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Testimony of Marc Edwards, PhD before the
US House of Representatives Committee on Science and Technology, 111th Congress
Preventing Harm—Protecting Health: Reforming CDC’s Environmental Public Health Practices

EXPERIENCES AND OBSERVATIONS FROM THE 2001-2004 “DC LEAD CRISIS”

INTRODUCTION

I am the Charles Lunsford Professor of Civil and Environmental Engineering at Virginia Tech, where I conduct research at the interface of basic science, public health, corrosion control and environmental engineering. I have published over 100 peer-reviewed journal articles, made hundreds of technical presentations, and have been recognized with numerous awards including a Presidential Faculty Fellowship from the White House/National Science Foundation (1996) and a MacArthur Fellowship (2008). *Time* magazine named me amongst the 4 most important “Innovators” in water from around the world (2004) and just this year Villanova University awarded me the Praxis Award in Professional Ethics.

My undergraduate training in the basic/medical sciences (BS in Bio-Physics), my graduate degree in Environmental Engineering (MS/PhD), and my experiences with the Centers for Disease Control and Prevention (CDC) from 2005 to the present make me highly qualified to discuss key aspects of the agency’s public health practices. I have worked on the issue of elevated lead in Washington DC drinking water from 2001-2004, an event widely referred to as the “DC Lead Crisis,” since I was hired by the United States Environmental Protection Agency (US EPA) in 2003 to evaluate causes of the contamination. I testified on this issue before the US House Government Reform Committee in March 2004 and have worked on the issue as a volunteer ever since.

Before relating my experiences and observations, I disclose my position on certain matters discussed in this testimony. I believe that in some instances, elevated lead in US potable water is a public health concern. Other countries have studied this issue, determined that lead in water is a major correlate to elevated levels of lead in children’s blood, but have rationally weighed the different needs and decided that other problems are more deserving of public funding.¹ I respect, appreciate and can support such honest and open assessments. I also believe that lead paint and dust hazards pose a serious health threat, and I support all rational efforts to address them. I also believe that the vast majority of scientists and public health officials in the water industry, US EPA, local Departments of Health, and the CDC are conscientious and uphold very high ethical and scientific standards. I believe in the CDC’s mission. I also believe it is critically important that the CDC retain the public's trust. My testimony today should not be construed contrary to the above statements. Indeed, I offer today’s testimony in hopes of saving the CDC from itself.

My experiences and knowledge are primarily related to a publication entitled **Blood Lead Levels in Residents of Homes with Elevated Lead in Tap Water --- District of Columbia, 2004.**²

This paper was coordinated, prepared, and published by the CDC in their March 30, 2004 *Morbidity and Mortality Weekly Report* (MMWR) series. The MMWR series is often called “the voice of CDC” and “is the agency’s primary vehicle for scientific publication of timely, reliable, authoritative, accurate, objective, and useful public health information and recommendations.”³

This particular paper is henceforth referred to as the “CDC MMWR.” The paper had 21 co-authors, actions of three of whom are discussed in this testimony:

- 1) Mary Jean Brown, ScD, RN, Chief of the Lead Poisoning Prevention Branch at the National Center for Environmental Health (NCEH), CDC. Dr. Brown prepared the paper.
- 2) Lynette Stokes, PhD, MPH, who at the time of the paper’s writing was overseeing the blood lead testing program at the Washington DC Department of Health (DC DOH). Dr. Stokes was previously employed by CDC’s sister agency, the Agency for Toxic Substances and Disease Registry (ATSDR). Dr. Stokes is listed as 1st author of the paper.
- 3) Daniel R. Lucey, MD, MPH, interim head of the DC DOH. Dr. Lucey was involved in the DC Lead Crisis for just a few weeks before publication of the CDC MMWR. In his public statements, Dr. Lucey made it clear that he did not have experience on lead health issues, and that his actions and responses relied on the expertise of Dr. Brown and Dr. Stokes.

