mandate or a clearer definition or recognition of the necessity for such a program by EPA. These responses indicated a range of possible alternatives. Several state officials suggested that EPA should provide more educational information to states and localities concerning the importance of cross-connection control programs. Others

suggested that EPA should take a lead in standardizing the requirements of a cross-connection control program for all states to follow and enforce, thereby, making the laws consistent between the states.

A questionnaire used in GAO's review of state sanitary survey programs ([footnote 2](#)), asked states to assess the overall adequacy of the operations and conditions of public water systems under their jurisdiction. For each of 12 different elements included in the questionnaire, states were asked to estimate the percentage of small, medium-sized and large water systems that are adequate, in need of minor improvements, or in need of major improvements. The results of the questionnaire found that cross-connection control programs needed major improvements in 50% of small systems; 35% of medium systems and 19% of large systems. In addition, GAO reported that only 21 of the 50 states (42%) always or almost always evaluated the cross-connection control program at the local level while conducting their sanitary surveys.

Several of the states' staff who participated in our survey advised that until cross-connection control programs are either required, recognized, or more clearly defined by EPA, state cross-connection control programs may not be actively administered or enforced. This generally occurs because the many federally mandated requirements take precedence over state initiatives, and limited resources are allocated to the federal requirements rather than to state initiatives. Elevating the requirements for a cross-connection control program to the federal level would make it easier for some states to establish and enforce such a program.

Other state officials advised that while a federal requirement for a cross-connection control program is needed; they caution that EPA should not make another mandated requirement without providing resources. These state officials also believed EPA should allow them latitude in tailoring their own program. States do not want to significantly change their existing programs because it could be costly to do so.

Results of OIG's Engineering and Science Staff Research

Generally, the results of the OIG's Engineering and Science Staff research confirmed that many state cross-connection control programs vary from active and comprehensive programs, to others which require that local water suppliers establish a program. Also, the research indicates that the contamination of the potable water supply by cross-connections is largely undetected, not investigated, not documented, or not reported. This can be attributed to the dynamic and complex nature of plumbing cross-connections. It is sometimes difficult to recognize a cross-connection problem or identify the total number of actual cross-connection incidents.

Also, based on the research, cross-connection and backflow deficiencies are a potential threat to many drinking water systems, especially if a system has a high density of service connections per block; a variety of service line attachment devices; areas of static water, or a high number of storage tanks; reversals of flow and temporary low water pressures caused by line breaks; and increased fire control and customer demand during heat wave emergencies. According to the paper on EPA's joint research with the Missouri Department of Natural Resources, "Impact of Tanks and Reservoirs on Water Quality in Drinking Water Distribution Systems: Regulatory Concerns," ([footnote 3](#)) most of the regulations established under the Safe Drinking Water Act of 1974 and its Amendments of 1986 (SDWAA) have been promulgated with little understanding of the effect that the system can have on water quality.

The paper concluded that maintenance of water quality may conflict with the fact that distribution systems are frequently designed in this country to insure hydraulic reliability. Two factors that contribute to water quality deterioration are long residence times and the reaction that occurs between disinfectant and system materials to reduce disinfectant residuals. According to the paper, storage tanks and reservoirs are perhaps the most visible components of a drinking water distribution system but are generally the least understood in terms of their impact on water quality. Although storage tanks and reservoirs can play a major role in insuring hydraulic reliability for fire fighting needs and in providing reliable service, they can also serve as vessels for complex chemical and biological changes that may result in diminished water quality.

In addition to the SDWAA regulations, the paper discusses four case studies that demonstrate infrastructure failure (i.e., a cross-connections event) can also contribute to diminished water quality and ultimately be a threat to public health. Two of the four case studies discuss outbreaks that occurred in Cabool and Gideon, Missouri. In December 1989, Cabool experienced an apparent cross connection between sewage overflow and two major distribution system line breaks caused by freezing temperatures, resulting in 200 cases of E. coli 0157H:7 infection in a town of 2000 people. Four people died and 85 others were sick. In November 1993, in Gideon, about one half of its population of 1,000 contacted Salmonella Typhimurium. The Salmonella outbreak contributed to the death of three people. The paper stated it is presumed that bird droppings contaminated the community's storage tanks. As with Cabool, the city used nondisinfected ground water.

Various experts indicated to the OIG's Engineering and Science Staff that contamination of the potable water supply by cross-connections is largely undetected, not investigated, not properly documented, or not reported. For example, the Chief Engineer, Foundation for Cross-connection Control and Hydraulic Research at the University of Southern California (USC), indicated that the Foundation's staff has estimated that more than 90 percent of the backflow incidents coordinated with the Foundation are not included in the Summary of Case Histories reported by the University of Southern California in its Manual of Cross-Connection Control due to the inadequacy of the documentation submitted. The Foundation's Chief Engineer attributed the lack of proper documentation to two primary factors. First, in most instances it is difficult, if not impossible, to trace the origin of pollution or contamination of the potable water supply. Second, due to the climate in today's legal system, most agencies do not want to disclose the possibility that pollutants or contaminants have entered the potable water supply.

