

**GOVERNMENT OF THE DISTRICT OF COLUMBIA
OFFICE OF THE INSPECTOR GENERAL**

**AUDIT OF
ELEVATED LEVELS OF LEAD
IN THE DISTRICT'S DRINKING WATER**



**AUSTIN A. ANDERSEN
Interim Inspector General**

GOVERNMENT OF THE DISTRICT OF COLUMBIA
Office of the Inspector General

Inspector General



January 5, 2005

Jerry N. Johnson
General Manager
D.C. Water and Sewer Authority
5000 Overlook Avenue, S.W., 3rd Floor
Washington, D.C. 20032

Dear Mr. Johnson:

Enclosed is the final audit report summarizing the results of the Office of the Inspector General's (OIG) *Audit of Elevated Levels of Lead in the District's Drinking Water (OIG No. 04-2-17LA)*.

As a result of our audit, we directed 12 recommendations to the Water and Sewer Authority (WASA) for necessary action to correct the noted deficiencies. On December 6, 2004, WASA provided a written response to the recommendations made in our draft report. In general, management concurred with the report, however, WASA officials did not concur with recommendation number 12. While WASA officials reported that the current relationship with DOH is vastly improved and reflects a more creative and flexible partnership, WASA does not believe that a MOU is warranted. Due to the history of communications between WASA and DOH officials and the fact that other reviews have identified a similar need, we ask WASA to reconsider its position on the development of a MOU between the agencies. WASA officials also provided comments on certain aspects of data presented in our report that they felt required clarification. WASA's response is included at Exhibit H.

We appreciate the cooperation and courtesies extended to our staff during the audit. If you have any questions, please feel free to call me at (202) 727-2540, or William J. DiVello, Assistant Inspector General for Audits, at (202) 727-8279.

Sincerely,

A handwritten signature in cursive script that reads "Austin A. Andersen".

Austin A. Andersen
Interim Inspector General

Enclosure

AAA/cf

The Honorable Anthony A. Williams, Mayor, District of Columbia (1 copy)
Mr. Robert C. Bobb, City Administrator, District of Columbia (1 copy)
Ms. Alfreda Davis, Chief of Staff, Office of the Mayor (1 copy)
Mr. Gregory M. McCarthy, Deputy Chief of Staff, Policy and Legislative Affairs (1 copy)
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Mr. Glen Gerstell, Chairman, WASA Board of Directors (1 Copy)
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Ms. Marianne Upton, Staff Director/Chief Counsel, Senate Subcommittee on Oversight of
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Ms. Becky Wagner, Appropriations Director, Senator Mike DeWine (1 copy)
The Honorable Mary Landrieu, Senate Subcommittee on D.C. Appropriations (1 copy)
Ms. Kate Eltrich, Clerk, Senate Subcommittee on D.C. Appropriations (1 copy)
The Honorable Susan M. Collins, Chair, Senate Committee on Governmental Affairs
Attention: Johanna Hardy (1 copy)
The Honorable Joseph Lieberman, Ranking Minority Member, Senate Committee on
Governmental Affairs, Attention: Patrick J. Hart (1 copy)

**AUDIT OF
ELEVATED LEVELS OF LEAD
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ACRONYMS

Aqueduct	Washington Aqueduct
ATSDR	Agency for Toxic Substances and Disease Registry
CDC	Center for Disease Control
C.F.R.	Code of Federal Regulations
CIP	Capital Improvement Plan
CIS	Customer Information System
DWS	(WASA's) Division of Water Services
DDOT	District's Department of Transportation
DOH	Department of Health
DPW	Department of Public Works
EMA	Emergency Management Agency
EPA	Environmental Protection Agency
IUP	Intended Use Plan
LCR	Lead and Copper Rule
NPDWA	National Primary Drinking Water Act
OIG	Office of the Inspector General
PPB	Parts Per Billion
PPL	Project Priority List
SOP	Standard Operating Procedure
SDWA	Safe Drinking Water Act
TEWG	Technical Expert Working Group
WASA	Water and Sewer Authority
WASUA	Water and Sewer Utility Administration

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EXECUTIVE DIGEST

OVERVIEW

At the request of the Mayor, the Chairman of the Council's Committee on Public Works and the Environment, and the Council member for Ward 4, the Office of the Inspector General (OIG) initiated a special review of actions taken by the Water and Sewer Authority (WASA) in response to elevated lead concentrations in the District's tap water.

Our review focused on WASA's management controls over the processes and actions required for monitoring lead in drinking water, maintaining and replacing lead service lines, and communicating public safety concerns when lead action levels are exceeded. We also examined WASA's compliance with procedures and laws for managing and reporting lead levels in drinking water.

A January 31, 2004, *Washington Post* news article initially reported that the tap water in thousands of homes in the District of Columbia had recently tested above the federal action limit for lead concentrations set by the Environmental Protection Agency (EPA). The article further stated that WASA officials were aware of problems with elevated levels of lead in the District's drinking water since at least 2002.

In order to keep the report findings and recommendations in context, we discuss WASA's actions in response to the identified levels of lead in terms of "past efforts," "current efforts," and "future efforts." "Past efforts" coincide with actions taken prior to June 30, 2002. "Current efforts" encompass the approximate period of July 2002 through June 2004, and "future efforts" refer to any actions planned for a date in July 2004 or later. In many instances, current and future efforts may be overlapping and represent continuous efforts to address levels of lead in drinking water.

CONCLUSION

WASA's current initiatives concerning elevated lead concentrations in the District's tap water are worthy of note. However, past management actions taken by WASA officials in response to levels of elevated lead contaminants show that WASA could have been better prepared to deal with the issues. Specifically, improvements can be made to better ensure the safety and health of residents and the timely and accurate reporting to regulatory and oversight officials. These improvements center on: 1) WASA's annual monitoring efforts; 2) WASA's lead service line replacement efforts; and 3) WASA's communication efforts.

On November 18, 2004, we met with WASA officials to discuss the findings and recommendations contained in our draft report. Based on that meeting, we have revised language contained in the report to more accurately depict WASA's position on the issues. The changes made did impact the finding or recommendations.

EXECUTIVE DIGEST

RESULTS IN BRIEF

This section provides a summary of the areas requiring improvements and WASA's current efforts underway to correct the deficiencies. Our recommendations follow.

INTERNAL POLICIES AND PROCEDURES RELATED TO THE LEAD AND COPPER RULE

Written internal guidelines that implement federal and local requirements of law and regulation serve to memorialize an organization's practices, thereby fostering consistent approaches and actions to ensure compliance. We found that WASA had not developed or maintained internal policies or procedures for implementing the requirements set forth in the National Primary Drinking Water Regulations or the Lead and Copper Rule (LCR). Specifically, WASA needed to document procedures on: (1) how to select, take, and report lead water sample test results; (2) who to contact, internally or externally about water sample test results; (3) what information is to be provided to EPA, DOH, District residents and other stakeholders; and (4) how the information is to be relayed.

WASA officials stated that they have developed an operating procedure that will identify the responsibilities of WASA's Water Quality Division in the event District water exceeds the lead action level. We believe that developing and documenting internal policies is a positive step for WASA toward strengthening its operations.

ANNUAL MONITORING EFFORTS

A water monitoring program to test for and report on lead concentrations must be consistent in the application of EPA criteria for: (1) selecting residences to participate in the program, and (2) maintaining accurate records that document participation in the program. We found that WASA did not have a documented program that identified its methodology to select, replace, or substitute residences participating in its annual monitoring efforts. Consequently, we could not be certain that all residences in WASA's annual monitoring efforts met EPA requirements for participation.

Beginning at the start of the next required monitoring period, (January 1, 2005), and each reporting period thereafter, WASA will submit its plan for conducting the sampling required by 40 C.F.R. § 141.86 to EPA. This plan is to include the address of each proposed sampling location and how each sampling location satisfies the criteria for inclusion in the sampling pool. This will ensure the noted deficiency is resolved.

EXECUTIVE DIGEST

REPORTING OF WATER SAMPLE TEST RESULTS

The integrity of WASA's annual monitoring efforts rests on WASA's organizational ability to consistently and accurately take and report water sample tests results, free of error or bias. Our review showed there were discrepancies between the water sample results reported to EPA and the water samples analyzed by the Washington Aqueduct for WASA's annual monitoring efforts. Specifically, we identified that WASA did not: 1) submit the results of all water sample tests, which during one monitoring period would have caused WASA to exceed the lead action level; 2) take the required number of water sample tests for one monitoring period; and 3) timely report water sample test results to EPA. We believe that WASA's lack of policies addressing who should receive test results, and to whom and when these test results should be reported, coupled with inadequate channels of communication between WASA's Water Quality Division and WASA's executive officials caused tests results to be inaccurately and untimely reported.

WASA has agreed to adhere to EPA reporting requirements. We believe that once WASA establishes and documents its annual monitoring efforts, WASA will be able to conduct the number of required tests within required monitoring periods, and timely report results to EPA.

CUSTOMER INFORMATION SYSTEM

An accurate and reliable information system is essential for managing the reporting and monitoring requirements established by federal law and local guidelines. Our review of the data contained in WASA's Customer Information System (CIS) found that information regarding the content of customer service lines was inaccurate or incomplete. WASA executives concurred that the CIS was only approximately 80 percent accurate, and emphasized that the CIS was not created or originally designed to contain information on the content of customer service lines, but rather, was initially to be used to compile billing and customer contact information. Given the importance attributed to the CIS, we tested the accuracy of the information it contains.

WASA has been working to more carefully define and fine-tune its initial inventory of properties that contain lead service lines. WASA is also undertaking some test "dig-ups" where test results suggest the presence of a lead service line, and is now developing an appropriate plan to identify and prioritize service line replacements using information in its CIS.

LEAD SERVICE LINE REPLACEMENT EFFORTS: 1987 - 2002

WASA did not have a documented Lead Service Line Replacement Program prior to exceeding the established lead action level in FY 2002. We analyzed the number of lead service lines replaced by WASA from 1987 to 1997 and found that service line replacements were incidental to new construction, road improvements, or routine maintenance. Our

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analysis showed that WASA averaged 280 service line replacements annually for that 11-year period. Between 1998 and 2002, few lead service lines were replaced. Historically, we could not identify specific annual budgets for service line replacements. While lead service line replacements were undertaken in the 1987-2002 timeframe, there was little indication that replacements were planned or separately budgeted for each year.

WASA management stated that while they did perform service line replacements, they focused their efforts on corrosion control and compliance with the LCR using water treatment processes rather than service line replacements. WASA officials stated that in hindsight, an outsider could question their methodology to follow water treatment as the main plan to ensure compliance with the LCR rather than shifting resources to line replacements. However, WASA management felt that service line replacements during the 1998 – 2002 timeframe adequately complemented WASA’s corrosion control plan and in fact, was the best course of action to comply with the LCR. Because WASA’s Board of Directors has agreed to replace all known lead service lines by 2010, WASA officials agree that they should pursue any available federal funding to offset these costs.

LEAD SERVICE LINE REPLACEMENT EFFORTS: FY 2003

In order to meet reporting and testing requirements of their FY 2003 Lead Service Line Replacement Plan, WASA chose to perform extensive testing in order to identify lines that did not exceed the lead action limit rather than concentrating efforts on prioritizing and replacing lead service lines. WASA officials stated that due to the limited time available to meet reporting and testing requirements, the number of actual lines replaced was less than expected and replacements were not always based on assigned priority levels. WASA officials stated that many replacements were made based on efficiencies to save time and money. As a result, homes with relatively low “ppb” readings (less than 100) were replaced in lieu of homes with “ppb” readings exceeding 300.

WASA officials agreed that their efforts to replace lead service lines during FY 2003 did not pay particularly close attention to data now available regarding identified high lead levels, blood screening, identification of census data, and road information. WASA officials stated that water sample test results were not available in enough time to use the information for line replacements for FY 03. WASA officials stated that the bulk of the sample test results and blood screening data were not available until 6 months into FY 2003, and it would have been virtually impossible to use the other data identified above to aid line replacements because it would take considerable time to schedule replacements, hire and mobilize contractors, and notify residents. WASA officials admitted that they were “under the gun” to meet the replacement requirements and may not have addressed the highest lead levels and the most vulnerable populations. WASA officials stated that they have refined their process for lead service line replacement efforts being conducted in FY 2004 and scheduled for 2005

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to address the highest lead levels and the most vulnerable populations in areas where replacement is most efficient.

LEAD SERVICE LINE REPLACEMENT EFFORTS: FY 2004

WASA had made strides in improving its lead service line replacement efforts in FY 2004 through better planning initiatives designed to address customer health and well-being. FY 2004 efforts focused on the results of the recent testing program that identified customers testing 100 ppb and above for lead content and assured replacement of service lines to city blocks in which a large number of residents tested high, and blocks which had not been repaved. In addition, working with DOH on recent blood level tests results, WASA is giving priority for service line replacements at known addresses of pregnant women and day-care centers. We believe these actions demonstrate that WASA is now on the right track in regard to successful implementation of its the lead service line replacements.

WASA is instituting a program in which line replacement customers will be called and urged to participate. These customers will also be given a follow-up call if their sample is not received in a timely manner. This procedure was not deemed necessary by WASA until the low percentage of returned samples was discovered. In addition, WASA officials stated that they have reported the low sampling results to the EPA and were granted an exception for this requirement until their call back program starts. In July of 2004, WASA's Board of Directors committed to replacing all known lead service lines by 2010.

COMMUNICATION AND PUBLIC EDUCATION EFFORTS

While WASA has made progress in its public awareness initiatives, WASA can further improve its communication efforts and education program for notifying the public about the condition of their drinking water, educating consumers about the potential health effects of high concentrations of lead in their drinking water, and any necessary precautionary measures that need to be taken to protect themselves from lead exposure.

Based on our analysis of newsletters sent to customers, we believe that WASA attempted to notify customers of the problems and provide them with information on what to do. We believe that newsletters were informative; however, they did not contain all required elements, nor were they clear, concise, and specifically written in a manner that would convey a sense of urgency. Collectively, information contained on flyers, pamphlets, letters, in community meetings, and posted on WASA's website did constitute a public education campaign and meet all the requirements of the regulations. However, analyzed individually, information necessary to educate the public on the potential hazards and recommended treatments once subjected to lead exposure was not as effective as intended.

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Among the numerous venues to inform and educate the public about the containment of lead reported in the District's drinking water, WASA has held community meetings at various locations throughout the city, provided pamphlets and flyers to individuals, and made them available in public spaces, testified before the city council and congressional committees, printed advertisements in various newspapers, provided public service announcements to local radio stations, and has an extensive website with information concerning the results of water samples, the effects of lead in drinking water, and steps to take to protect yourself from harmful affects of elevated levels of lead in the drinking water.

COORDINATION WITH THE DEPARTMENT OF HEALTH

WASA officials did not timely notify the Department of Health (DOH) regarding the issue of lead in the District's drinking water. Further, DOH officials stated notification was made in a manner that was interpreted as having a low priority, with little cause for alarm or action. WASA officials reported exceeding the established lead action level to EPA in August of 2002; however, it was not until October 3, 2002, when WASA first contacted DOH requesting DOH's participation in distributing media for Lead Awareness Week. According to DOH officials, WASA did not provide an open channel of communication for sharing results of water testing or other lead related issues. Prior to 2004, DOH officials stated that it was very difficult to obtain test results and other data from WASA. WASA officials disagree with DOH's characterizations of WASA's actions regarding communications with DOH.

Irrespective of where the breakdown in communication occurred, timely coordination between WASA and DOH would help in providing vital information and assistance to residents. Such information will include test results of water samples, availability of blood screening, or other pertinent data to assist residents in treating or preventing the harmful effects of lead consumption.

WASA has held several community meetings in 2004 at which DOH officials attended to address health affects. Since that time, WASA and DOH officials have worked collaboratively on addressing the issue of lead presence in the District's drinking water.

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CORRECTIVE ACTIONS

We directed 12 recommendations to WASA that we believe are necessary to correct the deficiencies noted in this report. The recommendations, in part, center on:

- Establishing definitive policies and procedures that would identify specific actions to be taken in the event that lead action levels were exceeded.
- Documenting the methodology for the selection of participants for WASA's annual monitoring efforts.
- Ensuring that information stored in the Customer Information System is accurate.
- Accurately and timely reporting all test results of lead samples to EPA.
- Providing customers/residents with data that is consistent with EPA guidance and expert recommendations.
- Working collaboratively with the Department of Health (DOH) to provide information necessary to inform residents of the effects of lead in drinking water and any necessary precautionary measures that need to be taken to protect themselves from lead exposure.

A summary of potential benefits resulting from audit is at Exhibit A.

Prior to the issuance of the report, the OIG met with WASA officials on several occasions to discuss the findings and recommendations contained in our draft report. Based on those meetings, we have revised language contained in the report to more accurately depict WASAs position on the issues. The changes made did not impact the findings and recommendations.

On December 6, 2004, WASA provided a written response to the recommendations made in our draft report. In general, management concurred with the report, however, WASA officials did not concur with recommendation number 12. While WASA officials reported that the current relationship with DOH is vastly improved and reflects a more creative and flexible partnership, WASA does not believe that a MOU is warranted. Due to the history of communications between WASA and DOH officials and the fact that other reviews have identified a similar need, we ask WASA to reconsider its position on the development of a MOU between the agencies.

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Exhibit G contains the OIG's comments to WASA's responses related to clarification on selected issues contained in the draft report. WASA's complete response to the report and the recommendations is included at Exhibit H.

INTRODUCTION

BACKGROUND

WASA provides retail water and wastewater services to its residential and commercial customers in the District, with rates for these services approved by District members of WASA's Board of Directors. Wholesale wastewater treatment is provided to portions of Montgomery and Prince George's counties in Maryland and Fairfax and Loudoun counties in Virginia, as well as to the town of Vienna, Virginia. WASA's Blue Plains Wastewater Treatment Plant, located in southwest Washington, is the largest advanced wastewater treatment facility in the world.

WASA buys its drinking water from the Washington Aqueduct (Aqueduct), a division of the Army Corps of Engineers. The Washington Aqueduct produces drinking water for approximately one million citizens living, working, or visiting in the District of Columbia, Arlington County, Virginia, and the City of Falls Church, Virginia, and its service area. Funding for WASA's operations, maintenance, and capital improvements comes from revenue generated by selling drinking water and providing wastewater services to the three jurisdictions.

WASA's daily operations are controlled by a General Manager who reports to an 11-member Board of Directors. Six of the board members represent the District and five represent participating jurisdictions in Maryland and Virginia. Exhibit B contains additional background information about WASA's organization.

CODE OF FEDERAL REGULATIONS AND REGULATORY OVERSIGHT

WASA is bound to comply with the requirements set forth in the Code of Federal Regulations (C.F.R.). Most of the applicable regulatory provisions are contained in 40 C.F.R. § 141. The EPA is the regulatory authority for monitoring compliance with these provisions and serves as the primary or State agency for WASA. A description of EPA's role, its oversight responsibilities and regulatory guidance is at Exhibit C.

OBJECTIVES, SCOPE, AND METHODOLOGY

The objectives of this audit were to determine whether:

1. management controls are in place to ensure that WASA is effective, timely, and accurate in disseminating critical information within WASA and to external stakeholders so that decision makers and others have a reasonable basis for taking actions that affect the health of those served by WASA;
2. management controls are in place to ensure that prompt and effective action was taken on previously reported lead-related concerns; and

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3. federal and District laws, regulations, and internal procedures are followed and provide for sufficient triggers, processes, testing, and reporting to ensure information is available to decision makers and other stakeholders.

To accomplish our objectives, we examined documents from 1987 to 2004, to include water sample test results, literature from experts on lead and other contaminants, and data distributed to customers, residents, and the general population and media reports. We also conducted interviews with WASA representatives, District officials, Washington Aqueduct personnel, and EPA representatives who have a role in addressing the current lead issue in the District. We coordinated our efforts with other entities to include the Governmental Accountability Office, and special Task Forces formed and contractors engaged to review and report on the lead issue in the District. We also attended public hearings to identify other concerns or issues to consider in performing our review.

We obtained copies of reports issued by other review groups to determine what deficiencies they identified or what progress had been made by WASA to address this issue. We also met with City Council members or their designees to brief them on the status of our audit. A brief description of these groups, their members, and the focus of their review is included at Exhibit E.

Lastly, we contacted District residents to obtain information on their service lines, their participation in WASA's annual water sampling program, and their thoughts on WASA's efforts to keep them informed and provide them with information concerning lead in their drinking water. We did not rely on any computerized data; however, we did obtain test results of water samples taken from District residences. These results were stored in computer databases, and we analyzed them to determine trends or other variables.