According to the CDC, contributions to the MMWR series “must contain new or original information or guidelines/recommendations that substantially increase understanding of a public health problem.”³

My testimony begins with a review of what was known about lead in drinking water prior to publication of the CDC MMWR and then gives a brief overview of the DC Lead Crisis. After describing how the destructive impacts of the CDC MMWR were amplified by reckless omissions destined to mislead readers, it briefly discusses some of the intermediate and longer-term repercussions of the publication. Speculation as to the CDC’s possible motivation to mislead readers and the public at large, and failure to clearly correct their misleading conclusions for years after being made well-aware of serious problems with them, set the stage for highlighting some of my own experiences with the CDC. The testimony provides substantive insights to deficiencies in the agency’s environmental public health practices.

HEALTH EFFECTS OF LEAD IN WATER: BEFORE THE CDC MMWR

Knowledge that elevated lead in water poses a public health concern dates back more than 2,400 years. In 312 BC, Vitruvius noted that “...water ought by no means to be conducted in lead pipes, if we want to have it wholesome.”⁴ Later work on the subject was succinctly summarized on March 5, 2004 in the Congressional testimony of MacArthur Fellow and Johns Hopkins University Professor Ellen Silbergeld, PhD:⁵

“...lead exposure via drinking water alone can by itself be sufficient to induce toxicity, especially in young infants. In a landmark paper in 1967, Sir Abraham Goldberg and his colleagues traced the etiology of a cluster of mentally retarded children in Glasgow to the storage of drinking water in lead lined tanks (Gibson et al 1967). Shannon and Graef (1989) reported the case of an infant poisoned by drinking water with a lead concentration of 130 ppb. EPA considers that ***‘lead at concentrations of 40 ppb or***

higher poses an imminent and substantial endangerment to the health of children and pregnant women” (bold italic emphases in original).

Dr. Silbergeld’s written testimony was accompanied by an extensive list of peer-reviewed scientific papers that linked elevated lead in drinking water to lead in blood, and by extension to adverse human health effects.

Additional research is noteworthy. For instance, to examine the role of (then legal) lead solder as a potential hazard, Ryu et al. (1983) tracked a group of 7 infants fed formula contaminated with 70 parts per billion (ppb) lead and another group of infants formula containing 10 ppb lead.⁶ The blood lead of the infants exposed to the lower level of lead increased by 1.1 ug/dL, whereas that of infants exposed to the higher level of lead rose by 8.3 ug/dL (Figure 1). A blood lead level of 10 ug/dL or higher is termed “a level of concern” by the CDC for children less than 6 years of age. Blood lead levels exceeding the CDC level of concern are also commonly referred to as “elevated” or “lead poisoning” in different localities. The blood lead of infants consuming formula with 70 ppb lead rose above the CDC 10 ug/dL level of concern after about 1 month of exposure (Figure 1).