Additionally, the Engineering and Science Staff were apprised by various experts that the majority of water supply personnel could not find the source of a cross-connection incident because they have not been trained to do so.

According to the Summary of Case Histories reported by the University of Southern California in its Manual of Cross-Connection Control, Ninth Edition, dated December 1993, a minimum of 1,450 cross-connection incidents were submitted to the Foundation from 1980-1993. However, the Foundation's Chief Engineer maintained that the number submitted to USC represents a small percentage (10%) of actual cross-connection incidents that occur nationwide. Representatives of two separate American Water Works Association AWWA Sections confirmed that a small percentage of cross-connections incidents occurring nationwide are actually reported.

Gunther F. Craun in his "Waterborne Disease Outbreaks in the United States of America: Causes and Prevention," states that a total of 1,702 waterborne disease outbreaks (WBDOs) ([footnote 4](#)) with 542,018 cases of illness and 1,089 deaths were reported from 1920-1990. From 1920-1979, cross-connections caused 226 WBDOs with 59,698 cases of illness and 392 deaths from 1920-1979 ([footnote 5](#)). More recently this source documents an additional 145 cross-connection events occurring from 1980-1993.

During the ten year period ending in 1990, Gunther F. Craun indicates that 291 waterborne disease outbreaks were reported in community (43%) and non-community (33%) systems and from the ingestion of contaminated water from recreational (14%) and individual (10%) water sources. The average frequency of 29 outbreaks per year, is only slightly less than reported during the prior decade and comparable to the number reported during the 1930s and 1940s. More outbreaks are usually reported in community than in noncommunity systems and among these, most outbreaks are in small communities. From 1981 to 1985, 186 waterborne outbreaks were reported with only 105 reported during 1986-1990. In community systems, most outbreaks were caused by inadequate disinfection of surface water (28%) and contamination of water in the distribution systems (24%), primarily through cross-connections and repairs of mains. Of these community type waterborne disease outbreaks, approximately 30 (24% times 125) were attributed to contamination of water distribution systems, primarily through cross-connections and repairs of mains. This means that the average frequency of waterborne disease outbreaks caused by cross-connections could be as high as three outbreaks nationwide per year. In

noncommunity systems, most outbreaks (77%) were caused by contaminated, untreated and inadequately disinfected groundwater. None of these, however, were attributed to cross-connections.

EPA's Office of Research and Development's (ORD's) report entitled "Waterborne Disease Outbreak Investigations," identified the causes of WBDOs within community water systems by various deficiencies. As discussed above, community distribution system contamination can be primarily attributed to cross-connections and backflow deficiencies. The following table from this ORD report identified the major causes of WBDOs by deficiency.

This table shows that distribution causes contributed to 33% (41 of 123) of the WBDOs during the period 1971-1980 and 24% (32 of 132) of the WBDOs during the period 1981-1992.

CAUSES: WATERBORNE OUTBREAKS by DEFICIENCIES		
<i>Community Systems</i>		
Deficiency	1971-1980 % (N)	1981-1992 % (N)
Groundwater		
• Untreated	11 (13)	12 (16)
• Disinfection Only	16 (20)	12 (16)
• Filtration	0 (0)	2 (2)
Surface Water		
• Untreated	3 (4)	2 (2)
• Disinfection Only	23 (28)	26 (34)
• Filtration	6 (7)	15 (20)
Distribution	33 (41)	24 (32)
Inadequate Chemical Feed	3 (4)	2 (3)
Unknown, Misc	5 (6)	5 (7)
Total	100 (123)	100 (132)
Community water systems serve 91% of the U.S. population.		

The above 41 WBDOs for the 10-year period ending in 1980 were equivalent to 4.1 waterborne disease outbreaks per year. The 32 WBDOs for the 12-year period ending in 1992 were equivalent to 2.7 waterborne disease outbreaks per year, or 1.4 less waterborne disease outbreaks per year than the average per year in the prior decade.

In December 1991, the Department of Health and Human Services' Public Health Service's Centers for Disease Control (CDC) reported that 12% of WBDOs, from 1989-1990 were attributed to a distribution system deficiency (e.g., a cross-connection, backsiphonage, contamination of water mains during construction or repair, or contamination of a storage facility). In November 1993, the CDC also reported that for the 2-year period 1991-1992, 17 states and territories reported 34 WBDOs associated with water intended for drinking. The outbreaks caused illness in an estimated 17,464 persons. Of the total 34 WBDOs, 5 or 15% were attributed to a distribution system deficiency. These 5 WBDOs for this 2-year period were consistent with Gunther F. Craun's determination, that as many as three waterborne disease outbreaks per year could result from cross-connections. It should be noted that the reporting of any waterborne disease outbreaks is voluntary. EPA and the

Centers for Disease Control (CDC) will provide assistance when requested in the investigation of a WBDO. Furthermore, there is no central agency or authority that aggressively accumulates and compiles a complete list of cross-connection incidents nationally.