Our audit was conducted in accordance with generally accepted government auditing standards and included such tests as we considered necessary under the circumstances.

FINDINGS

<p>FINDING 1: INTERNAL POLICIES AND PROCEDURES RELATED TO THE LEAD AND COPPER RULE</p>

SYNOPSIS

Written internal guidelines that implement federal and local requirements of law and regulation serve to memorialize an organization's practices, thereby fostering consistent approaches and actions to ensure compliance. We found that WASA had not developed or maintained internal policies or procedures for implementing the requirements set forth in the National Primary Drinking Water Regulations (NPDWR) or the Lead and Copper Rule (LCR). Specifically, WASA needed to document procedures on: (1) how to select, take, and report, lead water sample test results; (2) who to contact, internally or externally, about water sample test results; (3) what information is to be provided to EPA, DOH, District residents and other stakeholders; and (4) how the information is to be relayed. WASA contends that it has followed a "common-sense approach" and has been diligent in fulfilling its responsibilities to the public and even has gone "above and beyond" what would be expected of an organization faced with this similar problem. We do not disagree that WASA is actively engaged in the District's lead-in-water problem. However, we do believe that WASA needs to strengthen its processes by documenting policies and procedures for its monitoring program, lead service replacement program, and public education program.

DISCUSSION

The following subsections provide details of our review of WASA's policies and procedures that would address the requirements contained in the LCR, 40 C.F.R. §§ 141.80 - 141.91, including the lead and copper monitoring requirements in 40 C.F.R. § 141.86 and the reporting requirements in 40 C.F.R. § 141.90(a).

Internal Policies and Procedures

WASA officials stated that they did not have any documented internal policies or procedures that would address the actions it would take to comply with the LCR, or processes it would follow when District water exceeded the lead action level. WASA officials contend that they follow a "common-sense approach," and stated that they have been diligent in fulfilling WASA's responsibilities to the public and even has gone "above and beyond" what would be expected of an organization faced with this similar problem. We do not disagree that WASA is actively engaged, as they continue to learn, share information, and work to communicate in an environment that has been especially challenging. We do believe, however, that WASA can make improvements to its monitoring program, be more aggressive in its lead service

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replacement program, and provide information in a timely manner to all stakeholders. Policy development and implementation would provide the groundwork or foundation for such improvements.

Needed Guidance

Documented procedures are not only important to ensure adherence to laws or other regulations, but also to identify responsibilities and memorialize them in the event of a change in management and operating personnel. Identifying roles and responsibilities before action is required often proves more valuable because the organization can respond according to a plan during a crisis, especially when time is of the essence. Without documented procedures describing the course of action to follow, WASA cannot be assured that the public was adequately informed of health and safety issues that may adversely affect them. Given WASA's mission of providing safe drinking water, the agency depends on public confidence in its processes. To that end, we have identified three areas (described in detail in Findings 2 – 9) where WASA can improve management controls and accountability through development and documentation of internal policy and procedures.

Annual Monitoring Efforts

WASA can strengthen its operations by developing and documenting internal policies that ensure homes included in its annual monitoring efforts meet EPA requirements, as well as the procedures for substitutions or replacements including the circumstances under which substitutions or replacements are made. Additionally, WASA should have procedures that identify: (1) the required number of water sample tests for one monitoring period; (2) the officials/managers responsible for submitting the results of water sample tests, which during one monitoring period would have caused WASA to exceed the lead action level; (3) the officials/agencies to whom WASA must submit the results of water tests; and (4) the timeframe for submitting the results of water sample tests to EPA and other responsible officials and agencies.

Lead Service Line Replacement Efforts

WASA can strengthen its operations by developing and documenting internal policies on the procedures for identifying and prioritizing replacements of lead service lines in residences throughout the District.

Public Education and Communication Efforts

WASA can strengthen its operations by developing and documenting internal policies that identify the officials/managers responsible for timely notifying the public, customers, and residents of any exceeded action level by using direct mail, public advertisements, news and

FINDINGS

media. The internal policies should identify the timeframe for notifying the public, customers, and residences of any exceeded action level and the procedures to ensure that information provided to the public, customers, and residents meets all 10 recommended items on the effects of lead exposure (see Finding 8). Lastly, information should identify how to protect oneself against lead exposure.

Current and Future Efforts:

At an exit conference, WASA officials stated that they are developing a standard operating procedure (SOP) that will identify the responsibilities of WASA's Water Quality Division in the event District water exceeds the lead action level. Upon the completion of our fieldwork, WASA does not have plans to update employee performance goals/plans to include compliance with this SOP. Additionally, there are no SOPs or other policies under development which would outline responsibilities of personnel within WASA's Public Affairs Office, Customer Service Division, or WASA's executive staff related to ensuring compliance with the NPDWA or the LCR. However, WASA officials stated that while employee performance goals do not specifically identify assignments or reporting requirements, employee performance plans do require employees to perform their job duties in a satisfactory manner, which would imply adherence to the NPDWA and LCR.

FINDINGS

FINDING 2: ANNUAL MONITORING EFFORTS

SYNOPSIS

A water monitoring program to test for and report on lead concentrations must be consistent in the application of EPA criteria for: (1) selecting residences to participate in the program, and (2) containing accurate records that document participation in the program. We found that WASA did not have a documented program that identified its methodology to select, replace, or substitute residences participating in its annual monitoring efforts. WASA provided OIG auditors various participant lists and interpretations as to how WASA selected participants. Consequently, we could not conclude that all residences in WASA's annual monitoring efforts met EPA requirements for participation.

DISCUSSION

Monitoring Sites. In accordance with 40 C.F.R. § 141.86(c), the required number of monitoring sites depends on whether the water utility system is under standard monitoring or reduced monitoring. For standard monitoring, EPA requires large water utility systems to collect samples from 100 sites during two consecutive 6-month periods during the year. Water utility systems only have to collect samples from 50 sites during a 1-year period for reduced monitoring.

WASA was under standard monitoring from January 1992 through June 1999. Beginning in July 1999, WASA was under reduced monitoring and remained on reduced monitoring until it had reported exceeding the lead action limit in July of 2002, at which time WASA returned to standard monitoring requirements.

Collection and Reporting Process. We were informed by WASA representatives, that in the fall 1991, WUSA, now WASA,¹ solicited individuals to collect tap water samples as part of its annual monitoring efforts. In January 1992, participants began collecting tap water samples in two consecutive six-month periods, as required under standard monitoring criteria. The participants would collect a sample during the January through June period, and another sample during July through December period. In 1993 and 1994, WASA continued to monitor the lead level in two consecutive six-month periods. The sampling conducted in

¹ Prior to 1996, WASA was called the Water and Sewer Utility Administration (WSUA). WSUA was under the Department of Public Works. In 1996, WASA was formed as an independent agency of the District government. For purposes of this report, irrespective of time frames, the term WASA will be used.

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1992, 1993, and 1994 is considered the initial sampling period. Section 141.86(c) of Title 40 of the C.F.R. requires water utility systems to collect at least one tap water sample.

The EPA did not require WASA to have participants collect samples in 1995 and 1996 because the District had to install corrosion control during this period. In 1997, monitoring efforts resumed and WASA began requiring the participants to collect two tap water samples to be submitted for testing.

Selection of Participants for Monitoring Efforts. WASA officials provided several spreadsheets that identified participants in WASA’s annual monitoring efforts over the past several years. They also provided several explanations as to why the lists varied from year to year in content and size. We were informed that over the years, participants would request to be added to or excluded from WASA’s annual monitoring efforts. Additionally, the number of sites required to be tested also changed, and therefore WASA made replacements and substitutions of participants. WASA officials explained that volunteers were originally solicited by placing an advertisement in the local newspaper and in some instances, customers would call WASA with questions regarding their water quality and ask to be included as part of WASA’s annual monitoring efforts.

We noted the following deficiencies in WASA’s process for selecting participants for its annual monitoring efforts:

- 1) WASA maintained lists of participants; however, WASA did not document its methodology of selecting participant homes as part of their annual monitoring efforts or the criteria for substitutions or replacements;
- 2) WASA did not verify that participant homes met EPA requirements; i.e., that the homes contained copper pipes with lead solder installed before 1982, or contained lead pipes, and/or are served by a lead service line; and
- 3) WASA’s annual monitoring efforts appeared to focus on homes that were concentrated in select quadrants of the city, to the possible under-representation of other District areas.

Criteria. According to 40 C.F.R. § 141.86(a)(3), “the sampling sites selected for a community water system’s sampling pool (“tier 1 sampling sites”) shall consist of single family structures that: (i) Contain copper pipes with lead solder installed before 1982 or contain lead pipes; and/or (ii) Are served by a lead service line.”

In addition, 40 C.F.R. § 141.90(a)(i)(v) states, “[w]ith the exception of initial tap sampling conducted pursuant to §141.86(d)(1), the [water] system shall designate any site which was

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not sampled during previous monitoring periods, and include an explanation of why sampling sites have changed....”

Selection Methodology. We were informed by WASA representatives, that in the fall 1991, WASA placed an advertisement in a newspaper to solicit volunteers to participate in its annual monitoring efforts. WASA also solicited its employees to be a part of their annual monitoring efforts. Potential participants were asked if they had lead pipes, and if they responded affirmatively they were included as part of WASA’s monitoring efforts. If the content of their pipes was unknown, WASA staff instructed them on how to determine if they had lead pipes. WASA only visited a few homes to determine if the homes actually had lead pipes.

Over the course of the 15 monitoring periods reviewed, several hundred homes were identified as participants in WASA’s annual monitoring efforts. Our review found that WASA had identified the content of participant service lines for only one monitoring period, (January through June of 2003), For this particular monitoring period, there were 147 participants. WASA had noted on the participant list that only 54 of these participants had lead service lines. The other lines were identified as copper or unknown. Because WASA did not independently verify that all of the homes included in their annual monitoring efforts met the EPA sampling criteria, WASA did not meet the criteria of 40 C.F.R. § 141.86(a)(3).

In April 2004, we sent a questionnaire to the 163 individuals that participated in the program from July 2001 through December 2003. Ninety-six individuals responded to the questionnaire, and 27 of the 96 reported that WASA requested them to be included in their monitoring efforts. (The results of the OIG questionnaire are discussed in the “Other Matters of Interest.” See page 49 of this report.)

Change in Sampling Sites. There has been a significant change in sampling sites since WASA’s monitoring efforts began in 1992. For example, our audit showed there were 104 individuals who agreed to take water samples during the January 2003 through June 2003 monitoring period. Only 14 of these individuals submitted water samples during monitoring periods in 1994, and only 15 individuals submitted water samples during the January 1999 through June 1999 monitoring period.

When WASA submitted the tap water sample results to EPA, WASA did not indicate which sample sites had not been sampled during previous monitoring periods, as required by EPA. In addition, WASA did not explain why the sampling sites had changed, although our audit showed there has been a significant change in sampling sites. By not providing a description of the criteria under which each sampling site was selected for the sampling pool, WASA also did not comply with 40 C.F.R. § 141.90(a)(1)(i) for the monitoring periods we reviewed.

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During the monitoring periods July - December 1998, January - June 1999, July 1999 - June 2000, July 2000 - June 2001, July 2001 - June 2002, January - June 2003, and July - December 2003, samples reported by WASA were collected from sites that were not sampled during the preceding monitoring period. In reports submitted pursuant to 40 C.F.R. § 141.90(a)(1) for these monitoring periods, WASA did not identify the locations that were not sampled during the preceding monitoring period and did not provide an explanation of why different sampling locations were used.

Verification of Service Line Content. While WASA recorded the content of the service lines for many of the homes used in its annual monitoring efforts, volunteer lists showed several entries were blank or marked “unknown.” WASA’s Water Quality Division personnel informed us that they had not performed independent verifications of the service line content. Other WASA employees stated that the information contained on the participant lists was based on discussions with the homeowners and reflected what the homeowner knew about the metal content of their water lines or their presumptions about the metal content of their water line.

We were also informed that information related to the content of service lines was contained in the Weston Report, on Tap file records,² or documented when physical replacements were made. We were told that service line content information was maintained in WASA’s Customer Information System (CIS). In order to determine whether homes included as part of WASA’s annual monitoring efforts met EPA requirements, we conducted limited tests of WASA’s CIS. In summary, we found that service line information was either inaccurate or unavailable. Details of the results of our tests are reported in Finding 4 of this report. As a result, we could not be assured that all the homes included in WASA’s annual monitoring efforts met the requirements contained in 40 C.F.R. § 141.86(a)(3).

Representation of District Properties. It is important to note that regulations do not require WASA to specifically select or include homes for its annual monitoring efforts based on physical location. However, in 1982, the LCR was updated to specify criteria for selection of homes for inclusion in a water utility’s annual monitoring efforts. WASA officials stated that the Weston report shows the last recorded lead line installed in the District, based on tap records, was 1977. The Weston report also has a plot, again based on tap records, that shows that very few lead service lines were installed after 1946. Most were installed in 1910, then between 1919 and 1935, and again from 1942 through 1946. In short, WASA officials believe that lead service lines were rarely used after 1946.

² Tap file (also known as the Master file), contains information on the size of the property’s water main, street location of that main, the tap date, as well as the location and sizes of stopcocks and curb cocks. The Tap file also contains information about the location and age of the property, repairs made to the water service line or to adjoining service lines, and the type of material used in or found in the service line (lead, copper, etc.).

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While regulations require homes constructed prior to 1982 to have an equal chance of being included as part of WASA’s annual monitoring efforts. Because tests generally included homes in a central area or specific quadrant of the city, test results may not be representative of all homes in the District. The table below lists the sampling sites by quadrant and the percentage of homes in the sample relative to the homes in each quadrant.

Sampling Sites By Quadrants¹

	Southeast	Southwest	Northeast	Northwest
January 1992 - June 1992	11	2	28	65
July 1992 - December 1992	18	2	32	69
January 1993 - June 1993	17	1	37	67
July 1993 - December 1993	17	0	35	76
January 1994 - June 1994	14	1	32	73
July 1994 - December 1994	14	1	32	66
January 1997 - June 1997	20	5	29	57
July 1997 - December 1997	20	5	26	63
July 1998 - December 1998	18	5	25	53
January 1999 - June 1999	3	0	15	85
July 1999 - June 2000	3	0	10	42
July 2000 - June 2001	4	0	9	31
July 2001 - June 2002	7	0	9	37
January 2003 - June 2003	11	0	9	84
July 2003 - December 2003	13	0	14	69
Total	190	22	342	937
Percentage of homes included in annual monitoring efforts to total:	13%	1%	23%	63%
Percentage of homes by quadrant based on census data²:	19%	1%	30%	50%
<p>Note 1: WASA officials provided several spreadsheets showing the sampling sites, and we counted the number of sampling sites located in each quadrant.</p> <p>Note 2: An Office of Tax and Revenue official provided the number of residential homes (excluding apartments and condominiums) located in each quadrant. We did not verify the data.</p>				

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The preceding data show that WASA's annual monitoring efforts were not proportionate to the number of single-family homes in each of the District's four quadrants. WASA officials reiterated that they believed homes built prior to the 1950's posed the greatest risk. WASA officials added that they had data that showed that the majority of the homes located in the Northwest quadrant were built prior to the 1950's and that was why most of their testing was conducted in that quadrant. As stated earlier, WASA had no data readily available to show that they had met the requirements for home selection. Therefore, WASA needs to establish and document a protocol for selecting the homes for inclusion in its annual monitoring efforts that adheres to CFR requirements. Further, when soliciting participation, WASA needs to control the sample to ensure representative coverage and balanced participation by all District quadrants.

Current Efforts:

Improvements to the documentation of, and compliance with, EPA requirements on the criteria for inclusion and reporting requirements have been minimal but improved over the past year. WASA is continuing to revise and update its participant list and submit documentation to EPA to obtain approval for inclusion of homes in conjunction with its annual monitoring efforts. As a result of the Administrative Order for Compliance on Consent issued by EPA, WASA has agreed to ensure compliance with 40 C.F.R. § 141.90(a) as to obtaining approvals and submitting all required documents for any substitutions or replacements beginning with the current reporting period.

Future Efforts:

WASA has agreed to comply with the terms and conditions identified in EPA's Administrative Order for Compliance on Consent. This order requires WASA, no later than July 1, 2004, and on the first day of each monitoring period until such time as the 90th percentile lead level in WASA's distribution system is below the LCR action level for two consecutive six-month monitoring periods, to submit to EPA its plan for conducting the sampling required by 40 C.F.R. § 141.86. This plan is to include the address of each proposed sampling location and how each sampling location satisfies the criteria for inclusion in the sampling pool. Additionally, WASA is to identify any sampling location utilized during the preceding monitoring period to which WASA does not plan to return, explain why WASA is not returning to that sampling location, and identify any sampling location that was not sampled during the preceding monitoring period.

WASA plans to have a documented, verified list of participants that will serve as its monitoring participants for the reporting period, beginning July 1, 2004.

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FINDING 3: REPORTING OF WATER SAMPLE TEST RESULTS

SYNOPSIS

The integrity of WASA's annual monitoring efforts rests on WASA's organizational ability to consistently and accurately take and report water sample tests results free of error or bias. Our review showed there were discrepancies between the water sample results reported to EPA and the water samples analyzed by the Washington Aqueduct for WASA's annual monitoring efforts. Specifically, we identified that WASA did not: 1) submit the results of all water sample tests, which during one monitoring period would have caused WASA to exceed the lead action level; 2) take the required number of water sample tests for one monitoring period; and 3) timely report water sample test results to EPA. We believe that WASA's lack of policies addressing who should receive test results, and to whom and when these test results should be reported, coupled with inadequate channels of communication between WASA's Water Quality Division and WASA's executive officials caused test results to be inaccurately and untimely reported. As a result, WASA did not comply with many of the requirements of the LCR. The delayed reporting of noncompliance with the LCR allowed the residents to drink tap water that exceeded the LCR action limit for at least one year longer than they would have without being provided information on the potential hazards of, and recommended treatments for, lead exposure. (See Exhibit D for a discussion of the Potential Causes and Effects of Lead Exposure.) WASA officials stated that there are many opinions of the effects of lead exposure and that no conclusive evidence is available to prove a negative health impact. In response to the unreported samples, WASA officials claimed that these test results could have been related to samples drawn for other reporting requirements outside WASA's annual monitoring efforts, or that the unreported samples were somehow invalidated.

DISCUSSION

Under-Reporting of Water Test Results. For the July 2000 through June 2001 monitoring period, our review showed that the Washington Aqueduct analyzed tap water samples for 64 sites and that 10 first draw samples exceeded the EPA action level. Comparatively, WASA reported to EPA that it tested 50 sites and identified 4 first draw samples that exceeded the EPA lead action level. The table on the next page provides the details on the samples reported to the EPA and the samples analyzed by the Washington Aqueduct.

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Criteria. Pursuant to 40 C.F.R. § 141.86(e), the results of all samples conducted in accordance with established collection procedures during the monitoring period, including any samples taken in addition to the minimum number and frequency of samples required by the LCR, shall be included in making any determinations, including calculation of the 90th percentile lead level.

Title 40 C.F.R. § 141.80(c)(3) provides the method by which water systems must calculate the 90th percentile:

- (i) The results of all lead or copper samples taken during a monitoring period shall be placed in ascending order from the sample with the lowest concentration to the sample with the highest concentration. Each sampling result shall be assigned a number, ascending by single integers beginning with the number 1 for the sample with the lowest contaminant level. The number assigned to the sample with the highest contaminant level shall be equal to the total number of samples taken.
- (ii) The number of samples taken during the monitoring period is then multiplied by 0.9.
- (iii) The contaminant concentration in the numbered sample yielded by the calculation . . . is the 90th percentile contaminant level.

In order not to exceed the lead action limit, that sample would have to be 15 ppb or below. To ensure an accurate determination of the 90th percentile lead level, the LCR provides a mechanism whereby flawed samples can be “invalidated,” meaning that they do not count toward determining the 90th percentile or toward meeting other requirements of the LCR. According to 40 C.F.R. §§141.86(f)(2) and (3), any decision by a water utility system to invalidate a sample must be made in writing to the State, describing both the decision and the underlying rationale. Because WASA did not report to the EPA the results of all water samples, or provide or maintain documentation to support that unsubmitted samples met the criteria for invalidation, WASA failed to comply with 40 C.F.R. § 141.86(f).