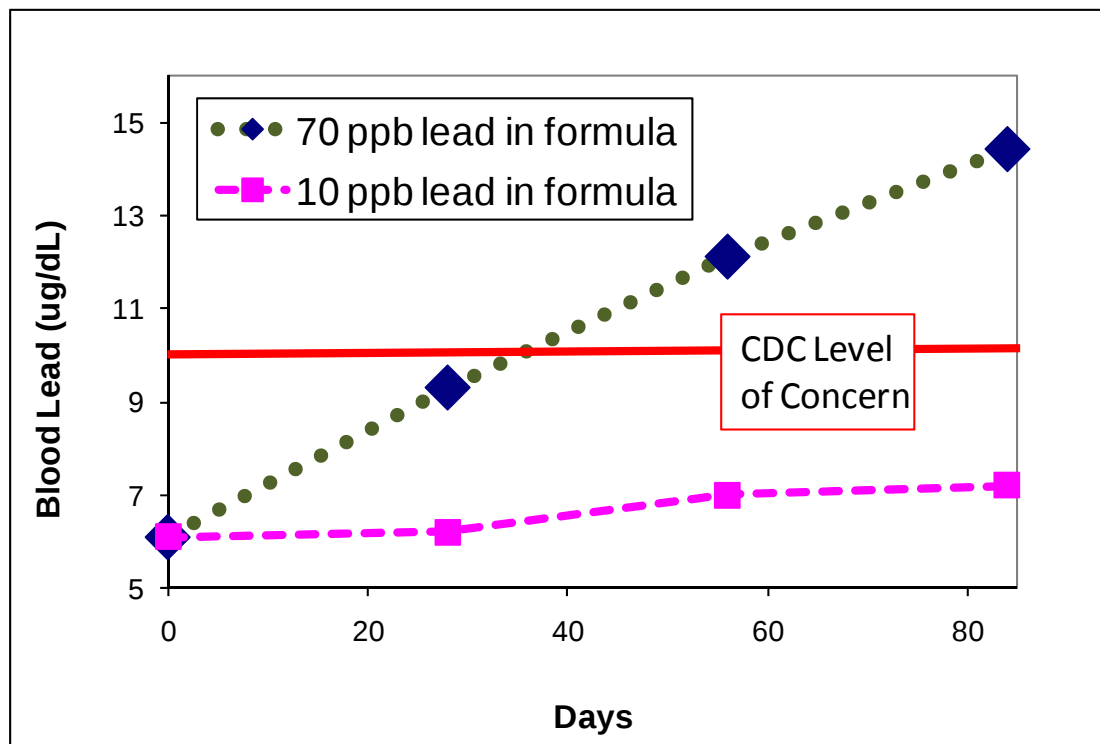


Figure 1. Effects of infant formula contaminated with lead on blood lead of infants (data from Ryu et al., 1983).⁶

Numerous other peer-reviewed research publications were consistent with the Ryu et al. results, including one co-authored by CDC’s Dr. Brown entitled “Childhood lead poisoning: Case study traces source to drinking water.”^{7,8} In that study, an infant whose blood lead rose to 42 ug/dL had no other lead source in the home but contaminated drinking water, and the flushed water contained just 20-80 ppb lead. These publications served as the basis for the US EPA Lead and

Copper Rule (US EPA, 1991), the nation's only federal regulation designed to protect consumers from exposure to elevated levels of lead in their drinking water.⁹

In early March 2004, after public disclosure of DC's serious lead in water contamination problems, and several weeks before the CDC MMWR's publication, researchers at the US EPA National Center for Environmental Risk Assessment used projections based on human health data to predict the likelihood of lead poisoning for DC infants consuming reconstituted infant formula for one year. I obtained copies of this work via the Freedom of Information Act (FOIA).¹⁰ The US EPA determined that if lead in DC tap water exceeded about 200 ppb, it was a virtual certainty that a DC infant's blood lead would rise above the CDC's 10 ug/dL level of concern (Figure 2). Even if the drinking water contained just 50 ppb lead, the agency calculated, blood lead levels of nearly 1 out of every 2 infants (i.e., 50% probability of elevated blood lead) would rise above CDC's level of concern. According to an inter-agency e-mail, the US EPA sent Dr. Stokes memos and results summarizing their work as part of an on-going conversation between the US EPA and DC DOH.