In July 1994, the President of the American Backflow Prevention Association (ABPA) wrote to EPA's Director, OGWDW about the guidance on Emergency Authority under Section 1431 of the Safe Drinking Water Act. The ABPA President stated it is apparent a major contributor to drinking water contamination, cross-connections within the distribution system, has been overlooked. According to the letter, research funded and compiled by the EPA found that cross-connections and backflow were responsible for 78 per cent of the outbreaks and 95 percent of the disease caused by community distribution system contamination in the United States between the years of 1920-1980.

The American Water Works Association presented in 1994 a national satellite teleconference entitled, "Preventing Waterborne Disease: Is Your System at Risk?." Cross-connections were identified as the primary cause (31.8%) of waterborne outbreaks from 1971-1985. This data is associated only with surface water supplies.

At the November 1994 Water Quality Technology Conference, San Francisco, California, a paper was presented by Rebecca L. Calderon of EPA's Health Effects Research Laboratory and Gunther F. Craun of Global Consulting for Environmental Health, which identified causes of WBDOs within water systems by various deficiencies. The authors identified 8,975 cases of illness from 1971-1992, resulting from 51 WBDOs that were attributed specifically to cross-connections and backsiphonage type deficiencies of distribution systems.

Conclusions

The subject of cross-connections is very complex to evaluate because of the nature of plumbing cross-connections and the reported inability of state and local levels to identify a cross-connection control problem and its source. Our survey results identified that contamination of the potable water supply by cross-connections is largely undetected, not investigated, or not sufficiently reported. Infrastructure failure and breakdowns in distribution systems can result in significant and dramatic public health adverse effects in certain states and local communities, but we cannot conclude that these incidents were representative of a national problem justifying the need to establish a federal cross-connection control program. The absence of a high number or significantly growing number of waterborne disease outbreaks caused by cross-connections further contribute to the uncertainty of the level of resources needed for this program.

We were told by 29 of the 45 states we contacted that they have some type of a cross-connection program, and the responsibility for administration and enforcement of the program is generally at the local level. Based on the state responses to our survey, we concluded that local government enforcement varies among states with some using state guidelines to enforce and others using local requirements to enforce. All but one of the states that do not have programs, advised that a state-level program was appropriate or needed. Also, the level of some state administered cross-connection programs may be reduced in intensity due to federal mandates taking precedence over state initiatives and requirements.

Considering the Administration's recent announcement on Reinventing Environmental Regulation and building partnerships between EPA, state, and local governments, we encourage EPA to work with the states to identify the most cost effective approaches for measuring the public health significance of cross-connections at the state and local levels. When EPA and a state determines that it is in the best interest of the public health to establish a cross-connection program or elevate the intensity of an existing program, we believe EPA should assist the state in developing an acceptable solution. This would be an opportunity to implement some of the Administration's guiding principles for reinventing environmental regulation issued on March 16, 1995.

We encourage EPA to include in its sanitary survey guidelines a step to determine the level of cross-connection activities. Also, we encourage EPA when it revises the PWSS Priority Guidance to cite cross-connection activities as an example of local issues states can prioritize, or include in its overall program strategy. This will elevate the visibility of cross-connection control programs implemented by water suppliers. We suggest that the Safe Drinking Water Information System (SDWIS) be designed with the ability to identify those public water suppliers that have implemented cross-connection programs and those that have not. We suggest also that when EPA establishes its program intended to help identify and study emerging environmental problems, under Reinventing Environmental Regulation, EPA address cross-connections.

Should you or your staff want to discuss this matter further or require additional information, please contact Ernie Ragland, of my staff, on (202) 260-8984.

APPENDIX I

DISTRIBUTION

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Footnotes

1 "Drinking Water Glossary: A Dictionary of Technical and Legal Terms Related to Drinking Water," EPA 810-B-94-006, June 1994.

2 Source: GAO report entitled Drinking Water Key Quality Assurance Program Is Flawed and Unfunded, dated April 1993.

3 Written by (1) Robert M. Clark, Director, Drinking Water Research Division, Risk Reduction Engineering Laboratory (RREL), EPA; (2) John E. Hill, Environmental Engineer, Missouri Department of Natural Resources; (3) James A. Goodrich, Environmental Scientist, RREL; (4) Judith A. Barnick, Computer Specialist, RREL; and (5) Farzaneh Abdesaken, Statistician, Technical Application, Inc.

4 The definition for a waterborne disease outbreak ("WBDO") comprises two criteria: (1) at least two persons must have experienced a similar illness after ingesting or using water intended for drinking, or after being exposed to or unintentionally ingesting or inhaling fresh or marine water used for recreational purposes; and (2) epidemiologic evidence must implicate the water as the source of the illness.

5 Section 11, Case Histories, Manual of Cross-Connection Control Sixth Edition, Published by Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California, Los Angeles, California. The early data were collected by the Department of Water and Power, City of Los Angeles, California. The more recent data were taken from records submitted to the Foundation