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Samples Collected for the July 2000 - June 2001 Monitoring Period

Month/Year ³	Reported to EPA		Identified by OIG	
	Sites	1 st Draw Failures	Sites	1 st Draw Failures
August 2000	15	1	16	1
September 2000	20	0	25	1
October 2000	5	1	5	1
December 2000	0	0	1	0
January 2001	0	0	2	0
June 2001	10	2	15	7
Total	50	4	64	10

Unreported Water Sample Test Results

Count	Sample No.	PPB Lead Level
1	0106122-001	44
2	0106122-007	35
3	0106140-001	36
4	0106140-005	72
5	0106140-007	31
6	00090924	113

If WASA had included the 6 unreported samples identified above in its calculation for the 90th percentile lead level for the monitoring period July 2000 - June 2001, WASA would have exceeded the LCR's lead action level of 15 ppb at the 90th percentile for the July 2000 - June 2001 monitoring period.

Sample Results Not Reported to the EPA. Based on the identification of unreported samples, which would have caused WASA to exceed the lead action limit in the July 2000 – June 2001 monitoring period, we expanded the analysis of water sample test records for the other 14 monitoring periods spanning between January 1992 and December 2003 to determine the water sample test results WASA reported.

We found that for the 15 monitoring periods reviewed, in total, WASA did not report the test results to EPA for 53 test sites, which identified 39 instances (failures) where water sample test results exceeded 15 ppb. Even though we identified unreported test results, the reporting of these results would not have caused WASA to exceed the lead action level in any

³ The months identified represent months in which water sample tests were conducted. Tests are not required to be conducted every month. Tests were not conducted in July 2000, November 2002, and February-May 2001.

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reporting period other than the period previously identified. The table on the next page identifies water sample test results for the monitoring periods reviewed, with a comparison of the data reported by WASA to EPA and the data OIG auditors obtained from the Aqueduct.

Analysis of Water Sample Test Results

Month/Year	Reported by WASA to EPA ¹			Results of Tests Conducted by Washington Aqueduct ²			REPORTED TO EPA Underreported or (Overstated)		
	No. of Sites Tested	Draw Failures ³		Sites	Draw Failures		No. of Sites Tested	Draw Failures	
		1 st	2 nd		1 st	2 nd		1 st	2 nd
1/1992 -6/1992	125	16	- ⁴	131	14	-	6	(2)	-
7/1992 – 12/1992	125	30	-	125	30	-	0	0	-
U/I ⁵ 1992	0	0	-	5	1	-	5	1	-
1/1993 – 6/1993	122	6	-	121	6	-	(1)	0	-
7/1993 – 12/1993	132	29	-	128	29	-	(4)	0	-
U/I 1993	0	0	-	5	0	-	5	0	-
1/1994 – 6/1994	114	9	-	121	9	-	7	0	-
7/1994 – 12/1994	116	9	-	115	9	-	(1)	0	-
U/I 1994	0	0	-	1	0	-	1	0	-
1/1997 – 6/1997	112	6	5	113	6	5	1	0	0
7/1997 – 12/1997	115	6	4	113	6	4	(2)	0	0
7/1998 – 12/1998	108	4	3	108	4	3	0	0	0
1/1999 – 6/1999	106	5	4	105	5	3	(1)	0	(1)
7/1999 – 6/2000	55	4	7	55	4	7	0	0	0
7/2000 – 6/2001	50	4	3	64	10	9	14	6	6
7/2001 – 6/2002	53	26	24	76	39	38	23	13	14
1/2003 – 6/2003	104	30	18	104	31	19	0	1	1
7/2003 – 12/2003	108	35	31	108	35	31	0	0	0
Totals	1,545	219	99	1,598	238	119	53	19	20

Note 1: Data provided by EPA.
 Note 2: Data provided by the Washington Aqueduct
 Note 3: A water sample test is deemed a failure when the test results show a lead content in the water sample to exceed 15 ppb.
 Note 4: A “ - ” (dash) indicates that a water sample was not drawn.
 Note 5: U/I indicates the date was unidentified. These samples were taken during one of the two monitoring periods in 1992, 1993, and 1994, but we could not identify the exact monitoring period.

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WASA officials stated that unreported samples could have been related to samples drawn for other reporting requirements outside of WASA's annual monitoring efforts, or that the unreported samples were somehow invalidated. However, WASA did not document or report to EPA why these test results identified were not reported as required by regulation. Therefore, we concluded that it was the result of inadequate policies or a breakdown in the responsibility chain to ensure that all samples are properly documented and reported.

Taking Samples within the Monitoring Period. For the period January – June 1999, WASA reported taking 106 water test samples. Our analysis of the 106 samples showed that 11 of the samples were taken on July 1 and July 2, 1999, after the close of the monitoring period of June 30, 1999. Consequently, for the January – June 1999 period, WASA actually only obtained 95 samples; 5 less than the 100 samples required by EPA for the monitoring period.

Additionally, for the monitoring period July 2000 through June 2001, WASA reported taking 50 samples. However, of those 50 samples, 2 were samples taken from a previously sampled location. Sample ID Nos. 00081276 and 00100185 were taken at the same address on August 29, 2000, and September 30, 2000, respectively; and Sample ID Nos. 00090037 and 00100191 were taken at the same address on September 1, 2000, and September 30, 2000, respectively. Thus, WASA obtained samples from only 48 unique sampling locations.

Timely Reporting to EPA. For the monitoring period July 2001 – June 2002, WASA did not timely notify EPA that it had exceeded the EPA established action level for lead concentrations. EPA regulations require that the supplier of water must report to the State within 48 hours the failure to comply with any national primary drinking water regulation. *See* C.F.R. § 141.30.

WASA notified EPA on August 26, 2002, that it had exceeded the LCR action level for lead. WASA reported that of the 53 sites analyzed, the calculated 90th percentile for the first and second draws of lead concentrations were above the established action level of .015 mg/L. Our review showed that WASA had the results of monitoring samples in July of 2002, more than half of which were obtained in 2001, and did not report these results to EPA until August 26, 2002. While WASA is not required to report monitoring results until 10 days after the end of the monitoring period (July 10, 2002), WASA exceeded the required time to report the violation to EPA by more than 30 days.

We expanded our review to determine how timely WASA has been in submitting test results to the EPA since the establishment of the program in 1992.

A review of the data transmitted to the EPA for 15 reporting cycles showed that WASA submitted reports to EPA before the required due dates in 3 instances and submitted reports late in 4 instances. For the remaining eight reports submitted between 1992 and 2003, we could not determine if WASA timely reported the sample results either because WASA did

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not provide a dated letter to the EPA summarizing the sample results or EPA did not date-stamp the receipt of the report from WASA.

Criteria. As stated above, pursuant to 40 C.F.R. § 141.90(a)(1), WASA was required to report the results of all tap water samples within the first 10 days following the end each applicable monitoring period.

Based on statements from WASA officials, we were told that WASA informally notified EPA of its monitoring results on several occasions throughout and shortly after the conclusion of the monitoring periods. Based on documents provided by EPA, we determined that WASA's final reports for three monitoring periods after their exceedance of the action level were several weeks late. Specifically, for the monitoring period ending June 30, 2002, WASA submitted its formal report to EPA on tap water monitoring for lead and copper on August 26, 2002 -- approximately 6 weeks late, our audit found that for the monitoring period ending June 30, 2003, WASA submitted its formal report to EPA on tap water monitoring for lead and copper on July 30, 2003 -- approximately 3 weeks late. For the monitoring period ending December 31, 2003, WASA submitted its formal report to EPA on tap water monitoring for lead and copper on January 26, 2004 -- approximately 2 weeks late. Accordingly, WASA did not comply with 40 C.F.R. § 141.90(a)(1) because WASA did not submit its formal report to EPA on tap water monitoring for lead and copper within the first 10 days following the end of the aforementioned monitoring periods.

Current and Future Efforts:

WASA has agreed to adhere to EPA reporting requirements. We believe that once WASA establishes and documents its annual monitoring efforts, WASA will be able to conduct the number of required tests within required monitoring periods, and timely report results to EPA.

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FINDING 4: CUSTOMER INFORMATION SYSTEM

SYNOPSIS

An accurate and reliable information system is essential for managing the reporting and monitoring requirements established by federal law and local guidelines. Our review of the data contained in WASA's Customer Information System (CIS) found that information regarding the content of customer service lines was inaccurate or incomplete. During the course of our audit, we were informed by WASA management and engineers that data contained in the CIS, (which was compiled from Tap Files and data in the Weston Report) and water sample test results, were used to make line replacement prioritizations. At an exit conference, WASA's General Manager stated that the CIS was not created or originally designed to contain information on the content of customer service lines, but rather, was initially to be used to compile billing and customer contact information. Due to the inaccuracies we identified in the CIS, we believe that the current CIS data related to the content of the service lines are not reliable. Further, it is questionable if it is an accurate accounting of the total number of known lead service lines in the District, which is the basis for the calculation of the 7 percent EPA replacement requirement.

DISCUSSION

The starting point for the inventory of service lines in the District was the "Lead in Water Study," conducted in 1990 (commonly known as the Weston Report). This pre-initial inventory documented 126,069 total service lines, of which 28,161 were identified as lead service lines. WASA implemented a database initially for customer billing purposes using information from the Weston Report and data obtained from engineering records and Tap files.

Customer Information System (CIS). The CIS is an automated system that contains information pertaining to each water customer. Created in June of 2001, it assigns each customer an account number and identifies the current resident/customer by name and address. The CIS identifies the size of the water main, street location of that main, the tap date, as well as the location and sizes of stopcocks and curb cocks. CIS contains information about the location and age of the property, repairs made to the water service line or to adjoining service lines, and the type of material used in or found in the service line (lead, copper, etc.). WASA's General Manager described the CIS as a robust system with significant record retention and reporting capabilities. WASA executives added that updates to the CIS are continuously made based on information from service line work order documentation, permits and inspections for additions/work done to a property, and/or other permits as may be required such as a permit to raze a building. We were also informed that

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in 2003 and 2004, WASA greatly expanded and updated the CIS, using Tap file records and data contained in the Weston Report. WASA officials also informed us that the CIS would be the main source of information for lead service line identification and used to prioritize and replace all lead services over the coming years, even though WASA management estimated that the information in the CIS was 80 percent accurate. Given the importance attributed to the CIS, we tested the database to determine the accuracy of the information it contains.

Tap File Information. Tap file (also known as the Master file), contains some of the same information as the CIS. However, in some cases, it is the only source of water line information available for many homes and neighborhoods in the WASA system. The Tap file consists of an unknown number (some estimate the number to be over 100,000) of five by eight inch cards which contain handwritten information similar to that previously described as being in the CIS. Some of these cards date back to the 1800s and are certified by water department employees, District inspectors, or private plumbers to contain accurate information. The Tap file is a valuable source of historical and presumably factual information about the District's water lines. This old Tap file information can be expanded only by incurring the expense to uncover the water lines for examination.

We found that the Tap file was kept in a warehouse style environment and, for the most part, stored in a large rotating cabinet. WASA hired temporary employees to transfer information from Tap files to the CIS. Because the data transfer took place at a different location, the Tap file cards were moved in batches to that location and input into the CIS. We noted that many boxes containing (by our estimate) several thousand of the five by eight inch Tap file cards were stored around the Tap file location. A WASA clerk who maintains the cards in question stated that they had never been filed in the rotating cabinet and, therefore, had not been inputted into the CIS. In discussing this matter with WASA officials, we were told that they were confident that all customers receiving WASA services are included in the CIS.

Verification of CIS Data. To verify that the Tap file contained addresses of all WASA customers and that information from each Tap file card was transferred accurately to the CIS, we sampled the file. We selected 60 addresses that were included in WASA's monitoring efforts during one or more monitoring periods between January 1992 and December 2003 and requested that the Tap file card for each be pulled for verification. WASA officials were only able to locate the Tap file cards for 42 properties (70 percent). When we compared information from the Tap cards of the 42 properties to the information reported in WASA's CIS, 18 properties (43 percent) had conflicting information reported. For example, the Tap file card might reflect that a service line was lead while the CIS said that it was copper. In another example, the Tap card file was silent as to service line material while the CIS stated it was lead.

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We invited WASA officials to review the 18 differences and help us determine exactly how such discrepancies could have occurred. After that review, the officials were not able to determine the cause for the 18 discrepancies, nor could they find the missing 18 customers from our original request for 60 Tap file cards.

Based on the results of our tests, we concluded that the CIS is not complete and may contain inaccurate information due to the high number of discrepancies we identified when we attempted to trace data from the Tap file into the system. WASA officials admitted that data in the CIS were incomplete but would not concede that the information was inaccurate. When asked why our tests of CIS data had shown discrepancies between Tap file records and entries in the CIS, WASA officials suggested that the identified differences were the result of updated information based on service line replacements or physical verifications as to the content of service lines, either of which would have been made directly into the CIS without an audit trail being maintained to verify that the current information in the system is accurate. Based on the results of our tests identified above, we discussed this matter with WASA staff who confirmed that the data were not verified when inputted into the CIS.

Tap File Expertise. We were able to identify only one employee who has the knowledge to properly use the Tap file system. We noted that specific addresses are almost impossible to locate unless the one person who actually set up the system is present. In fact, we had two other employees who worked with the Tap file try, without success, to find known addresses in the system. WASA officials stated that because all the data is now maintained in the CIS, which is considered the primary record, the information contained in the Tap File system is no longer necessary to preserve; therefore, it would not be necessary to train other personnel on how to use the system.

Current and Future Efforts:

WASA continues to update and refine its inventory records. We were informed that WASA has contacted the residents who live in properties for which the CIS has no record of service line pipe material. In this regard, WASA has been working to more carefully define and fine-tune its initial inventory of properties that contain lead service lines. WASA is also undertaking some test “dig-ups” where test results suggest the presence of a lead service line, and is now developing an appropriate plan to provide filters to additional properties that are likely to contain lead service lines. This information is primarily used for compliance with lead service line replacement requirements.

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**FINDING 5: LEAD SERVICE LINE REPLACEMENT EFFORTS:
1988 - 2002**

SYNOPSIS

WASA did not have a documented Lead Service Line Replacement Program prior to exceeding the established lead action level in FY 2002. We analyzed the number of lead service lines replaced by WASA from 1988 to 1997 and found that service line replacements were incidental to new construction, road improvements, or routine maintenance. Our analysis showed that WASA averaged 268 service line replacements annually for that 11-year period. Between 1998 and 2002, few lead service lines were replaced as WASA cited funding difficulties. Historically, we could not identify specific annual budgets for service line replacements. While lead service line replacements were undertaken in the 1988-2002 timeframe, there was little indication that replacements were planned or separately budgeted for each year.

WASA management stated that while they did perform service line replacements, they focused their efforts on corrosion control and compliance with the LCR using water treatment processes rather than service line replacements. WASA officials stated that in hindsight, an outsider could question their methodology to follow water treatment as the main plan to ensure compliance with the LCR rather than shifting resources to line replacements. However, WASA management felt that service line replacements during the 1988 – 2002 timeframe adequately complemented WASA’s corrosion control plan and in fact, was the best course of action to comply with the LCR. Because WASA’s Board of Directors has now agreed to replace all known lead service lines by 2010, WASA officials agree that they should pursue any available federal funding to offset these costs.

DISCUSSION

Service Line Replacement Program. WASA officials informed us that during the 1990’s WASA has followed an optimal corrosion control plan that focused on water treatment practices to ensure compliance with the LCR. However, WASA has also included as part of its long range capital improvement plan, replacements of lead service lines. We asked WASA to identify the budgeted funds specifically set aside for lead service line replacements in past years. WASA explained that separate and specific line items were not established in WASA’s budget for lead line replacements and that such replacements were performed in connection with other projects, such as new construction, revitalization, road paving, and other Department of Public Works (DPW) projects. WASA stated that the costs for the lead line replacement program were consolidated into the total cost for each of these projects and displayed only as a grand total for that project in the WASA capital budget and/or other capital improvement budgets.

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Budgeting for Service Line Replacements. The significant investment and planning involved in exercising a service line replacement plan requires that WASA establish specific budget lines in its capital improvement or repair/maintenance budgets. Additionally, the budgeting and planning must be coordinated with other District agencies, such as DPW and the District’s Department of Transportation (DDOT), who are also engaged in replacing water service lines, and DOH, which has information regarding lead screening test results that may be useful in determining prioritizations of water line replacements. Coordinated budget and planning would clearly demonstrate WASA’s commitment for replacing lead service lines. Additionally, management can only gauge the accomplishments of a project if its goals, plans, and costs are clearly defined. In this regard, costs should be identified and approved prior to the start of the project, the work to be completed needs to be identified on each project, and the project needs to be monitored and reported on. Without this information, an organization cannot assess whether goals were achieved or measure performance. We also believe that a plan to address the elevated levels of lead identified in the District’s drinking water should employ a system for prioritizing lead service line replacements based on results from the testing for lead in drinking water. Without a budget or documented plan, neither WASA management nor outside reviewers such as the EPA or independent auditors can accurately assess the progress made in replacing lead service lines.

Lead Service Line Replacements – 1988 to 1997. Between 1988 and 1997, WASA averaged a yearly replacement of about 268 lead lines. As the schedule below shows, the number of yearly replacements varied from a low of 148 in 1997 to a high of 375 in 1989. The number of replacements varied from year to year because WASA did not specifically identify service lines for replacement, rather, it replaced lines that were identified during the performance of other projects, i.e., new construction, road improvements, or routine maintenance, being performed by WASA or other agencies such as DPW.

**Schedule of Lead Lines Replaced Between
1988 and 1997**

Year	Lead lines replaced
1988	290
1989	375
1990	354
1991	353
1992	252
1993	220
1994	229
1995	242
1996	217
1997	148

FINDINGS

Lead Service Line Replacements – 1998 to 2002. According to WASA officials, between 1998 and 2002 funding difficulties curtailed or drastically reduced lead service line replacement activity. Officials stated that while some lines were replaced during those years, the exact number of replacements was not readily available.

Availability of Federal Funds. We were provided documents by EPA officials, which stated that in June 2002, EPA solicited participation from WASA on a draft Project Priority List (PPL) and draft Intended Use Plan (IUP) for drinking water infrastructure funding for the District. The PPL lists capital projects in ranked order of their priority, as determined by numerical scores for factors including contribution to protecting public health, improving compliance with regulatory standards, and maintaining drinking water safety and reliability. The IUP describes how federal funds available under the Drinking Water State Revolving Fund appropriation in the current fiscal year would be used—what projects on the PPL (in priority order) are eligible for funding, would be ready to move forward in the subsequent year, and the extent to which available funding would support them. Thus, federal funding was available to assist in the replacement of lead service lines.

WASA officials conveyed to EPA that there was no need to obtain federal funding to assist in the replacement of lead service lines. In July 2002, WASA's then Deputy General Manager responded to EPA via e-mail that WASA was in full compliance with the requirements of the Safe Drinking Water Act (SDWA) of 1974 and, accordingly, there was no regulatory basis for including a Lead Service Line Replacement project (which would use available federal funding) at that time. As such, WASA did not have an identified lead service line replacement project suitable for inclusion in the 2002 PPL and IUP, and did not support the inclusion of such a project at that time.

In further discussions with WASA officials regarding obtaining federal funding, we were informed that WASA annually receives the maximum amount of the SDWA grant. This amount is 1 percent of the total grant, approximately \$10 million. Any additional grant monies received would be offset dollar-for-dollar from this grant. Therefore, WASA officials stated that it is not prudent to pursue any additional federal funding, because it would not change their net cash flow.

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<p>FINDING 6: LEAD SERVICE LINE REPLACEMENT EFFORTS: FY 2003</p>

SYNOPSIS

In order to meet reporting and testing requirements of their FY 2003 Lead Service Line Replacement Plan, WASA chose to perform extensive testing in order to identify lines that did not exceed the lead action limit rather than concentrating efforts on prioritizing and replacing lead service lines. WASA officials stated that due to the limited time available to meet reporting and testing requirements, the number of actual lines replaced was less than expected and replacements were not always based on assigned priority levels. WASA officials stated that many replacements were made based on efficiencies to save time and money. As a result, homes with relatively low “ppb” readings (less than 100) were replaced in lieu of homes with “ppb” readings exceeding 300.

We also found that WASA did not conduct follow-up sampling within 72 hours after the completion of partial replacement of lead service lines. In response to WASA’s failure to conduct follow-up testing, WASA reported to the EPA that property owners of the partial replacements did not leave samples for WASA to pick up within the 72 hour period.