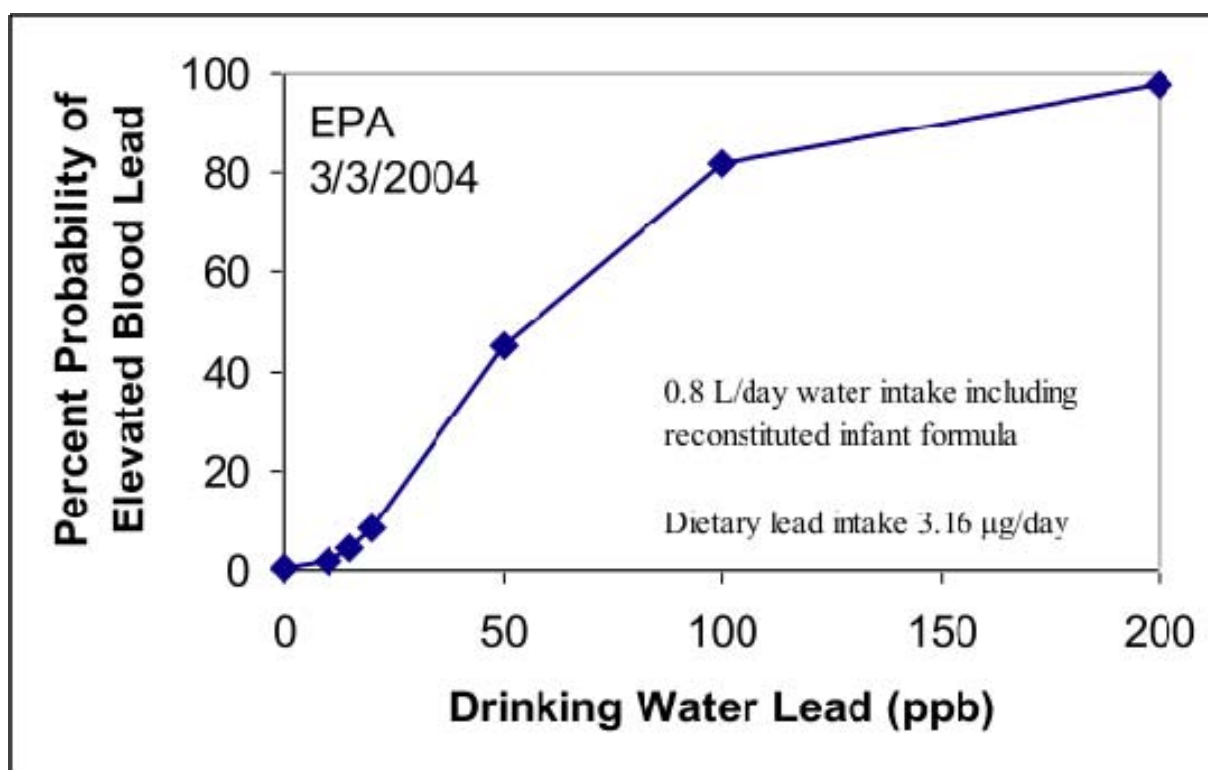


Figure 2. Data from US EPA projections made early March 2004, indicating the likelihood of elevated blood lead in DC infants as a function of water lead level. Infants were assumed to consume reconstituted formula for 1 year of exposure.

As a further point of reference, on February 2, 2005, the US Consumer Product Safety Commission (CPSC) was to classify a lead dose of 175 ug as an “acute health risk” to children:¹¹

“To avoid exceeding the 10 μ g/dL level of concern from acute exposure, CPSC staff recommends that children not ingest more than 175 μ g of accessible lead in a short period” (red underlined emphasis in original).

The new CPSC standard was used as a trigger for recalling millions of products. If this standard, which was applied to jewelry and toys (products *not* intended for human consumption), were applied to lead in water (a product intended for human consumption), the one-time ingestion of 1 liter of water at 175 ppb lead would also be classified as an “acute health risk” due to concerns related to elevated blood lead.

In conclusion, prior to publication of the “new information” in the CDC MMWR on March 30, 2004, there was extensive knowledge in the US public health community that water lead levels in the range of 20-70 ppb would constitute a serious public health concern (Table 1). Canada and the World Health Organization (WHO) also have health-based guidelines of 10 ppb for drinking water.^{12, 13}

Table 1. Relevant lead in water standards and associated public health guidance as of early March 2004; the key conclusion of the CDC MMWR, published on March 30, 2004; and the CPSC acute health risk criteria of early 2005, as applied to drinking water.

Source	Lead (ppb)	Health Guidance and Warning	Reference
Health Canada	10	Do not consume water	Health Canada (2003) ¹²
WHO	10	Health-based guideline	WHO (1993) ¹³
US EPA	40	Imminent and Substantial Endangerment to Children	US EPA (2004) ⁵
CPSC [#]	175	Acute Health Risk	CPSC (2005) ¹¹
CDC MMWR	300	“..no children were identified with BLLs >10µg/dL, even in homes with the highest water lead levels” of greater than 300 ppb	CDC MMWR (2004) ²

[#]Translated to water, based on assumed consumption of 1 liter water containing 175 ppb

THE DC LEAD CRISIS AND THE CDC MMWR

The lead levels in DC drinking water from 2001-2004 were unprecedented in modern history. Some samples exceeded “hazardous waste” criteria (>5,000 ppb) and the contaminated water was present in tens of thousands of DC buildings including homes, apartments, offices, schools, daycare facilities and even the US Congress. From 2001-2004 the extent of the problem was hidden from the public by illegal actions, unethical behavior and bungling of numerous government agencies as detailed in investigations led by current US Attorney General Eric H. Holder, the US Government Accountability Office (GAO), hearings before five Congressional Committees, and hundreds of articles in the *Washington Post* and elsewhere.¹⁴⁻²⁰ Some findings from these investigations and the role of each agency are briefly summarized in Table 2.