DISCUSSION

In 2002, after installing corrosion control treatment, WASA exceeded EPA lead action levels (.015 milligrams per liter or 15 parts per billion) requiring WASA to replace lead service lines at the minimum rate of 7 percent of the known lead service lines per year. That meant that EPA regulations required WASA to replace 1,615 lead service lines during FY 2003.

FY 2003 Lead Service Line Replacement Efforts. In November of 2002, individuals from WASA’s Engineering and Technical Services, Water Services, and Customer Services Divisions developed a plan of action to comply with the requirements of the LCR. It was decided to replace and test lead service lines concurrently. Specifically, WASA would test 1,250 lead service lines, in anticipation that 1,000 of these lines would have lead results below the action level and WASA would have to physically replace 615 lines. Of the physical replacements, 350 lines would be replaced through existing WASA or DDOT contracts and an outside firm would be hired to replace the remaining 265 lines.

WASA officials contend that the decision to test in lieu of replacement (*See* 40 C.F.R. § 141.84(c) (providing that a system is not required to replace a lead service line if samples taken from that line are less than or equal to .015 mg/l)) was based primarily on the fact that

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water sample test results were not available in enough time to use the information for line replacements for FY 03. WASA officials added that water test results have been compiled and used to identify FY 04 and FY 05 replacements. WASA officials agreed that their efforts to replace lead service lines during FY 2003 did not pay particularly close attention to data now available regarding identified high lead levels, blood screening, identification of census data, and road information. WASA officials stated that the bulk of the sample test results and blood screening data was not available until 6 months into FY 2003, and it would have been virtually impossible to use the other data identified above to aid in line replacements because it would take considerable time to schedule replacements, hire and mobilize contractors, and notify residents. WASA officials admitted that they were “under the gun” to meet the replacement requirements and may not have addressed the highest lead levels and the most vulnerable populations.

We believe that WASA could have been more aggressive in its lead service line replacements, since WASA knew of the requirement of replacing 1,615 lead service lines as early as July of 2002, which would have given them 14 months to obtain test results, prioritize and make required replacements. Further, WASA had other information available to identify and prioritize line replacements such as the Weston Report and Tap records.

On October 27, 2003, EPA received WASA’s final report regarding its FY 2003 lead service line replacement efforts. According to the final report, during the period October 1, 2002 – September 30, 2003, WASA reported that it had replaced 385 lead service lines through physical replacement and had identified 1,241 lead service lines that qualified as replacements based on WASA’s ability to test in lieu of replacement. The cost of each replacement was estimated by WASA officials to be \$13,000, which includes the cost to patch the road after replacement. The total cost of the FY 2003 lead service line replacement efforts was estimated to be \$5.8 million.

DDOT officials stated that the replacements conducted during FY 2003 were performed in connection with previously planned repaving or other road/transportation projects. We obtained a list of the 385 identified replacements and traced these addresses into the database maintained by WASA in order to determine what the lead levels of the properties were or to determine if any other priority was used in the replacement selection. WASA’s, Capital Improvement Plan (CIP) had reported that 14 line replacements were completed; the DWS performed 67, and WASA contractors performed an additional 304 line replacements, for a total of 385 lead service line replacements. According to WASA officials, service lines were replaced using the following criteria: (1) CIP and DWS replacements were done as a result of planned or emergency work which, in the process, uncovered lead service lines; (2) contractor replacements were geographically diverse throughout the District, on streets designated by DDOT as “non-moratorium” (i.e. available for non-emergency excavation) and that have the highest number of lead services listed in Replacement Category 4 (having test result in excess of 50 ppb according to the 1990 Lead in Water Study).

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We reviewed the 1990 Lead in Water Study (also known as the Weston Report) and matched the addresses of the 304 service lines replaced in order to determine the number of Category 4 lines replaced. We found that only 76 (25%) of the replacements were from Category 4 (water sample test results > 50 ppb). The remaining replacements were 70 (23%) from Category 3 (tests results between 50 and 20 ppb) and 21 (7%) from Categories 2&1 (test results 20 ppb and below).

Testing in Lieu of Replacement. EPA regulations provide additional rules that allow water utility systems to avoid replacing 7 percent of their lead service lines. *See* 40 C.F.R. §§ 141.84(c) and 141.86(b)(3). These rules state that a water utility system may collect a sample of water that has been undisturbed in the lead service line for 6 hours or more to capture worst-case lead levels, and if water from that line tests at or lower than 15 ppb, that particular lead service line does not have to be replaced. The water utility system can receive credit for the service line that tested below 15 ppb and count this line toward the number of lines that are required to be replaced annually. In other words, if a system can find enough lead service lines that test below the EPA standard (a number equal to 7 percent of their known lead service lines), they will not have to replace any service lines.

To meet or exceed the goal of identifying 1,000 lead service lines below 15 ppb, WASA tested 4,613 service lines. Of those 4,613 lead service lines sampled and tested, WASA found 1,241 lines testing at or below the 15 ppb EPA standard for lead in drinking water. The identification of these lines allowed WASA to avoid the replacing 7 percent of the known lead service lines for the year. However, in testing 4,613 service lines, WASA also identified 3,372 service lines that contained water exceeding the standard. The tests in fact revealed that 43 percent of service lines testing in excess of 15 ppb for lead tested in the range of 16 to 50 ppb while the remaining 57 percent tested at 51 ppb up to an exorbitant level of 1,520 ppb. A reading of 1,520 ppb is over 101 times the EPA standard for lead in drinking water. WASA officials stated that these test results, as well as results of water tests conducted throughout the city, may be used to prioritize line replacement efforts. The table below shows the results of the 3,372 homes in question that tested above 15 ppb.

Range of lead content (ppb)	Homes Found
16 - 50	1,449
51 - 100	1,077
101 - 200	540
201 - 300	176
301 -1,520	130

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WASA Notification to Homeowners. WASA sent a letter to homeowners notifying them of test results. The subject line of that letter was “Lead Sampling Test Results.” The letter stated that test results for the samples collected from that home were found to be above the EPA action level of 15 ppb for lead in drinking water. The letter also included the test results for the 1st draw and the 2nd draw samples. This was followed by a short paragraph explaining that lead concentrations were not detected in the WASA water supply, nor were they detected in the water main that runs down the street and serves their home. The paragraph ended by stating that the most probable source of any lead in “your” drinking water is the plumbing in “your” home and the lead portion of the service line. Lastly, the letter contained a paragraph listing two options said to be “currently underway” to determine how best to address elevated lead levels. Option one was that WASA “may” replace lead service lines to the home, and option two was that WASA was studying adjusting the water chemistry at the treatment plant to avoid the dissolving of lead particles into the water supply. The letter closed by recommending that homeowners review an attachment entitled “How to Reduce Lead in your Drinking Water.” This was an excerpt from the “Notification and Reporting Requirements for Partial Lead Service Line Replacement under the Lead and Copper Rule” published by the EPA in April 2000. That attachment listed six tips to reduce lead in drinking water: (1) flush your taps; (2) use only cold water for cooking and drinking; (3) remove debris from faucet strainers regularly; (4) install a point of use/home treatment device; (5) purchase bottled water for drinking and cooking; and (6) replace internal plumbing such as faucets. The letter with attachment was signed by the WASA Deputy General Manager and sent in both English and Spanish.

While it is commendable that WASA took the steps described in the above paragraph to notify homeowners of test results, there were no follow-up calls or follow-up letters to homeowners. The homeowner was left to answer his or her own questions after reading the test results letter. We interviewed a homeowner who had received a test result letter showing that his first draw sample tested at 210 ppb and the second draw sample tested at 550 ppb. He stated that he felt the letter did not begin to answer all the questions he needed answered. On several occasions, he tried to reach someone at WASA via phone, but was unable to get a reply or answers to his questions. Some of those questions concerned the timeline by which he could expect some type of action by WASA to help remedy his situation. The homeowner also sent letters, to include certified mail, but received no response.

Follow-up Monitoring of Partially Replaced Lead Service Lines. Of the 385 physically replaced lead service lines reported by WASA as of October 1, 2003, WASA reported 79 were “full” replacements, and 306 were “partial” replacements. A “partial” replacement means that something other than the entire length of the service line is replaced (i.e., the portion on public space). See 40 C.F.R. § 141.84(d). Title 40 C.F.R. § 141.84(d) requires that a public water utility system replace the portion of the lead service line owned by the system (the portion from the water main to the homeowner’s property line) but does not require that the system bear the cost of replacing portions of the line that the system does not

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own (the portion on the homeowner's property). Pursuant to 40 C.F.R. § 141.84(d)(1), each partially replaced lead service line must be sampled within 72 hours of partial replacement of the service line. One purpose of this requirement is to ascertain the extent, if any, of the lead levels in the drinking water in the replaced lead service line.

Of the 306 lead service lines WASA reported as partially replaced as of October 1, 2003, WASA has reported follow-up monitoring on samples received from customers with respect to 147 of these lines. WASA reported that it followed standard practice, and that the property owners for 159 partially replaced lead service lines did not leave samples for WASA to pick up within the 72 hour period. Consequently, WASA was unable to fully meet the EPA follow-up test requirement.

Current and Future Efforts

WASA officials stated that they have refined their process for lead service line replacement efforts being conducted in FY 2004 and scheduled for 2005 to address the highest lead levels and the most vulnerable populations in areas where replacement is most efficient.

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<p>FINDING 7: LEAD SERVICE LINE REPLACEMENT EFFORTS: FY 2004</p>

SYNOPSIS

WASA made strides in improving lead service line replacement in FY 2004 through better planning initiatives designed to address customer health and well-being. FY 2004 efforts focused on the results of the recent testing program that identified customers testing 100 ppb and above for lead content, and assured replacement of service lines to city blocks in which a large number of residents tested high, as well as blocks which had not been repaved. In addition, WASA is working with DOH on recent blood level tests results to give priority for service line replacements at known addresses of pregnant women and day-care centers. We believe these actions demonstrate that WASA is now on the right track toward successful implementation of its lead service line replacements.

DISCUSSION

In order to comply with the EPA Administrative Order on Compliance and Consent, WASA agreed to physically replace 1,615 lead service lines during FY 04. In order to meet this requirement, WASA has hired several contractors.

According to WASA officials, when the 2004 replacement began, DOH had a concern that cutting lead lines might increase the amount of lead in a resident's water. Therefore, DOH asked WASA to suspend cutting lead lines until this supposition could be tested. Because of DOH's concern, WASA could not replace all service lines to the property during the early period of the 2004 program. After extensive testing by WASA and DOH it was determined that lines could be cut without increasing the lead exposure and WASA was allowed to proceed with cutting lines. Once the restriction was lifted, WASA began replacing lead service lines at a rate of about 20 per day. Our review showed that on June 4, 2004, (during the time of the DOH restriction) only 308 service lines were replaced. As of August 13, 2004, (after lifting DOH restrictions), WASA had completed 1,200 replacements, and, barring unforeseen circumstances, is on schedule to reach their goal.

Current and Future Efforts

WASA is instituting a program in which line replacement customers will be called and urged to participate, and they will be given a follow-up call if the sample is not received in a timely manner. This procedure was not deemed necessary by WASA until the low percentage of

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returned samples was discovered. In addition, WASA officials stated that they reported the low sampling results to the EPA and were granted an exception for this requirement until the call-back program starts.

In July of 2004, WASA's Board of Director's committed to replacing all known lead service lines by 2010.

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FINDING 8: COMMUNICATION AND PUBLIC EDUCATION EFFORTS

SYNOPSIS

Although WASA has made progress in its public awareness initiatives, WASA can further improve its communication efforts and education program for notifying the public about the condition of their drinking water, the potential health effects of high concentrations of lead in their drinking water, and any necessary precautionary measures that need to be taken to protect themselves from lead exposure.

Based on our analysis of newsletters sent to customers, we believe that WASA attempted to notify customers of the problems and provide them with information on what to do. We believe that newsletters were informative; however, they did not contain all required elements, nor were they clear, concise, and specifically written in a manner that would convey a sense of urgency. Collectively, information provided on flyers, pamphlets, and in letters, and that disseminated in community meetings and posted on WASA's website did constitute a public education campaign and meet all the requirements of the regulations. However, when analyzed individually, these information sources designed to educate the public on the potential hazards of and recommended treatments for lead exposure were not as effective as intended.

An Administrative Order for Compliance on Consent issued by EPA, identified six violations of the National Primary Drinking Water Regulations. According to WASA officials, for the purposes of settlement and the public interest, WASA neither admitted nor denied the findings contained in the Administrative Order. We believe that WASA, in an attempt to exercise good faith, should have met specific deadlines regarding timely notification to residents and customers, and should have included all language and specific elements in literature provided to the public.

DISCUSSION

Among the numerous venues available to inform and educate the public about the containment of lead reported in the District's drinking water, WASA has held community meetings at various locations throughout the city, provided pamphlets and flyers to individuals, and made them available in public spaces, testified before city council and congressional committees, printed advertisements in various newspapers, provided public service announcements to local radio stations, and has an extensive website with information concerning the results of water samples, the effects of lead in drinking water, and steps to take to protect yourself from harmful affects of elevated levels of lead in the drinking water.

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In order to evaluate the timeliness of communications to customers made by WASA, we reviewed the EPA reporting requirements. 40 C.F.R. § 141.90(a) states that a water system shall report the information for all tap water samples specified in § 141.86 and for all water quality parameter samples specified in § 141.87 within the first 10 days following the end of each applicable monitoring period specified in § 141.86 and § 141.87.

Section 141.90(a)(4)(iii) further states that no later than 60 days after a public utility becomes aware that it has exceeded the lead action limit shall provide written notification to the State, “setting forth the circumstances resulting in the lead-containing materials being introduced into the system and what corrective action, if any, the system plans to remove these materials.” Finally, pursuant to Section 141.85(c)(2)(i), a water system must provide customers with written notification within 60 days of exceeding the lead action level that alerts homeowners of the elevated lead levels in the community.

WASA’s monitoring period ended June 30, 2002. Hence, WASA was required to submit the test results to the primacy agency by July 10, 2002. WASA officials stated that they did not receive the final results of water samples for the monitoring period ending June 30, 2002, from the Aqueduct until August 20, 2002. WASA officials sent a letter to EPA, on August 26, 2002, informing them that the results exceeded the lead action limit. In WASA’s opinion, this would have triggered the 60-day requirement to deliver the proper notifications to all customers by October 26, 2002. WASA officials further stated that EPA extended the deadline to October 31, 2002. WASA officials stated that they mailed the Living Lead Free brochures to all customers by October 30, 2002.

In discussions with WASA executives and other officials, we were told that WASA did know that they had exceeded the action level prior to the end of the June 30, 2002, reporting period. WASA officials further stated that they actually knew that they had exceeded the action level at least 6 months prior to that date based on the results of the first 50 percent of the water test samples.

We confirmed that WASA notified EPA on August 26, 2002, that the District’s water exceeded the EPA action level of 15 ppb. While it is WASA’s position that WASA was required to contact all customers within 60 days of that date (October 25, 2002) to meet the public notice requirements specified by 40 C.F.R. § 141.203, we believe that WASA should have made notification within 60 days of learning it had exceeded the action level or as an alternative, 60 days from the monitoring period due date of July 10, 2002, and therefore, was not timely in notifying customers.

Written Materials Provided to Customers. Pursuant to 40 C.F.R. § 141.85(c)(2)(i), WASA was required to place the following notice on each customer’s water utility bill within 60 days of exceeding the lead action level and every 12 months thereafter:

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SOME HOMES IN THIS COMMUNITY HAVE ELEVATED LEAD LEVELS IN THEIR DRINKING WATER. LEAD CAN POSE A SIGNIFICANT RISK TO YOUR HEALTH. PLEASE READ THE ENCLOSED NOTICE FOR FURTHER INFORMATION.

If a water utility system does not have a billing scheduled within 60 days from exceeding the lead action level, or if major changes to the billing system would be necessary to insert the information, then the water utility system may use a separate mailing to deliver the information, so long as the LCR information and alert are delivered within the 60 days. The notice WASA placed on its customers' water bills on or about August 29, 2003, stated:

WASA'S WATER QUALITY IMPROVEMENT PROGRAMS INCLUDE SAMPLING FOR LEAD IN THEIR DRINKING WATER. SOME HOMES IN THIS COMMUNITY HAVE ELEVATED LEAD LEVELS. LEAD CAN POSE A RISK TO YOUR HEALTH. PLEASE READ THE ENCLOSED NOTICE FOR FURTHER INFORMATION.

This notice included the phrase "in their drinking water" in the first sentence, but omitted the phrase "in their drinking water" from the second sentence, and also omitted the term "significant" from the third sentence, thereby omitting the language identifying the extent of the risk. The notice, therefore, did not strictly comply with 40 C.F.R. § 141.85(c)(2)(i).

In order to meet annual notification requirements, WASA included in customers' August 2003 bill a copy of its "What's on Tap Newsletter," dated August 2003. This newsletter contained an extensive article on lead in drinking water, which addressed the elements that are required to be included in the public notice for violations of National Primary Drinking Water Regulations (NPDWR) or other situations requiring public notice. While we believe that WASA did not meet the 60-day notice requirement, WASA's August 2003 newsletter satisfied the annual reporting requirements.

Pamphlets, Brochures, Newsletters, and other Communication Methods. WASA employed other methods to educate the public, including sending out monthly brochures and an Information Guide on Lead in Drinking Water. In total, WASA officials stated that more than 65,000 of the brochures were sent to several District agencies and organizations. Additionally, approximately 64 pamphlet packages were sent to local libraries, hospitals, and other public service establishments during FY 2004. We were informed that WASA's General Manager has done television appearances and radio interviews to get the word out to the public.

While informative, the newsletters did not contain all required elements, nor were they always clear, concise, and specifically written in a manner that would provide a sense of urgency.

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Letters to Customers. We identified four letters that WASA sent to District residents. We analyzed the content of the letters and found that they did not meet the various time requirements set forth by the EPA (30 days, every 3 months, or annual required notifications), nor did they contain the required language, or address the 10 elements required to be included in the public notice for violations of NPDWR. In addition, customer’s water utility bills did not contain the exact wording in large print that was required to be included along with inserted notices. WASA officials stated that these letters were not mailed to meet the LCR communication reporting requirements. These letters were included in our review to report on all communications and data WASA provided to its customers and the residents of the District of Columbia.

The first identified letter was dated April 24, 2003, 8 months past the required notification deadline. This letter did not contain all of the elements identified by the EPA as necessary to properly inform customers/residents of the condition of their drinking water, what precautions need to be taken to protect themselves, and the possible health effects of drinking water containing elevated lead levels.

When confronted with these facts, WASA officials argued that they did not have to meet all of the statutory requirements for public education and notification because WASA had not violated the NPDWR; it had merely exceeded the LCR lead action level for lead in drinking water.

Below is a table depicting the dates letters were sent out to WASA customers and the identification of required elements that these notifications contained.

Date	Sent To	Topic	C.F.R. Elements Not Included ⁴
4/24/03	Specific District Residents with Lead Service Lines	Implementation of lead service line replacement program	1-6, 8, 10
2/9/04	Customers	Educating public on elevated levels of lead in drinking water	3, 5, 8, 10
2/26/04	District Residents	DOH letter to Residents	2, 7, 8, 10
3/1/04	Customers	Annual system-wide flushing program	1-6, 8, 10

⁴ Exhibit F identifies elements that must be included in the public notice for violations of the NPDWR or other situations requiring a public notice.

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Public Service Announcements. For the compliance period ending September 30, 2003, WASA submitted one public service announcement to local radio and television stations. The information required to be included in the public service announcements pursuant to 40 C.F.R. §§ 141.85(c)(2)(iv) and 141.85(c)(3) is set forth in 40 C.F.R. § 141.85(b). Accordingly, WASA did not comply with 40 C.F.R. § 141.85(c)(3) because it did not submit public service announcements to at least 5 local radio and television stations every 6 months during the period ending September 30, 2003.

Additionally, the public service announcement WASA prepared and submitted to local radio and television stations on October 30 and 31, 2002, did not contain the language set forth in 40 C.F.R. § 141.85(b). WASA's public service announcement referred to "**potential elevated** levels of lead" in the drinking water, in lieu of the phrase "**unhealthy** levels of lead" set forth in 40 C.F.R. § 141.85(b) (emphasis added).

WASA provided us with a listing of the local radio and television stations to whom it distributed public service announcements. As of the date of our review, we had identified 5 television stations and 17 radio stations that WASA requested to air public service announcement information. Even though there were several public service announcements that were sent out to local television and radio stations to assist in notifying the public of the levels of lead in water and the potential health effects from lead exposure, public service announcements that WASA submitted to media outlets in 2002 were not aired or printed by those media outlets.

News Media. The earliest evidence of a press or news release that complied with EPA requirements was dated January 28, 2004. Approximately 17 months passed before WASA put out its first press release in an effort to notify the public. WASA also voluntarily purchased an advertisement in the *Washington Post* in September 2003 to disseminate its public service announcement. WASA's *Washington Post* advertisement, however, did not contain the exact language set forth in 40 C.F.R. § 141.85(b).

Notification Shortcomings. Residents received mixed messages from various statements released by WASA. For example, the *Washington Post* reported on February 3, 2004, that WASA recommended that residents whose water was contaminated should flush cold water lines for 30 seconds before using water for cooking or drinking. Separate literature distributed by WASA during January and early February of 2004, identified a recommended flushing time of 1 minute, while other literature recommended 3 minutes, and 5 minutes. By February 19, 2004, District residents were told to flush for 10 minutes. Then on February 25, 2004, the District's DOH issued an advisory warning residents that all pregnant women and children under six years old should immediately stop drinking District tap water. Although, provided with the best of intentions, this information coupled with the fact that many people did not know if they had a lead service line, was at a minimum confusing.

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In reviewing the information on lead provided on WASA's website, an EPA official described the information as "buried" and hard to download. The EPA official stated that if WASA wanted to make the information accessible, it should place an obvious computer link on WASA's home page to direct persons to the appropriate location and provide a text version of the data.

Customers/residents also criticized WASA's actions stating that they did not timely receive lead test results and they did not understand what the results meant. (These comments are discussed in more detail in the "Other Matters of Interest" section of this report.)

Current and Future Efforts:

We were informed by WASA's Director of Public Relations and Communication that WASA has formed a technical working group to study the cause and identify solutions for the elevated lead levels. Further, WASA officials participate in other committees that continue to work toward a reducing lead to at or below established action levels. WASA has also hired a consultant to evaluate WASA's actions in response to the identification of elevated lead levels.

Additionally, WASA has taken steps to reach not only its current customers, but has also sent information on lead, related potential hazards, and suggested avenues for assistance to all known addresses in the District. At any given time, WASA has approximately 125,000 current customers; however, not all residents of the District receive a utility bill (the bill may be paid by a landlord, or other third party) and the number of residents well exceeds the number of customers. As such, WASA's mailings to all known addresses exceeded 300,000.

WASA officials stated that they have gone beyond the requirements of 40 C.F.R. § 141.85(b) and (c), principally by working directly with customers. For instance, WASA's Lead Services Hotline, a program that the EPA did not require, was initiated in January 2003 to facilitate direct communications with its customers. Additional efforts included:

- Responding openly to many individual and media inquiries; participation in community meetings; and participation in some of the active community list serves.
- Soliciting between 14,000 and 15,000 customers to participate in the sampling program to test the concentration of lead in the water at the tap.
- Shipping filters to every residence believed to have a lead service line pipe based on WASA's records.

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- Sending out over 300,000 letters in English and Spanish to every address in the District of Columbia. The letters included a DOH Fact Sheet, general information on the subject of lead in water, as well as precautions for potentially affected properties, and were mailed in a specially printed envelope with a large letter message printed on the front “Please Read: Important Lead Information.”
- Issuing information such as “Guide on Lead in Drinking Water” and “Living Lead-Free in D.C.,” a joint publication by WASA and the DOH, to all known addresses in the District. These documents contained all the data required by the EPA.
- Conducting over 35,000 tests of water samples provided by District residents at a cost of approximately \$2.5 million.

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FINDING 9: COORDINATION WITH THE DEPARTMENT OF HEALTH
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SYNOPSIS

WASA officials did not timely notify the Department of Health (DOH) regarding the issue of lead in the District's drinking water. Further DOH officials stated the notification was made in a manner that was interpreted as having a low priority, with little cause for alarm or action. WASA officials reported exceeding the established lead action level to EPA in August of 2002. It was not until October 3, 2002, when WASA first contacted DOH requesting DOH's participation in distributing media for Lead Awareness Week. According to DOH officials, WASA also did not provide an open channel of communication for results of water testing. Prior to 2004, DOH officials stated that it was very difficult to obtain test results and other data from WASA. WASA officials disagree with DOH's characterization of their communication efforts and lack of timeliness in reporting water sample test results and other lead related data.

Irrespective of where the breakdowns in communication occurred, timely coordination between WASA and DOH will help in providing vital information and assistance to residents. Such information will include test results of water samples, availability of blood screening, or other pertinent data to assist residents in treating or preventing the harmful affects of lead consumption.

DISCUSSION

Mission, Organization, and Structure of DOH. The DOH mission is to promote and protect the health, safety, and quality of life of residents, visitors and those doing business in the District of Columbia. DOH's responsibilities include identifying health risks; educating the public; preventing and controlling diseases, injuries, and exposure to environmental hazards; promoting effective community collaborations; and optimizing equitable access to community resources.

The DOH is organized into administrations and offices, to include the Office of the Senior Deputy Director for Health Promotion. This office assesses the health status of the community, provides health education and outreach, integrates the health delivery system, and implements intervention strategies.

Another office, the Environmental Health Administration oversees the Water Quality Division. The mission of the Water Quality Division is to restore and protect the surface and ground waters of the District of Columbia. The program is comprised of three principal

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components: 1) Water Quality Control; 2) Water Quality Monitoring; and 3) Environmental Laboratory.

DOH's Bureau of Hazardous Materials and Toxic Substances administers the Lead-Based Paint Management Program. The mission of the Lead-Based Paint Management Program is to reduce the population's exposure to lead hazards through property inspections, comprehensive educational outreach, training, and prevention activities. However, the current Lead-Based Paint Management Program does not address lead exposure from drinking water. DOH officials stated that their current grants do not support research or other work to be conducted in this specific area. Further, DOH believed that since lead exposure from drinking water is only a small percentage of the total known sources that contribute to lead entering the blood stream, it was not a priority at DOH. A more in-depth discussion of the potential cause and effect of lead exposure is discussed in Exhibit D.

Notification of Elevated Lead Levels. WASA officials reported exceeding the established lead action level to EPA in August of 2002; however, it was not until October 3, 2002, when WASA notified DOH of exceeding the action level and requested DOH's participation in distributing media for Lead Awareness Week. DOH officials contend that the notification was made in a manner that was interpreted by DOH officials as having a low priority, or little cause for alarm or action.

The then Acting DOH Director stated that in their initial telephone discussion in October of 2003, WASA's General Manager did inform him that WASA had test results showing that the District's water had exceeded the lead action level, but felt it may be an anomaly and more testing needed to be performed before any crises or alarm should be made. The DOH Director believed that the intent of the phone call was not to serve as a call for prompt or immediate action, but rather, a casual request for materials related to Lead Awareness Week.

Evaluation of Communication Efforts. DOH officials added that they did not routinely meet with WASA to discuss lead, water sample test results, or anything related to the current issue with WASA, the Emergency Management Agency, or the Washington Aqueduct. DOH officials said there was no full-fledged disclosure nor open discussion of water test results, lead service line replacements, or other water corrosion treatment plans between DOH and WASA until the first few months of 2004, when special tasks forces were formed by the Mayor and City Council. DOH officials stated that they have been provided copies of annual water quality reports, but at no time prior to 2004 has DOH been asked to play a role in making a decision concerning the chemical composition of the District's water. DOH added that in past years they have drafted two separate letters asking for primacy over the District's drinking water, but to date, this request has not been granted. DOH officials added that in 2002, they asked WASA to step-up the lead service replacement line program because of residents complaining of discoloration and foul odors in their water. DOH also began to receive routine emails from the public in late November 2003 from citizens asking for

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assistance in interpreting lead test results. WASA executive officials stated that they were unaware of this request and could not recall any communications from DOH relaying resident concerns. Additionally, WASA officials disagree with DOH's characterization of their communication efforts and lack of timeliness in reporting water sample test results and other lead related data.

Coordination Efforts with Public Health Officials. As cited earlier, written internal guidelines that implement federal and local requirements of law and regulation serve to memorialize an organization's practices, thereby ensuring consistent approaches and actions to foster compliance. This same concept applies to the coordination and partnership needed between or among agencies when responding to problems that require action by two or more agencies. As such, we believe that WASA and DOH should implement a memorandum of understanding (MOU) that defines both agencies' roles and responsibilities and the expert advice each agency can provide in the areas of water quality management. A MOU would assure that there is a mutual understanding regarding the fundamental aspects of what information is to be shared and the frequency and manner of transmission. Additionally, other topics may be covered in the MOU as needed. Other reviews conducted that have evaluated WASA's actions relative to their exceeding the lead action level have recommended that similar partnerships be formed.

Blood Screening for District Residents. DOH has provided free blood testing for District residents at D.C. General Hospital, at multiple clinics across the city, and through home visits in order to determine whether any resident has excessive blood lead levels. DOH was assisted in these efforts by the Commissioned Corps Readiness Force, which provided a team of Public Health Service officers to help DOH administer blood tests. As part of WASA's efforts to address the lead issues, as of September 2004, WASA has reimbursed DOH over \$1.3 million for these tests.

Current and Future Efforts:

WASA has held several community meetings in 2004, at which DOH officials addressed health affects related to high levels of lead in the bloodstream. Since that time, WASA and DOH officials have worked collaboratively on addressing the issue of lead in the District's drinking water.

On April 15, 2004, DOH, in collaboration with the Office of the Chief Technology Officer, implemented a new electronic database that allows rapid reporting to DOH of all blood lead levels from commercial laboratories and all other sources who tests District residents for lead exposure. This database allows the sharing of blood screening data and other test results among healthcare professionals.

RECOMMENDATIONS

We recommend that the General Manager, WASA:

1. Establish and implement policies and procedures that identify WASA personnel and their responsibilities as they relate to ensuring compliance with the Lead and Copper Rule, and the actions required to be taken when the District's drinking water exceeds lead action levels.
2. Develop a documented methodology for selection of participants for WASA's annual monitoring efforts. In developing the selection methodology, WASA should identify selection criteria to ensure that a representative sample is used, and that addresses with a history of reported elevated lead levels are be given priority consideration when selecting participants.
3. Establish controls that would assign responsibility for conducting water sample testing, maintaining the corresponding documentation, and maintaining receipt of water test results from the Washington Aqueduct or other testing laboratory. Procedures should be established that delineate timelines for notifying all stakeholders, both internal and external to WASA, when test results show lead levels exceeding the EPA action level.
4. Verify the accuracy of the data, including the metal content of each service line contained in WASA's CIS and establish controls to ensure that data is recorded accurately and completely.
5. Cross-train at least one other individual in the use of the CIS. Staff should be able to retrieve information and generate reports for use by management.
6. Identify, in conjunction with WASA's plan to replace all "known" lead service lines, the content of the more than 25,000 "unknown" service lines and plan accordingly to replace those and any other service lines determined to be made of lead. Additionally, any partial replacements should be properly documented and tested to ensure that they meet EPA requirements and would qualify as lead-free.
7. Establish separate budgets for the replacement of service lines to ensure that proper funding is available, that federal funding availability is explored, and sources for the completion of the work are identified, (whether it be through the use of WASA personnel, DDOT personnel, or a contractor).
8. Establish procedures that would notify residents of test results within 30 days of WASA obtaining the test results. Homes with test results exceeding maximum contaminant levels or recommended action levels should be provided with adequate information that clearly explains the violation, the test results, what precautions need

RECOMMENDATIONS

- to be taken to protect themselves, and the possible health effects of drinking water containing elevated levels of lead or other contaminants.
9. Establish a mechanism to follow-up with those residents having notably high lead levels resulting from the tests conducted in conjunction with WASA's 2003 Lead Service Line Replacement Program, specifically, homeowners with readings above 300 ppb should be contacted to explain what steps WASA is taking to address this problem and what precautions are available to them. (We were informed that WASA is providing DOH officials with the names and addresses of homeowners/addresses testing over 300 ppb so that blood-screening tests could be conducted.)
 10. Take steps to develop a plan to move those households with very high ppb readings to a priority list for the replacement of their lead service lines. Additionally, WASA should work collaboratively with the DOH, to recommend that those residents receive a blood-lead screening test.
 11. Establish controls that would ensure that EPA public notification and education requirements are met.
 12. Implement a Memorandum of Understanding between WASA and the DOH, which would identify controls that would ensure that channels of communication remain open with DOH officials and that data related to water test results and ppb levels are timely provided to DOH. Conversely, WASA needs to obtain data related to lead test results from DOH and any other pertinent information for use in line replacement prioritizations.

OTHER MATTERS OF INTEREST

Regulatory Oversight

WASA is a regulated water utility system and it is accountable not only to the customers and to the broader public it serves, but to its Board of Directors and the EPA. The District of Columbia Council also maintains legislative oversight over WASA.

Most states or territories have gained primary enforcement responsibility for ensuring compliance with water quality standards under the SDWA, including those standards pertaining to the LCR. This authority, called primacy, has been granted to all states and territories with the exception of Wyoming and the District of Columbia. Therefore, as it relates to the District of Columbia, the Water Protection Division of EPA Region III has primacy enforcement responsibility to administer and oversee WASA's and the Washington Aqueduct's compliance with all SDWA standards, including the LCR. In its role, EPA provides advice and technical assistance regarding federal regulations, and oversees the monitoring of the drinking water and treatment processes.

The OIG Survey Questionnaire

The OIG sent questionnaires (surveys) to the 163 individuals WASA identified as participants in the Annual Lead Monitoring Program (Program) from July 2001 through December 2003 to determine whether:

- individuals volunteered to participate in the annual program, or if WASA requested them to participate;
- WASA provided the test results to the individuals, adequately explained the test results, and timely notified the individuals of their test results;
- individuals feel that their tap water is safe to drink;
- individuals believed WASA timely notified them of the elevated lead level identified in June 2002, and
- individuals believe WASA is performing a good job in conducting its current efforts.

Results of OIG Survey Questionnaire

The OIG received responses from 96 of the 163 individuals (59 percent) to whom we sent questionnaires. Based on our analysis of the survey results, the OIG believes WASA needs to make improvements to its annual monitoring efforts. Specifically, WASA needs to ensure individuals timely receive their test results, especially if the lead concentration in their water samples exceeds the EPA action level. WASA officials stated that WASA does not notify

OTHER MATTERS OF INTEREST

the individuals of their test results until the end of the monitoring period. Thus, individuals that collected samples in July 2001 for the July 2001 through June 2002 monitoring period did not receive their test results until June 2002.

The survey shows that WASA needs to improve its current efforts to ensure District residents: (1) have their water tested for lead, (2) know how to reduce the lead content in their drinking water, and (3) are kept informed of the lead level in the District's water supply. Over 30 percent of the individuals participating in our survey responded that WASA is performing poorly in conducting these tasks.

On average, the survey results show that more than 70 percent of the participants in WASA's Annual Monitoring Program felt WASA's actions were average or less than average with regard to customer notification. It is important for an agency that provides a critical service or product to be perceived in a favorable light and to act responsively in addressing needs of its customers. Improved customer satisfaction helps an agency to restore the faith and confidence of the public it serves.

Program Participation. Although WASA officials informed the OIG that participants volunteered to participate in the Program, the survey results showed WASA requested some individuals to participate. Twenty-seven individuals (28.13 percent) responded that they were requested by WASA to participate in the annual program. Table 1 below displays the results of the responses to participation in the Program.

Table 1 - Method of Participation

Method of Participation	Number of Responses	Percent
Volunteered	52	54.17
Requested	27	28.13
Both	4	4.17
Not Answered	13	13.54
Total	96	

Notification of Test Results. Seventy-nine individuals (82.29 percent) responded that WASA did notify them of their lead test results. Although these 79 individuals responded that they did receive notification of their test results, 24 of these individuals (25 percent) responded WASA did not adequately explain the test results to them (see Table 2). Seventy individuals responded that WASA notified them of their lead test results in writing.

OTHER MATTERS OF INTEREST

Table 2 - Notification of Test Results

	Did WASA provide test results?	Did WASA Adequately Explain Test Results?
Number of Individuals Responding Yes	79	56
Number of Individuals Responding No	7	24
Number of Individuals Responding Yes and No	0	1
Number of Individuals That Did Not Answer Question	10	15
Total	96	96

Timeliness of Notification. Thirty-five individuals (36 percent) reported they were either not notified, (6), or not notified until 90 days after they collected their samples, (29), for the annual program. Thirteen of the 35 individuals reported that they were not notified until over 120 days after they collected their samples for the annual program. The results are shown in Table 3 below.

Table 3 - Notification Timeframe

Timeframe	Number of Responses	Percentage
0-45 Days	19	19.79
45-90 Days	19	19.79
90-120 Days	16	16.67
120 Plus Days	13	13.54
Various Days	4	4.17
Not Answered	19	19.79
Not Notified	6	6.25
Total	96	

Drinking Water Consumption. Despite the District’s recent lead problem, the survey results showed many individuals drink tap water. Table 4 below shows that twenty-four individuals (25 percent) responded that they drink tap water, and 45 individuals (46.88 percent) responded that they drink both tap and bottled water.

OTHER MATTERS OF INTEREST

Table 4 - Drinking Water Consumption

Water Consumed	Number of Responses	Percent
Bottled Water	26	27.08
Tap Water	24	25.00
Both Bottled and Tap	45	46.88
Not Answered	1	1.04
Total	96	

Although the survey results may indicate most individuals feel safe drinking tap water, it is important to note that other factors play a role in the decision to drink tap water, such as the cost of bottled water or the fact that individuals may have filters on their faucets.

Questionnaire's Focus on WASA's Actions

Informing the Public Timely. Seventy-one individuals (74 percent) rated WASA's actions in timely notifying the public of the elevated lead level as poor, and 16 individuals (16.67 percent) rated WASA's actions as average. None of the survey respondents rated WASA's actions in informing the public as excellent.

Testing Water for Lead. Thirty individuals (31 percent) rated WASA's current efforts to ensure District residents have their water tested for lead as poor, and 32 individuals (33 percent) rated WASA's testing efforts as average. Five individuals rated WASA's testing actions as excellent.

Reducing Lead Content. Thirty-one individuals (32 percent) rated WASA's efforts to inform District residents of the ways to reduce the lead content in their water as poor, and 37 individuals (39 percent) rated WASA's lead reduction efforts as average. Ten individuals (10 percent) rated WASA's lead reduction actions as excellent.

Keeping the Public Informed. Thirty-five individuals (36 percent) rated WASA's current actions in keeping the public informed about the elevated lead levels as poor, and 31 individuals (32 percent) rated WASA's public information actions as average. Eight individuals (8 percent) rated WASA's public information actions as excellent. Table 5 below accumulates the responses from survey participant's to questions about the adequacy of WASA's actions in the above areas.

OTHER MATTERS OF INTEREST

Rating of WASA's Actions

	Informing Public of Elevated Lead Level	Ensuring Water is Tested for Lead	Informing Public - Reducing Lead	Keeping Public Informed	Total	Percent
Poor	71	30	31	35	167	43
Average	16	32	37	31	116	30
Good	6	28	17	21	72	19
Excellent	0	5	10	8	23	6
No Response	3	1	1	1	6	2
Total	96	96	96	96	384	100

EXHIBIT A: SUMMARY OF POTENTIAL BENEFITS RESULTING FROM AUDIT

Recommendation	Description of Benefit	Amount and/or Type of Monetary Benefit	Status⁴
1	Internal Control and Compliance. Establishes policies and procedures to ensure compliance with laws and regulations when the lead action level is exceeded.	Non-Monetary	Closed
2	Program Results. Ensures a consistent methodology is developed and applied for selecting participants for inclusion in its annual monitoring efforts.	Non-Monetary	Closed
3	Internal Control and Compliance. Establishes controls over the water-testing process and the process for notifying stakeholders when the District exceeds lead action levels.	Non-Monetary	Closed
4	Internal Control and Compliance. Ensures WASA's Customer Information System contains accurate and complete data to document WASA's annual monitoring requirements and assist in prioritizing service line replacements, as well as other information necessary for billing purposes.	Non-Monetary	Closed
5	Internal Control and Compliance. Ensures that more than one person can access and extract data from Tap File records.	Non-Monetary	Closed
6	Program Results. Improves WASA's management of customer service lines, the identification of lead service lines, and assurance that partial service line replacements meet EPA requirements.	Non-Monetary	Closed
7	Program Results. Creates a separate line in WASA's Annual Budget to identify the funds designated for service line replacements.	Non-Monetary	Closed

EXHIBIT A: SUMMARY OF POTENTIAL BENEFITS RESULTING FROM AUDIT

Recommendation	Description of Benefit	Amount and/or Type of Monetary Benefit	Status⁴
8	Internal Control and Compliance. Establishes procedures to comply with EPA rules for notifying residents of excessive lead contaminants within 30 days after discovery.	Non-Monetary	Closed
9	Program Results. Creates a mechanism for focusing action on residents whose water samples tested in excess of 300 ppb lead water content.	Non-Monetary	Closed
10	Program Results. Prioritizes those households eligible for service line replacements.	Non-Monetary	Closed
11	Internal Control and Compliance. Establishes controls to ensure compliance with EPA notification and public education requirements.	Non-Monetary	Closed
12	Internal Control and Compliance. Establishes controls ensure that channels of communication exist between WASA and the DOH.	Non-Monetary	Open

⁴ This column provides the status of a recommendation as of the report date. For final reports, “**Open**” means management and the OIG agree on the action to be taken, but action is not complete. “**Closed**” means management has advised that the action necessary to correct the condition is complete. “**Unresolved**” means that management has neither taken the recommended action nor proposed satisfactory alternative actions to correct the condition.

EXHIBIT B: WASA'S ORGANIZATIONAL BACKGROUND

History of WASA

From its inception in 1938 until 1996, the District of Columbia Water and Sewer Utility Administration was a part of the D.C. government. In 1996, the D.C. government and the U.S. government collaborated to create WASA, a semiautonomous regional entity. Although WASA continues to maintain some ties with the D.C. government, its finances are now separate. The Authority develops its own budget, which is incorporated into the District's budget and then forwarded to Congress. All funding for operations, improvements, and debt financing now comes through usage fees, EPA grants, and the sale of revenue bonds. The new organizational structure enables WASA to respond quickly to changes in the industry; to create its own regulations and policies for procurement, human resources, and finances; to negotiate its own contracts and labor agreements; and to sell bonds.

Facts about WASA

- WASA is a multi-jurisdictional regional water utility system that provides drinking water, wastewater collection and treatment to more than 500,000 residential, commercial, and governmental customers in the District of Columbia, and wastewater collection and treatment for 1.6 million customers in Montgomery and Prince George's counties in Maryland, and Fairfax and Loudoun counties in Virginia.
- WASA delivers water to over 130,000 locations in Washington, D.C., and provides nearly 135 million gallons of drinking water a day for use by individuals and businesses.
- To distribute water and support the distribution system, WASA operates nearly 1,300 miles of pipes, 5 pumping stations, 5 reservoirs, 4 elevated water storage tanks, 36,000 valves, and 8,700 hydrants.
- To collect wastewater, WASA operates approximately 1,800 miles of sanitary and combined sewers, 22 flow-metering stations, 9 off-site wastewater-pumping stations, and 16 storm water-pumping stations within the District of Columbia. Separate sanitary and storm water sewers serve two-thirds of the city. In the older portion of the system, primarily in the downtown area, combined sewers are in service.

WASA's Organizational Structure

WASA's General Manager reports to the Board of Directors and manages the day-to-day operations. The Board provides direction to the General Manager, who then implements that direction through WASA's 1,200 employees. The General Manager is supported by four key

EXHIBIT B: WASA'S ORGANIZATIONAL BACKGROUND

executives who have responsibility over critical functional units within WASA. These executives are: 1) Chief Engineer/Deputy General Manager; 2) General Counsel; 3) Public Affairs Director; and 4) Chief Financial Officer.

The Chief Engineer/Deputy General Manager oversees all technical operations at WASA, including Wastewater Treatment Services, Water Services, Sewer Services, Engineering and Technical Services, and Maintenance Services. The Division of Water Services is the functional unit on which this report is primarily focused. The Water Services Division is currently divided into four subdivisions: 1) the Distribution Division, primarily responsible for fixing water main breaks; 2) the Pumping Division, which manages WASA's pumping operations; 3) the Technical Support Services Division, which tracks water service issues; and 4) the Water Quality Division, which is responsible for the oversight of the chemistry and quality of the water supply.

EXHIBIT C: REGULATORY OVERSIGHT

The Role of the EPA

In regard to WASA's lead monitoring programs, EPA plays the same role as any state with primary enforcement responsibility. With respect to lead and copper, WASA is required to comply with the requirements of LCR, 40 C.F.R. § 141.80-.91, including the lead and copper monitoring requirements in 40 C.F.R. § 141.86 and the reporting requirements in 40 C.F.R. § 141.90(a). EPA's role is to review the monitoring results and associated information submitted by WASA pursuant to 40 C.F.R. § 141.90 to determine if the reports indicate that WASA has complied with the LCR tap water monitoring requirements. EPA plays no role in selecting or approving sampling locations prior to the sampling period. EPA reviews information and compliance monitoring results after the monitoring period is completed. This role remained the same through each of WASA's compliance monitoring periods.

Reports submitted by WASA are received in the Drinking Water Branch in EPA Region III and reviewed by EPA's Program Manager for the District of Columbia Public Water Utility System Supervision Program within the Drinking Water Branch to determine WASA's compliance with the various requirements of the LCR, such as monitoring the 90th percentile action level calculation⁵, reporting, lead service line replacement and public education requirements. An EPA representative of the Safe Drinking Water Act Branch also reviews WASA's lead service line replacement report.

EPA provides advice and technical assistance, reviews compliance reports submitted by WASA for completeness, evaluates compliance with the LCR based on those reports, and takes enforcement actions as necessary to obtain compliance with the regulations.

The EPA Region III oversight role includes:

- ensuring District water suppliers know and understand EPA regulations
- requiring the water suppliers to monitor the water and treatment process
- ensuring that suppliers report test results and required information in appropriate format and detail, by required deadlines

⁵ The 90th percentile is calculated by placing the results of all lead or copper samples taken during a monitoring period shall be placed in ascending order from the sample with the lowest concentration to the sample with the highest concentration. Each sampling result shall be assigned a number, ascending by single integers beginning with the number one (1) for the sample with the lowest contaminant level. The number assigned to the sample with the highest contaminant level shall be equal to the total number of samples taken. Next, the number of samples taken during the monitoring period shall be multiplied by nine-tenths (0.9). The contaminant concentration in the numbered sample yielded by the calculation is the 90th percentile contaminant level.

EXHIBIT C: REGULATORY OVERSIGHT

- reviewing results and reports to assure compliance with regulations
- taking actions against suppliers if violations occur, and
- using enforcement actions to return the suppliers to compliance

Communications between EPA and WASA officials have involved various aspects of the SDWA and drinking water program, including lead and copper issues. Topics of communication included progress reports, specific problem areas, and future activities. EPA also included certain WASA staff as recipients for information about upcoming meetings and conferences pertaining to drinking water issues and regulations. Prior to the beginning of calendar year 2004, the frequency of communications was approximately two or three e-mails or telephone calls per month throughout the year. Since the beginning of 2004, the frequency of communication has significantly increased. In some cases, it may be as often as two or three (or more) telephone calls or e-mails per day.

National Primary Drinking Water Regulation

The EPA's National Primary Drinking Water Regulations, found in 40 C.F.R. § 141, require all public water utility systems to optimize corrosion control to minimize lead contamination resulting from the corrosion of plumbing materials. Even at relatively low levels of exposure, there are concerns to include the possibility of an interference with red blood cell chemistry, delays in normal physical and mental development in babies and young children, slight defects in the attention span, hearing, and learning abilities of children, kidney problems, and increases in the blood pressure of some adults. Title 40 C.F.R. § 141.80(c) establishes an action level for lead in drinking water of 0.015 milligrams per liter (mg/l), which is the equivalent to 15 parts per billion (ppb). This action level was not designed to measure health risks from water represented by individual samples. However, as the EPA states, it is a statistical trigger value that, if exceeded, requires more treatment, public education, and possible lead service line replacements. Systems are required to monitor a specific number of customer taps, according to the size of the system. If lead concentrations exceed 15 ppb in more than 10 percent of the taps sampled, the system must undertake a number of additional actions to control corrosion and to inform the public about steps they should take to protect their health.

The regulatory requirements directly related to the monitoring of the District's water supply for lead are contained in the Lead and Copper Rule (LCR) under the provisions of the Safe Drinking Water Act. Below is a description of pertinent sections of the rule as it relates to the issues discussed in this report.

EXHIBIT C: REGULATORY OVERSIGHT

Lead Service Line Replacement Requirements - 40 C.F.R. § 141.84

A water utility system *must* replace some of its lead service lines if it continues to exceed lead action levels after installing corrosion control treatment and/or completing source water monitoring and treatment. *Id.* § 141.84(a). Within 12 months of exceeding the lead action level, the water utility system is required to demonstrate in writing to the State that it has conducted a material evaluation to identify the number of lead service lines in its distribution system. *Id.* § 141.90(e)(1).⁶ The water utility system must also provide a lead service line replacement schedule. *Id.* The LCR requires the water utility system to replace at least 7 percent of the lead service lines in its distribution system annually from the time the replacement program begins. *Id.* The State may accelerate the schedule, if feasible, but it must notify the water utility system in writing of the shorter schedule within 6 months after the lead service line replacement program is triggered. *Id.* § 141.84(e). The water utility system is not required to replace a service line if the lead concentration in all properly collected service line samples from that individual line is no greater than 15 ppb. *Id.* § 141.84(c).

Partial Replacements/Notification to Residents. The LCR only requires the water utility system to replace the portion of the lead service line that it owns. *Id.* § 141.84(d). If the system does not own an entire lead service line that needs to be replaced, the system must notify the line's owner, or the owner's authorized agent, that the system will replace the portion of the service line owned by the water utility system. *Id.* The system must offer to replace the private owner's portion of the line; however, the system is not required to bear the cost of replacing the privately owned portion. *Id.* If a water utility system does not replace the entire service line, it must provide notice to the residents of all buildings serviced by the line that they may experience a temporary increase of lead levels in their drinking water, and it must provide guidance on measures consumers can take to minimize their exposure to lead. *Id.* § 141.84(d)(1). Further, the LCR requires the water utility system to inform residents that it will collect a sample from each partially replaced service line for lead content analysis, and collect the sample within 72 hours of the completion of the partial replacement. *Id.* Within 3 business days of receiving the lead content analysis results from that sample, the water utility system must report the results to the owner and residents served by the line. *Id.* The water utility system is also required to submit a report to the State within the first 10 days of the month following its receipt of the laboratory results verifying all partial lead service line replacement activities that have occurred. *Id.* § 141.90(e)(4).

⁶ Since WASA does not have primacy, WASA reports to the EPA who acts as the "State" enforcement authority.

EXHIBIT C: REGULATORY OVERSIGHT

Reporting to EPA. The water utility system must report to the State (or the EPA) that it has satisfied the LCR's requirement to replace at least 7 percent of the initial service lines within 12 months of exceeding the lead action level. *Id.* § 141.90(e)(2)(i). Alternatively, the water utility system can report that it has conducted sampling that demonstrates that the lead concentration in service line samples from individual lines is less than or equal to 15 ppb, and that the total number of lines meeting the criteria, in combination with the number of lines physically replaced, meets the 7 percent requirement. *Id.* § 141.90(e)(2)(ii). Thus, the 7 percent annual replacement total can include service lines that test under the 15 ppb lead limit but that have not been physically replaced. The system's annual report to the State must include the number and location of each physically replaced service line, as well as in the case of those lines tested in lieu of replacement, the sampling method, water lead concentration, and date and location of each lead service line sampled. *Id.* § 141.90(e)(3).

The water utility system may terminate the replacement program whenever first-draw samples collected and reported pursuant to its consumer tap monitoring program no longer exceed the lead action level during each of two consecutive monitoring periods. *Id.* § 141.84(f). However, if subsequently collected samples for a given monitoring period exceed the lead action level, the lead service line replacement program shall recommence. (*Id.*).

Public Education and Supplemental Monitoring Requirements –40 C.F.R. § 141.85

The LCR requires water utility systems that have exceeded the lead action level to inform system customers within 60 days about the health effects of lead, lead sources, and the steps that can be taken to reduce exposure to lead. *Id.* § 141.85(c)(2). These public education efforts specified by the LCR take many forms, and include billing inserts that are sent directly to consumers, pamphlets, or brochures delivered to certain organizations, newspaper notices, and public service announcements. *Id.* The public education program must be repeated every 12 months until the water utility system no longer exceeds the lead action level, with the exception that the public service announcements must be repeated every 6 months. *Id.* § 141.85(c)(3). Within 10 days after the end of each 6- or 12-month period, the system must submit a written report to the State demonstrating that the system has delivered the public education materials to customers and listing all newspapers, radio and television stations, and facilities and organizations to which the system delivered public education materials. *Id.* § 141.90(f)(1).

Content of Notification to Customers. When the lead action level is exceeded, the water utility system must insert notices in each customer's water utility bill that contain certain LCR-specific language and must include an alerting message in large print on the water bill itself. *Id.* § 141.85(c)(2)(i). If the water utility system has a billing cycle that does not include a billing within those 60 days, or if major changes to the billing system would be

EXHIBIT C: REGULATORY OVERSIGHT

necessary to insert the information, then the water utility system may use a separate mailing to deliver the information, so long as the information is delivered to each customer within the 60 days. (*Id.*).

Public Information Notices. The LCR specifies language for use in all printed materials distributed through a water utility system’s public education program. *Id.* § 141.85(a). Additional information may be included in the materials, so long as it is consistent with the LCR-specific information and is in plain English that lay people can understand. *Id.* § 141.85(a)(1). Subject to State approval, a water utility system may delete information pertaining to lead service lines only if there are no lead service lines anywhere in the water utility system service area. *Id.*

Certain LCR-specific language must also be submitted to the editorial departments of the major daily and weekly newspapers circulated in the community. *Id.* § 141.85(c)(2)(ii). Pamphlets and/or brochures containing certain portions of LCR-specific language must be delivered to a number of facilities and organizations, including the following: schools; health departments; local Women, Infants, and Children and/or Head Start Programs; hospitals; clinics; pediatricians; family planning facilities; and local welfare agencies. *Id.* § 141.85(c)(2)(iii) Public service announcements, which include certain LCR-specific information, must also be submitted to at least five of the radio and television stations with the largest audiences that broadcast to the community served by the water utility system. *Id.* §§ 141.85(b) and 141.85(c)(2)(iv).

A water utility system may discontinue delivery of public education materials if the system has not exceeded the lead action level during the most recent 6-month monitoring period. *Id.* § 141.85(c)(6). The system must recommence such public education if it subsequently exceeds the lead action level during any monitoring period. *Id.*

Additionally, a water utility system that exceeds the lead action level must offer a means to sample the tap water of any customer who requests monitoring. *Id.* § 141.85(d). The LCR does not, however, require the system to pay for the collection or analysis of the sample, nor is the system required to collect and analyze the sample itself. *Id.* § 141.85(d).

Monitoring Requirements for Lead and Copper in Tap Water – 40 C.F.R. § 141.86

Under the LCR, water utility systems such as WASA are required to monitor lead levels of consumers’ tap water at 6-month intervals, using specified methods, unless the system qualifies for what is known as “reduced monitoring,” a status that allows the system to monitor for lead on an annual or triennial basis in certain circumstances and to collect tap samples from a reduced number of sample sites. *Id.* § 141.86(d). In brief, upon written approval from the State, a system may qualify for reduced monitoring on an annual basis if it

EXHIBIT C: REGULATORY OVERSIGHT

demonstrates that it has maintained a certain range of the State’s water quality parameters during each of two consecutive six-month monitoring periods *Id.* § 141.86(d)(4)(ii), or for 3 consecutive, 1-year monitoring periods *Id.* § 141.86(d)(4)(iii). Additionally, any system that demonstrates for 2 consecutive 6-month periods that the tap water lead level is less than or equal to 5 ppb (a level significantly below the LCR’s 15 ppb lead action level) and that the tap water copper level is less than or equal to 0.65 mg/L may reduce sampling to once every 3 years. *Id.* § 141.86(d)(4)(v).

Using a Materials Evaluation to Identify Scope and Size of Sampling. In order to ensure that the appropriate number of monitoring sites for tap samples is available, the LCR requires each water utility system to complete a “materials evaluation” identifying the total number of lead service lines in its water distribution system. *Id.* § 141.86(a)(1). Upon completion of the materials evaluation, the water utility system identifies the requisite number of sampling sites at which it must test the water — in the case of WASA, 100 sites if subject to standard monitoring and 50 sites if subject to reduced monitoring. *Id.* § 141.86(c). Unless there are an insufficient number to complete the sampling pool, these sites must be single-family structures that (i) contain copper pipes with lead solder installed after 1982, or contain lead pipes and/or (ii) are served by a lead service line. *Id.* § 141.86(a)(3). If this group of “tier I sampling sites” does not yield a sufficient sampling pool, the water utility system then looks to “tier 2 sampling sites,” which are buildings and/or multiple-family residences that (i) contain copper pipes with lead solder installed after 1982 or contain lead pipes and/or (ii) are served by a lead service line. *Id.* § 141.86(a)(4). If either of these options does not provide enough sampling sites, the LCR outlines additional ways to expand the sampling pool. *Id.* § 141.86(a)(5). If a water utility system’s distribution system includes lead service lines, the water utility system is required, if possible, to draw 50 percent of its sampling from sites that contain lead pipes or copper pipes with lead solder, and 50 percent of the samples from sites served by a lead service line. *Id.* § 141.86(a)(8).

Procedures for Drawing and Collecting Water Samples. To collect monitoring samples, either the water utility system may collect “first-draw” samples directly from the selected sites, or the system may allow residents to collect samples themselves after proper instruction on collection procedures. *Id.* § 141.86(b)(2). Each sample collected must be one liter in volume, must have stood motionless in the plumbing system for at least six hours, and must be collected from cold kitchen tap water or bathroom sink tap water. *Id.* Samples collected by the water utility system from the service line may be gathered in a number of ways, but must be one liter in volume and must have stood motionless in the lead service line for at least six hours. *Id.* § 141.86(b)(2) and (b)(3). The water utility system is required to collect follow-up tap samples from the same sampling site in which it collected a previous sample; if the system is unable to gain access to such sites, then it may collect the follow-up sample from a new site that shares the same targeting criteria and is within reasonable proximity to the original site. *Id.* § 141.86(b)(4).

EXHIBIT C: REGULATORY OVERSIGHT

The 90th Percentile Lead Level. To ensure an accurate determination of the 90th percentile lead level, the LCR provides a mechanism whereby flawed samples can be “invalidated,” meaning that they do not count toward determining the 90th percentile or toward meeting other requirements of the LCR. Samples can be invalidated for one of four reasons: (i) the laboratory establishes that improper sample analysis caused erroneous results; (ii) the State determines that the sample was taken from a site that did not meet the LCR’s site selection criteria; (iii) the sample container was damaged in transit; or (iv) there is substantial reason to believe that the sample was subject to tampering. *Id.* §§ 141.86(f)(1)(i)-(iv). WASA must report to the EPA all samples, including those for which it requests invalidation, and must provide all supporting documentation for any sample invalidation. *Id.* § 141.86(f)(2). Any decision to invalidate a sample must be in writing, describing both the decision and the underlying rationale. *Id.* § 141.86(f)(3). The rule specifically provides that samples may not be invalidated solely because a follow-up sample yields a test result higher or lower than that of an original sample. *Id.* If, after invalidating samples, a system has too few samples to satisfy the requisite number of sampling sites that must be tested in the monitoring period, the system must collect replacement samples in a specified period from the same locations as the invalidated samples. *Id.* § 141.86(f)(4). If it is not possible to collect samples from the same sites, such additional samples should be collected from locations other than those already used for sampling during the monitoring period. *Id.*

Reporting Monitoring Period Results to EPA. Within 10 days after the end of each applicable monitoring period, the water system utility must report to the State certain information for all tap water samples, including (i) the lead level results of all tap samples and the location and selection criteria for each site, (ii) documentation for each tap water sample for which the system requests invalidation, (iii) the 90th percentile lead concentrations measured from among all water samples collected during each monitoring period, and (iv) a description of any site not sampled during previous monitoring periods and an explanation of why sampling sites have changed. *Id.* §§ 141.90(a)(1)(i)-(v).

EXHIBIT D: POTENTIAL CAUSES AND EFFECTS OF LEAD EXPOSURE AND CORRECTIVE ACTIONS UNDERWAY

The following information is not the opinion of the OIG. It is an accumulation of data from the following sources:

- discussions with WASA personnel, Washington Aqueduct personnel, and DOH personnel;
- excerpts from reports and other literature by water quality technicians, professors, and civil engineers;
- data published by the New England Journal of Medicine; and
- information posted on EPA's and the Center for Disease Control's website.

Theories About the Source of Lead in the Water

According to many experts, lead in drinking water likely results from the corrosion of materials which contain lead, are installed in a building's plumbing (such as lead solder, brass, bronze and other alloys containing lead,) and come in contact with water. Lead may also be found in the water distribution infrastructure. Usually this source of lead will be found in what is known as service lines, smaller pipes coming off the main water source at the street, which deliver water exclusively to a water meter. These service lines may or may not contain lead, depending on things such as material availability at the time the infrastructure was built or what the existing building code allowed at the time. In fact, the Safe Drinking Water Act (SDWA) requires that after June 19, 1986, only "lead free" pipe, solder or flux may be used in the installation or repair of (1) public water utility systems, or (2) any plumbing in a residential or non-residential facility providing water for human consumption, which is connected to a public water utility system. The amount of lead attributable to corrosion by-products in the water also depends on a number of factors, including the amount and age of lead bearing materials susceptible to corrosion, the way they were manufactured, how long water is in contact with the lead containing surfaces, and how corrosive the water is towards these materials. The corrosivity of water is influenced by, among other things, acidity, alkalinity, and hardness of the water.

Water Treatment Practices

It is also believed that the physical attributes of the water utility system could be the cause for the current lead levels in the District's water. Scientists and other water quality experts have been warning the EPA and the water industry that changes in drinking water treatment practices (such as enhanced coagulation⁷ and increasing use of chloramines⁸) can be expected

⁷ Coagulation: being clotted or congealed

⁸ Chloramines: any of various compounds containing nitrogen and chlorine.

EXHIBIT D: POTENTIAL CAUSES AND EFFECTS OF LEAD EXPOSURE AND CORRECTIVE ACTIONS UNDERWAY

to have serious adverse consequences on home plumbing systems. Additionally, problems of pinhole leaks and chloramines' leaching⁹ effect on leaded brass are among concerns expressed publicly. Water producers/sellers are required by EPA regulations to purify the water (remove bacteria and harmful particulates) before introducing it into the distribution system. EPA regulations specifically spell out the exact parts per billion of these particulates allowed in the water supply. Different types of chemicals are used to satisfy this requirement and there is a question in the minds of some experts whether these chemicals cause or accelerate the leaching of lead when they sit in service or home plumbing lines. According to some literature, there is a history of water industry problems whereby leaching occurs when chloramines come in contact with brass and copper.

Reaction to Drought

The drought of 2001-2002 and its impacts to the Potomac River water quality was also identified as a potential cause of the elevated levels of lead. The Washington Aqueduct's conversion from chlorine to chloramines was also thought to have an impact. In 2000, the Washington Aqueduct replaced free chlorine with chloramines, a change intended to address potential concerns with trihalomethanes in the District's water supply. When a switch back to chlorine was made, (from April 2, 2004, to May 8, 2004), lead level test results in homes with lead service lines were 25 to 30 percent lower than predicted.

Water System Maintenance

Another theory is that poor routine water supply system maintenance may contribute to the leaching process. For example, delivery system lines are recommended to be flushed each year. This process involves opening fire hydrants and flushing out any type of scale or film build up which may have occurred over the year. The distance between the hydrants combined with the water pressure at the opening determines how long to flush the service line. The District has not employed a consistent, regimented flushing program. In discussions with WASA and Aqueduct officials, it is believed that parts of the system had been flushed over the past two years, but it is believed that better results may occur if flushing occurred throughout the entire system every six months.

⁹ Leaching: the removal of materials by dissolving them away from a solid material.

EXHIBIT D: POTENTIAL CAUSES AND EFFECTS OF LEAD EXPOSURE AND CORRECTIVE ACTIONS UNDERWAY

Effects of Lead Exposure

Lead is a common metal found throughout the environment in lead-based paint, air, soil, household dust, food, certain types of pottery porcelain and pewter, and water. Lead can pose a significant risk to your health if too much of it enters your body. Experts agree that lead is toxic to almost every organ system, including the central nervous system, peripheral nervous system, kidneys, and blood.

Risks of Exposure

While the long-term effects of drinking water that has exceeded lead action levels are not clearly known, several possible health effects of lead ingestion through paint and dust have been noted by doctors and other healthcare professionals. Studies have shown that children exposed to lead have reduced potential for lifetime achievement and increased risk of social and behavioral problems. Even at relatively low levels of exposure, lead contained in drinking water adds to a person's total lead ingestion. With the increase of lead ingestion from all sources, concerns of the possibility of interference with red blood cell chemistry; delays in normal physical and mental development in babies and young children; slight defects in childrens' attention spans, hearing, and learning abilities; kidney problems; and increases in the blood pressure of some adults are noted. Fetuses that absorb lead from the mother are more likely to have developmental problems. Some epidemiologists report evidence that lead's effect on children can remain undetected for decades until psychiatric diseases, such as schizophrenia, emerge. Others have attributed impulsive and antisocial behavior, as well as juvenile delinquency, to lead exposure.

Most Vulnerable Populations

According to the Agency for Toxic Substances and Disease Registry (ATSDR), everyone is vulnerable to lead poisoning but it has been proven that children are more vulnerable than adults. Children are exposed to lead all through their lives and, can even be exposed to lead in the womb if their mothers have lead in their bodies. Babies and children can swallow and breathe lead in dirt, dust, or sand while they play on the floor or ground. Lead based paint in older houses can chip off and be ingested. (Some old paint is between 5-40 percent lead). Lead in drinking water is another source of lead ingestion, that can increase lead exposure levels. The point at which the precise ppb lead level in water lead becomes a health hazard is unknown because of the other ways lead can enter the blood stream. However, the health defects resulting from having lead in the bloodstream are well documented and, in fact, can cause death.

EXHIBIT D: POTENTIAL CAUSES AND EFFECTS OF LEAD EXPOSURE AND CORRECTIVE ACTIONS UNDERWAY

Levels of lead in the blood that only a few years ago were thought to be safe are today being challenged. For example, *The New England Journal of Medicine* recently published an April 17, 2003 article on, (Volume 348:1517-1526, Number 16), about a five-year study that found that lead is harmful to children at concentrations in the blood that are typically considered safe. The two Cornell scientists that conducted the study reported that “children suffer intellectual impairment at a blood-lead concentration below the level of 10 micrograms per deciliter (mcg/dl) -- about 100 parts per billion -- currently considered acceptable by the Centers for Disease Control and Prevention (CDC).” Susan Long, *Researchers: Low Lead Levels Pose Risk to Children’s Cognitive Functioning*, Cornell Chronicle, at [HTTP://www.news.cornell.edu/chronicle/03/4.17.03/10n_lead_levels.html](http://www.news.cornell.edu/chronicle/03/4.17.03/10n_lead_levels.html). (Apr. 17, 2003). They also found that the amount of impairment attributed to lead was most pronounced at lower levels. *Id.* In fact, Dr. Richard Canfield, lead author and a senior researcher in Cornell’s Division of Nutritional Sciences, stated that damage to intellectual functioning occurs at blood-lead concentrations that are below 10 mcg/dl. He stated that, “Given the relatively low exposure levels, we were surprised to find that the IQ scores of children with blood-lead levels of 10 mcg/dl were about seven points lower than for children with lead levels of 1 mcg/dl.” *Id.*

Total Lead Exposure

Officials from DOH explained that the blood lead level of concern by the medical professional industry is 10 deciliters. DOH refers to a model accepted by the EPA to identify the level of ppb at which the intake of lead becomes harmful (IEBUK Model). EPA regulations state that lead in drinking water, although rarely the sole cause of lead poisoning, can significantly increase a person's total lead exposure, particularly the exposure of infants who drink baby formulas and concentrated juices that are mixed with water. The model identifies lead in the water as an added factor – a percentage to the normally exposed levels occurring from exposure to lead in paint and dust and other sources. DOH official’s stated that the model suggests that an ingestion of 300 ppb over a period (again not specifically identified but thought to be 3 or 4 years) could contribute to as much as 20 percent of the amount of microliters found in a person’s blood stream. DOH officials confirmed other beliefs that it has been proven that there are subtle effects relating to neurological, digestive, and other effects that may not be clinically apparent.

EPA Efforts to Address Elevated Lead Levels

In response to WASA’s exceedance of the lead action level, the EPA’s efforts were concentrated on a review of the corrosion control treatment issue, offering technical assistance through contractors and agency staff to the Washington Aqueduct and WASA on

EXHIBIT D: POTENTIAL CAUSES AND EFFECTS OF LEAD EXPOSURE AND CORRECTIVE ACTIONS UNDERWAY

refinements to this treatment, and ensuring that WASA complied with the requirements of the LCR.

The EPA met with WASA staff on September 4, 2002, to discuss the activities that WASA needed to conduct in order to comply with the LCR. The main points of discussion at this meeting were the implementation of public education and lead service line replacement program requirements. This also included WASA resuming full lead and copper tap sampling. WASA expressed its intention to comply with the requirements of the LCR. Both EPA and WASA began the process of engaging contractors to conduct the corrosion control review.

The EPA secured a contractor who engaged an independent corrosion expert in May 2003 to research the cause of the increased lead levels. The expert presented a draft written report to the EPA in October 2003 and gave an oral presentation in November 2003. WASA developed a research strategy, which it presented to the Washington Aqueduct, Arlington County, the City of Falls Church, and the EPA in January 2004. In February 2004, the Technical Expert Working Group (“TEWG”) was formed to facilitate and expedite ongoing research to identify a long-term solution to the corrosion of lead from water pipes and fixtures in the District of Columbia. The TEWG consists of representatives from the EPA Region III, EPA Headquarters’ Office of Ground Water and Drinking Water, EPA’s Office of Research and Development, the Washington Aqueduct, WASA, the District of Columbia “DOH”, Arlington County, Falls Church, Virginia, and the Centers for Disease Control and Prevention. Based on the recommendation of and work performed by the TEWG, the EPA recently authorized the Washington Aqueduct and WASA to initiate introduction of the corrosion inhibitor orthophosphate to the four high pressure zones, a hydraulically isolated portion of WASA’s distribution system. Absent any unforeseen problems and subject to the EPA’s approval, the system-wide, optimal corrosion-control treatment ultimately will be modified to include application of a corrosion inhibitor to maintain reduced levels of lead in the entire District of Columbia distribution system.

On April 30, 2004, EPA approved the lead-reduction plan that the TEWG proposed to fix the District’s lead problem. Based on recommendations by the TEWG, WASA implemented a partial system test using orthophosphates at its Fort Reno Pumping Station. The Aqueduct added orthophosphate to a portion of the District’s water on June 1, 2004, with plans to introduce the chemical into the entire system by September 1, 2004, which is expected to counteract the corrosive effects on lead pipes of the treated water. To date, tests results are favorable. However, specific results from this added chemical will not be available for several months.

**EXHIBIT D: POTENTIAL CAUSES AND EFFECTS OF LEAD
EXPOSURE AND CORRECTIVE ACTIONS
UNDERWAY**

Additionally, WASA, in conjunction with the Washington Aqueduct and the EPA, has implemented a 6-year, \$300 million project to replace all known lead service lines and a public education program, the main objective of which is to reduce the corrosivity of treated water once the action level has been exceeded. WASA officials have emphasized that optimizing corrosion control in the treatment process has, and continues to be, the critical next step in addressing this issue.

EXHIBIT E: COORDINATION WITH OTHER REPORTING ENTITIES

Group	Members/Composition	Focus
EPA	EPA Officials	Review WASA's historical compliance with the LCR.
Integrity Task Force	Council of the District of Columbia Chairs: Committee of the Whole, Committee on Human Services, and Committee on Public Works and the Environment	Provide oversight on lead issues. Schedule hearings as needed.
Interagency (Mayor's) Task Force	Officials from: Mayor's office, WASA, Washington Aqueduct, DOH, DDOT, EMA	Review and report on efforts various District government entities were making to address the lead issue and to offer forward-looking recommendations.
Technical Expert Working Group	EPA, Aqueduct, WASA, Engineers	Identify a group of engineers to evaluate water treatment processes and perform chemical tests using phosphates to offer possible solutions to elevated lead levels.
D.C. Appleseed Center	Advocacy Group	Review the statutory and regulatory framework in place to address lead-related health emergencies, as well as best practices of other jurisdictions that have addressed comparable issues.

EXHIBIT E: COORDINATION WITH OTHER REPORTING ENTITIES

Group	Members/Composition	Focus
Covington & Burling	Law firm hired by WASA's Board of Directors.	To provide an independent report on the events surrounding the identification of elevated lead levels.
Government Accountability Office	Government Auditors	Determine when WASA knew what; focus on national issues, and benchmarking with other cities.
Ecologix Group, Inc.	Firm hired by the Chairman of the Committee on Public Works and the Environment.	Examine governance of water authority around the Nation, and propose changes to the management of WASA; the members of the Board.

EXHIBIT F: PUBLIC NOTIFICATION REPORTING REQUIREMENTS

According to 40 C.F.R. § 141.205, the following elements must be included in the public notice for violations of National Primary Drinking Water Regulations (NPDWR) or other situations requiring a public notice:

1. A description of the violation or situation, including the contaminant and the contaminant level(s) (as applicable);
2. Date of the violation or situation;
3. Any potential adverse health effects resulting from the violation or situation;
4. The population at risk, including particularly vulnerable subpopulations who have been exposed to the contaminants;
5. Whether alternative water supplies should be used;
6. What actions consumers should take, to include seeking medical help;
7. What corrective steps the water system is taking;
8. When the water system expects to return to compliance or resolve the situation;
9. The name, business address, and phone number of the water system, operator, (or designee) as a source of additional information; and
10. A statement to encourage the recipient to distribute the public notice to other persons served.

EXHIBIT G: OIG COMMENTS TO WASA'S RESPONSE TO THE DRAFT REPORT

Prior to the issuance of the report, the OIG met with WASA officials on several occasions to discuss the findings and recommendations contained in our draft report. Based on those meetings, we have revised language contained in the report to more accurately depict WASA's position on the issues. The changes made did not impact the findings or recommendations.

On December 6, 2004, WASA provided a written response to the recommendations in our draft report. In general, management concurred with the report and provided a listing of actions taken or planned to address each recommendation. Exhibit G contains the OIG's comments to WASA's responses related to clarification on selected issues contained in the draft report. WASA's complete response to the report and the recommendations is included at Exhibit H.

In regard to recommendation number 12, WASA's comments are noted. However, due to the history of communications between WASA and DOH officials and the fact that other reviews have identified a similar need, we ask WASA to reconsider its position on the development of a MOU between the agencies. A MOU would define both agencies' roles and responsibilities and the expert advice each agency can provide in the area of water quality management. Additionally, a MOU would assure that there is a mutual understanding regarding the fundamental aspects of what information is to be shared and the frequency and manner of transmission.

Lead Service Line Replacement Efforts

WASA refuted the language in this section of the report stating that it "*suggests that the Safe Drinking Water Act and the LCR include 'optimal corrosion control' in drinking water treatment as an option, and as a potentially less effective option compared to physical service line replacement – a misunderstanding of the LCR, the chemical and the engineering challenge of effectively treating and delivering safe drinking water.*" District of Columbia Water and Sewer Authority Response to Recommendations p. 11.

The OIG understands the requirements of the LCR. It was not the intention of the OIG to assess the effectiveness of the method used by WASA to comply with the LCR, only to report WASA's actions taken in response to exceeding the action level and to ensure that WASA complied with the requirements of the LCR.

The main points of this finding were that WASA: 1) used a mechanism to "test in lieu of replacement", which was allowable by regulation, without regard to using the lead service line data for replacement or even prioritization efforts; 2) did not use available data to prioritize replacement efforts, due to stringent timeframes and deadlines imposed

EXHIBIT G: OIG COMMENTS TO WASA’S RESPONSE TO THE DRAFT REPORT

by EPA; and 3) did not conduct required follow-up testing of partial line replacements, which was required by regulation, due to the lack of cooperation by residents – a factor,

WASA officials stated that was not in their control. WASA officials have repeatedly stated that they only began replacing service lines based on the requirement imposed on them by the LCR once the action level was exceeded, and that WASA has historically used corrosion control in drinking water treatment as their main plan to ensure compliance with the LCR.

Potential Causes and Effects of Lead Exposure and Corrective Actions Underway

WASA responded that language in this section of the report may cause confusion given the technical nature of the subject matter. Additionally, given the very strong public interest in this matter, WASA officials believed that additional information and comment are required. WASA’s comments are noted and included in their entirety.

Exhibit D is based on several assumptions and may be construed as the “worst case scenario.” Regardless, we believe it is important to show the potential causes and effects of lead exposure and corrective actions underway compiled from discussions with WASA personnel, Washington Aqueduct personnel, and DOH personnel; excerpts from reports and other literature by water quality technicians, professors, and civil engineers; data published by the New England Journal of Medicine; and information posted on EPA’s and the Center for Disease Control’s website.

EXHIBIT H: WASA'S RESPONSE TO THE DRAFT REPORT



WASA

DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY

5000 OVERLOOK AVENUE, S.W., WASHINGTON, D.C. 20032

OFFICE OF THE GENERAL MANAGER
TEL: 202-797-2809
FAX: 202-797-2333

December 6, 2004

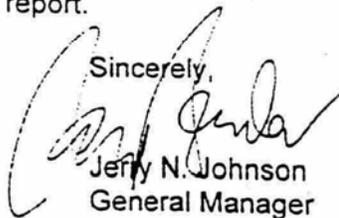
Mr. Austin A. Andersen
Interim Inspector General
Office of the Inspector General
717 14th Street, N.W.
Washington, D.C. 20005

Dear Mr. Andersen:

Enclosed is WASA's response to your draft report on "Audit of Elevated Levels of Lead in the District's Drinking Water". As noted in the response, we are in agreement with your recommendations and believe we have implemented, or are in the process of implementing, actions that address the recommendations. I appreciate your review of our activities to ensure our safe provision of drinking water to the residents of the District of Columbia, and our customers.

Please contact me if you have any questions about our response or need any further information to finalize your report.

Sincerely,



Jerry N. Johnson
General Manager

Enclosure

EXHIBIT H: WASA'S RESPONSE TO THE DRAFT REPORT



District of Columbia Water and Sewer Authority
Response to Recommendations

District of Columbia Office of the Inspector General
Special Review

DCWASA Response to Elevated Lead Concentrations in Tap Water

December 2004

EXHIBIT H: WASA'S RESPONSE TO THE DRAFT REPORT

At the request of District government elected officials, the District of Columbia Office of the Inspector General (“OIG”) initiated a special review of the actions taken by the District of Columbia Water and Sewer Authority in response to elevated lead concentrations in some District of Columbia homes. These homes were determined to have elevated concentrations in tap water during the Authority’s routine regulatory water sampling program conducted and reported to the EPA under the federal lead and Copper Rule (“LCR”) for the year 2002-2003.

The steps taken by the Authority (or the Authority in conjunction with other agencies) now fully address the requirements of the law and the need to take extra steps that go well beyond the requirements of the law to inform and reassure customers and the general public about their concerns, including but not limited to:

- Washington Aqueduct implementation of a new treatment (orthophosphate)
- WASA distribution of 38,224 water sample test kits (20,668 test kits have been returned by customers for analysis since January)
- WASA distribution of 34,786 water filters and replacement cartridges
- WASA implementation of a program to replace all lead service lines by 2010
- WASA presentation of regular briefings and customer newsletters on the topic

This District of Columbia Water and Sewer Authority Response to the OIG Special Review is intended to provide the Authority response to the OIG Special Review Recommendations. It will also:

- 1) note the multiple reviews that are completed or underway on this subject;
- 2) explain the Authority Board and management responses to the OIG Special Review and similar report “findings”;
- 3) summarize the general requirements of the LCR;
- 4) offer important clarifications on six (6) selected issues of fact in the OIG Special Review report given the complexity or technical nature of the subject matter:
 - Lead Service Line Replacement Efforts (2003 replacements)
 - Customer Information System
 - Lead Service Line Replacement Efforts (corrosion control)
 - Availability of Federal Funds
 - Written Material Provided to Customers
 - Potential Causes and Effects of Lead Exposure.

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The Authority Cooperates With Review/Agrees with the OIG Recommendations
A number of other reviews of the Authority’s management of this issue have been underway for a number of months. Although not all have concluded, several are complete, and have been made public. The Authority has fully cooperated with each of these inquiries, responding to each request for information which may have required the submission of one or all of written and oral testimony, correspondence, other documents, and personal interviews.

The District of Columbia Water and Sewer Authority (“the Authority” or “WASA”), however, does not necessarily agree with all of the findings that have been produced from these reviews, including the OIG Special Review. The Authority’s position on compliance with the LCR regulations has frequently been set forth in public statements, sworn hearing testimony and in filings submitted in legal proceedings.

Along with the OIG Special Review, the Authority has participated in a number of other audits and/or reviews, including:

- An Environmental Protection Agency LCR compliance audit - complete.
- A Covington and Burling investigation, at the request of the Board of Directors, of the Authority’s lead monitoring activities - complete.
- A federal Government Accountability Office review - underway.
- Two United States House Committee on Government Reform hearings.
- A United States House Energy and Commerce Subcommittee on Environmental and Hazardous Materials Subcommittee hearing.
- A United States Senate Environment and Public Works Fisheries, Wildlife and Water Subcommittee hearing.
- Approximately 12 District Council Public Works and the Environment hearings.
- An Interagency Task Force on Lead in Drinking Water (convened by Council Committee on Public Works and City Administrator) - complete.

Context – The LCR and What Exceeding the Lead Action Level Means

The context for this series of reviews and the Authority’s response to each is the effectiveness of the Water and Sewer Authority’s implementation and adherence to provisions of the federal Lead and Copper Rule or the “LCR” which are now the subject of an ongoing national debate.

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Generally two factors determine the levels of lead in tap water in the District: 1) the presence of lead in pipes that connect specific addresses to water mains and in internal plumbing fixtures, and 2) the success of the drinking water treatment process in reducing the natural tendency of water to corrode metals (it is this corrosion that causes the lead to leach from materials that contain lead.)

The LCR requires the Authority test tap water samples for lead in 50 to 200 homes. The Authority and all water systems take a number of actions when the levels of lead in these samples exceed a certain benchmark (15 parts per billion) in over ten percent of all the samples taken in a 12-month period. When this "action level" is exceeded, a system must:

- 1) Ensure that the water treatment process reduces corrosion/lead leaching
- 2) Provide public information on the effects of environmental lead exposure
- 3) Replace or "test to clear" seven percent of the lead service lines annually.

The Authority Response to OIG Special Review Recommendations

It is very important to note that recommendations made as part of these reports, including the OIG Special Review, are consistent with initiatives that have been completed or are already underway at the Authority. The Authority strongly concurs with the basic thrust of the OIG Special Review Recommendations. In fact, the Authority had either initiated or completed the implementation of these latest proposals before October 1, 2004.

1. Establish and implement policies and procedures that identify WASA personnel and their responsibilities as they relate to ensuring compliance with the Lead and Copper Rule, and the actions required to be taken when the District's drinking water exceeds lead action levels.

It is clear from the WASA Organization Chart and Position Requirements that the Water Quality Manager is responsible for routine sampling, reporting of the results to WASA management and related actions. This responsibility has been reinforced and clarified with a recently adopted Standard Operating Procedure for Sampling Invalidation. The actions to be taken when any provision of the National Primary Drinking Water Regulation is not met have been codified in a May 2001 document entitled: Public Notification Plan- Drinking Water. This document proscribes actions to be taken in communicating any non-compliance to the public. The LCR itself is also very specific as to the requirements when action levels are exceeded; however the recent exceedance has resulted in supplemental check lists to be followed by WASA staff to ensure compliance with all EPA LCR regulations.

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The Authority has already developed a set of procedures to streamline internal coordination of compliance requirements that are monitored by the Office of the General Counsel, and which are implemented by designated personnel within the Departments of Water Services, Engineering and Technical Services, and Public Affairs. A new position established within the Office of the General Counsel will focus on regulatory compliance across the Authority.

The Authority has also implemented a standard operating procedure that requires that all official Authority communication to and from the EPA be made through designated points of contact within both organizations. Official communications from the Authority to the EPA must in every instance be documented.

2. Develop a documented methodology for selection of participants for WASA's annual monitoring efforts. In developing the selection methodology, WASA should identify selection criteria to ensure that a representative sample is used, and that addresses with a history of reported elevated lead levels are be given priority consideration when selecting participants.

WASA drafted a document entitled: Lead and Copper Site Selection Criteria. This document was prepared and submitted to EPA on June 25, 2004. It was subsequently discussed with EPA and resubmitted, incorporating EPA comments, on November 24, 2004.

3. Establish controls that would assign responsibility for conducting water sample testing, maintaining the corresponding documentation, and maintaining receipt of water test results from the Washington Aqueduct or other testing laboratory. Procedures should be established that delineate timelines for notifying all stakeholders, both internal and external to WASA, when test results show lead levels exceeding the EPA action level.

Please see the response to Recommendation 1.

The Authority, however, has also taken additional steps to review the structure and operations of the Division responsible for this function. Working with the Director of Water Services, the Deputy General Manager/Chief Engineer has concluded an evaluation of the current mission, organization and staffing of the Water Quality Division in order to refine its mission and improve its performance. The review evaluated all components of the function, including sampling program development, lead service program volunteer recruitment, as well as certain relevant critical path processes such as sampling invalidation procedures.

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The review also included other aspects of the mission, including monitoring, distribution system/water quality research, managing customer services/water quality complaints, and implementing the Division's regulatory compliance programs. The General Manager has approved the redefinition of the Division, including a staffing plan. Work with the Department of Human Resources to fill any remaining vacancies is underway.

4. Verify the accuracy of the data, including the metal content of each service line contained in WASA's CIS and establish controls to ensure that data is recorded accurately and completely.

WASA prepared a document entitled: Plan for Update of Materials Evaluation and Lead Service Line Inventory. This document was submitted to EPA, and comprises a plan to verify the accuracy of the material of all service lines for addresses in the WASA system. It includes a plan to determine the pipe material for the service lines at addresses for which there is no historical record; to install software improvements for the WASA CIS customer billing system that will provide WASA with a single source of accurate and reliable information on the service line inventory, and; to provide a process for updating data for this inventory. By letter dated September 29, 2004, EPA approved this plan. WASA submitted its first quarterly plan progress report plan to EPA by letter dated November 24, 2004.

5. Cross-train at least one other individual in the use of the CIS. Staff should be able to retrieve information and generate reports for use by management.

All customer service center representatives have been trained to use the CIS system to provide information to customers, and WASA managers routinely use the system to generate reports for senior and executive management, as well as the Board of Directors.

Please see the response to Recommendation 4.

6. Identify, in conjunction with WASA's plan to replace all "known" lead service lines, the content of the more than 25,000 "unknown" service lines and plan accordingly to replace those and any other service lines determined to be made of lead. Additionally, any partial replacements should be properly documented and tested to ensure that they meet EPA requirements and would qualify as lead-free.

Please see the response to Recommendation 4.

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WASA also prepared a document entitled: Plan for Update of Materials Evaluation and Lead Service Line Inventory, that will verify the composition of all service lines, including those for which there is no historical record. Partial replacements will be recorded in the CIS system. Partial replacements are tested within 72 hours as required under federal regulations. By definition, WASA can only replace the portion of a service line that is in public space. If a customer does not chose to replace the portion of a lead service line that rests in private space, then these service lines are not "lead free".

7. Establish separate budgets for the replacement of service lines to ensure that proper funding is available, that federal funding availability is explored, and sources for the completion of the work are identified, (whether it be through the use of WASA personnel, DDOT personnel, or a contractor).

WASA established a budget for the replacement of lead service lines for fiscal years 2003, 2004 and 2005. A lead services line replacement budget has been proposed for FY 2006. The Board of Directors has mandated the replacement of all lead service lines in public space by 2010, and this project is a discrete program the 10-year Capital Improvement Plan. The Authority has allocated the limited federal resources available through the federal Safe Drinking Water Act State revolving Fund to this initiative. Throughout the FY 2005 appropriations cycle, District officials advocated for additional federal support. For the current year, WASA has bid three contracts, and plans a fourth.

The extensive coordination with the District of Columbia Department of Transportation ("DDOT") that relies upon DDOT and its contractors to do service line replacements in public space whenever possible in conjunction with street repaving/reconstruction continues. This initiative has been appropriately budgeted and funded by WASA. Also, when water mains with lead services are replaced under DDOT road contracts, WASA provides designs as well as resources, while also undertaking appropriate efforts to work with residents to replace the lead services on private property.

8. Establish procedures that would notify residents of test results within 30 days of WASA obtaining the test results. Homes with test results exceeding maximum contaminant levels or recommended action levels should be provided with adequate information that clearly explains the violation, the test results, what precautions need to be taken to protect themselves, and the possible health effects of drinking water containing elevated levels of lead or other contaminants.

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The standard procedure for the voluntary testing program calls for resident/program participant notification of test results within 30 days of WASA receipt of the data.

The EPA has not established a maximum contaminant level (or "MCL") for lead, and an exceedance of the lead "action level" is not a violation of the Safe Drinking Water Act. WASA, however, concurs with the recommendation that comprehensive information should be provided to those who participate in the testing program. WASA is confident that adequate communications are being provided to customers, and would be provided in the future if there were to be an exceedance (including information on results, precautions and possible health effects).

9. Establish a mechanism to follow-up with those residents having notably high lead levels resulting from the tests conducted in conjunction with WASA's 2003 Lead Service Line Replacement Program, specifically, homeowners with readings above 300 ppb should be contacted to explain what steps WASA is taking to address this problem and what precautions are available to them. (We were informed that WASA is providing DOH officials with the names and addresses of homeowners/addresses testing over 300 ppb so that blood-screening tests could be conducted.)

WASA's standard procedure is to transmit all lead water test results exceeding 300 ppb to the Department of Health ("DOH") for appropriate follow-up. WASA has also consulted with DOH to establish appropriate guidelines for prioritizing physical replacements. WASA has also distributed water filters and replacement cartridges to all addresses identified as having a lead service line, as well as to any residence that participates in the testing program and has a second draw test result that exceeds 15 ppb.

10. Take steps to develop a plan to move those households with very high ppb readings to a priority list for the replacement of their lead service lines. Additionally, WASA should work collaboratively with the DOH, to recommend that those residents receive a blood-lead screening test.

Please see the response to Recommendation 9.

WASA implemented this program in 2003. As discussed, WASA has developed procedures to provide pertinent test data for households to DOH for follow-up, including an analysis of possible health implications and the potential need for blood screening, as appropriate. As earlier noted, WASA and DOH, in consultation with EPA, established priority criteria in the early spring of 2003 to rank households for lead service replacement according to key factors such as blood test results, water test

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results, and the presence of at risk individuals (pregnant and/or nursing women and children under 6 years).

- 11.** Establish controls that would ensure that EPA public notification and education requirements are met.

The Authority has also already developed a set of procedures to streamline internal coordination of compliance requirements that are monitored by the Office of the General Counsel, and which are implemented by designated personnel within the Departments of Water Services, Engineering and Technical Services, and Public Affairs.

The management has established as part of the Revised FY 2005 and Proposed FY 2006 Operating Budgets a position that will be responsible for establishing internal processes and timelines to ensure that procedures are in place to make sure that submissions are legally sufficient and are timely. This function will work with Authority departments to enhance our ability to anticipate and monitor emerging environmental policy and regulatory issues, as well as maintain accountability for compliance at the department level.

- 12.** Implement a Memorandum of Understanding between WASA and the DOH, which would identify controls that would ensure that channels of communication remain open with DOH officials and that data related to water test results and ppb levels are timely provided to DOH. Conversely, WASA needs to obtain data related to lead test results from DOH and any other pertinent information for use in line replacement prioritizations.

WASA concurs with the view that a positive and continuing exchange of information among the many professionals at DOH and WASA must be routine, consistent and effective, but does not agree that an MOU is necessary to ensure effective cooperation. The current relationship with DOH is vastly improved, and reflects a more creative and flexible partnership. The range of substantive issues around which the Authority and the Department of Health must communicate is very wide, diverse and complex. Clear communication at the executive leadership level effectively promotes good information exchange and cooperation across the various staff functions.

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Important Clarifications on Selected Issues

Lead Service Line Replacement Efforts: FY 2003 (Page 4)

Language in this section of the report seems to suggest that WASA officials may not have been attentive to data in 2003 that would have significantly impacted the plans for physical service line replacements in that year.

As noted in the report, the physical line replacements were required by law to be completed before October 1, 2003. In the absence of much of the test data that was to become available later in the year, the Weston statistical report was the best source of information that is required to implement a physical service line replacement program. It would have proven very problematic to collect the sample test data quickly enough to simultaneously match it with the type of information currently used to prioritize replacements or to mate these addresses effectively with a manageable construction contract.

Given the timeframe imposed under an EPA schedule modification, the Authority's 2003 plan concentrated on the blocks with the largest number of identified lead service lines. This plan was a reasonable approach, and as WASA officials have explained, the regulator -- EPA, also approved it.

Customer Information System (Pages 3 and 25)

Language in certain sections of the report may seem to suggest that CIS is itself unreliable or that the system may generate unreliable data.

In fact, WASA executives stated that the CIS system is a state-of-the-art billing and customer information system – the 'non-lead' related information in CIS is highly accurate. The lead-related information is a very small segment of the database. The system was implemented in 2001, and it was not envisioned at that time to be the source database for service line material type. WASA affirmed that the CIS database records are complete and accurate and contain all the known information related to a customer's property. A small subset of the CIS database includes service pipe material information based on paper source documents called "tap cards" that in some instances date back over 100 years. For the past three years, WASA has been entering the tap card information on literally tens of thousands of customer records; however, not every property has a tap card record.

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WASA executives have stated to OIG staff and publicly that the subset of the CIS database that includes service line material type is only about 80% accurate, based on the known accuracy of the original source data used to populate the CIS database. WASA executives also reiterated that there are no other known source records that can improve the accuracy of the data. WASA executives also stated that they did update blank service pipe material records in CIS with Weston data to improve the accuracy of the number of lead services within the District. WASA officials believe the CIS lead-related information database is the most accurate and reliable source of lead service line material and related information in the District of Columbia.

Lead Service Line Replacement Efforts (Pages 4 and 28)

Language in this section of the report suggests that the Safe Drinking Water Act and the LCR include “optimal corrosion control” in drinking water treatment as an option, and as a potentially less effective option compared to physical service line replacement – a misunderstanding of the LCR, the chemical and the engineering challenge of effectively treating and delivering safe drinking water.

Using the treatment process, as required in the LCR and by EPA, is the optimal solution for avoiding lead leaching from service lines and other plumbing fixtures that contain lead. The treatment methods (orthophosphate, zinc orthophosphate, pH control) result in a coating on the inside of pipes and fixtures to help prevent water coming into contact with metals containing lead.

This treatment solution was effective in the District, as approved by the EPA and implemented by the Washington Aqueduct for several years. WASA’s policy decision to replace lead service lines in public space only when they were encountered during other budgeted capital construction projects (water main or sewer line repairs and replacements, etc..) was prudent and consistent with the safe Drinking Water Act, the LCR, EPA’s guidance on this issue, and the evidence that the treatment process (optimal corrosion control) worked for a number of years prior to the exceedance.

Availability of Federal Funds (Page 30)

Language in this section of the report suggests that WASA officials may not have pursued available federal funding.

The federal State Revolving Loan program results in an annual \$10-11 million grant from the federal government to WASA for safe drinking water projects. This annual grant for the District of Columbia is a very small percentage of a much larger, but finite national pool of funds allocated to states and territories. WASA executives have explained that

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management worked with the EPA to allocate the District’s one percent of the revolving fund resources away from other WASA priority water quality improvement programs to the lead service replacement program – EPA has specifically stated that they cannot provide additional State Revolving Fund or other new resources to offset this transfer.

However, WASA’s leadership, Mayor Anthony Williams and the District Council have worked diligently to identify other non-categorical sources of federal funding and to advocate for special appropriations.

Written Material Provided to Customers (Pages 39 and 40)

Language in certain sections of the report state that WASA failed to meet a reporting deadline because a public notice distributed by WASA did not have very precise wording in the notification.

WASA’s notice in customers’ August 2003 water bills communicated the regulatory requirement’s information in a timely manner. That the notice did not use the exact language of the statute does not negate the fact that the informational mailing was completed within the required reporting period.

Potential Causes and Effects of Lead Exposure and Corrective Actions Underway (Pages 67 and 68)

Language in this section of the report may cause confusion given the technical nature of the subject matter. There is no evidence that elevated lead levels in drinking water have in fact caused any health effects in the District, and the available evidence is to the contrary. Also given the very strong public interest in this matter, additional information and comment is required.

Exhibit D represents an effort to come to grips with public health issues. It is a challenging section of the report, because it requires the integration of knowledge on water chemistry, public health, toxicology, and regulatory policy. Although some of the exhibit is accurate, other parts are technically flawed. WASA is not a public health agency. WASA contacted its health consultant, Dr. Tee Guidotti MD, MPH, George Washington University Center for Risk Science and Public Health, to obtain his assistance in preparing a detailed response to Exhibit D.

Assumptions

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Exhibit D is based on several tacit assumptions. The first is that drinking water contributes a sufficient quantity of lead to be substantially harmful. The second is that lead at levels associated with drinking water is associated with documented health effects. The third is that the risk of lead exposure was high and remained so throughout the period in question (2002 – 2004). A fourth assumption is that the elevation of lead in drinking water in the District was more than an exceedance of a federal target level, and constituted a violation of an established health standard. These assumptions cannot be supported.

The District's Experience

There is no evidence that elevated lead levels in drinking water have in fact caused any health effects in the District, and the available evidence is to the contrary.

The public health risk of lead, and the level in blood of District children has been dropping in the District for many years. Screening for elevated blood lead levels is required in the District for children one and two years of age. The blood lead levels have continued to fall through the period when elevated lead occurred in some households. During the same period, the screening program identified 64 children aged less than six years old whose lead levels were above the CDC level of concern (10 ug/dL). Most, 70 percent, lived in homes without lead service lines. In all 64 cases, a source other than drinking water was documented, usually lead paint in the home. The risk that remains and individual cases of elevated blood lead levels among children are due almost entirely to lead exposure from other sources, not drinking water.

Factors that Mitigate Exposure Levels

There is no proven contribution of drinking water to elevated blood lead levels in children (and also adults) in the District in part because the amount of lead that was likely consumed through drinking water was very possibly, medically insignificant, and because lead that is ingested is generally inefficiently absorbed by the digestive tract. Although its impact has been debated, when lead levels in tap water were found to be elevated, a community education program was implemented. Later, a filter distribution program and more intensive outreach program targeted high-risk families.

The Meaning of the Lead Action Level (15 ppb)

The lead action level that was exceeded in some tests was a target level established by EPA to trigger certain regulatory responses (such as lead pipe replacements and public outreach programs), not a health-based standard. The current health-based standard was established by the Centers for Disease Control and Prevention (10 µg/dL) in 1991. Although there has been discussion of lowering the CDC guidance, this has not yet occurred and neither EPA nor the DC Department of Health have adopted more stringent standards, and DC WASA does not have independent authority to set health standards.

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EPA’s Model

This section of the report may result in a misunderstanding by inadvertently exaggerating the actual risk that drinking water may pose to District families based on its use of the EPA model. The model used by EPA to assess the risk of elevated lead levels in water is based on a variety of assumptions that do not fit the reality of most families. These assumptions have to do with when the water is drawn, whether the lead level stays consistently elevated and how often a child drinks water from that particular tap. In most families, children do not drink water solely from one tap in large quantities with relatively little intake of fluids from other sources. Assumptions are also made regarding how much lead is absorbed by the body and other factors, most of which are approximations on the high side.

Although the assumptions are not particularly realistic, they are useful in identifying “worst case” scenarios that can be prevented, and so are useful for public health protection, by making exposure even less likely and lower when it does occur. These worst-case scenarios are intended to be highly protective but they do not accurately predict the likely effect of lead in drinking water on real children. The report correctly observes that there could be adverse health effects from lead ingestion only “if too much of it enters your body.” (p. 67) There is no real-world evidence that District residents were exposed to sufficient levels of lead from drinking water such that adverse health effects would result.

Exhibit D may also be misleading because it provides an overview of the health issues that can be associated with lead exposure but does not put them in context. Most importantly, the discussion does not specify the dose levels associated with the health effects being described. Thus, the report generally discusses the range of health effects associated with very high levels of lead exposure, far higher than what was seen in the drinking water. As a result, the discussion focuses on health effects seen at levels associated with traditional “lead poisoning” (digestive effects, death, kidney problems) without clarifying what exposure level is being discussed.