Due to the actions and inactions of these government agencies, consumers of DC tap water including pregnant women and their fetuses, children attending schools and daycare centers, commuters, tourists and even members of the US Congress were at relatively high risk of exposure to lead in water hazards from 2001-2004. The public was for the most part entirely

unaware of the contamination, and for almost three years did not receive adequate warnings to use simple actions that would reduce or eliminate the hazard (e.g., use of filters, bottled water or flushing).

Table 2. Key agency involvement in the DC Lead Crisis. For details see references.¹⁴⁻²⁰

Agency	Key Role
Washington DC Water and Sewer Authority (DC WASA)	Distributed water to DC consumers. Hid the extent of the contamination from early 2001 by failing to report sampling data that showed high lead in water, firing a whistleblower who tried to alert US EPA to the high water lead levels, and distributing consumer education materials that downplayed the severity of the hazard.
Washington DC Department of Health (DC DOH)	Knew about the lead in water problem in 2002. Head of DC DOH refused to help DC WASA with public health response, and several DC DOH employees were fired for their role in the lead crisis. Dr. Stokes, listed first author of the CDC research which is the focus of this testimony, was coming under scrutiny by the press for not considering water as a possible source of lead poisoning for children throughout 2003, despite personal knowledge of DC's lead in water hazards in 2002.
US EPA Region III (US EPA R3)	Knew about the emerging lead in water problem as far back as August 2001. Approved DC WASA's consumer education language that downplayed the extent of the hazard. Because Washington DC is not a state, US EPA R3 has primacy (or direct responsibility) for problems with the District's water.
US EPA Office of Water (US EPA OW)	Developed well-intentioned regulation on disinfection by-products that prompted Washington DC to switch from chlorine to chloramine disinfectant, which inadvertently triggered the lead contamination.
US Army Corp of Engineers	Responsible for treating the water. Failed to implement a sound corrosion control plan, which coupled with chloramine use, created corrosive conditions when the water came into contact with DC WASA's lead pipes, and the lead-containing plumbing systems of DC residents.
Centers for Disease Control and Prevention (CDC)	Initially portrayed as an uninvolved third party, CDC was responsible for the CDC MMWR, which is the focus of this testimony. The CDC paper concluded that during the lead crisis "no children were identified with BLLs >10 μ g/dL, even in homes with the highest water lead levels."

When the extent of the lead in water problem was first revealed in the *Washington Post* on January 31, 2004,²¹ the public was fearful of the harm done to DC's children, and outraged at the responsible agencies' multi-year and gross negligence. Lead, which is perhaps the best-known environmental neurotoxin, affects adversely and irreversibly every major organ system in the human body. Developing fetuses and infants are most vulnerable to harm from exposure.

On March 8, 2004, the international law firm Paul Hastings filed a class action lawsuit against DC WASA and DC City Government, and gave formal notice to the US EPA, and the Army Corps of Engineers of a potential lawsuit. The press release stated that the lawsuit was brought on behalf of two young children with lead in water levels of 435 and 310 ppb, and that

potentially tens of thousands of "...DC residents have been unwittingly exposed to lead, a serious toxin."²²

A few weeks later the CDC released the CDC MMWR, purportedly investigating the impacts of the high lead in water on the blood lead of DC residents. Contrary to reasonable expectations based on prior research (Table 1), the CDC paper concluded that no children had experienced elevations to blood lead levels that exceeded CDC's level of concern as a result of the DC Lead Crisis:

"...although lead in tap water contributed to a small increase in BLLs in DC, no children were identified with BLLs $>10 \mu\text{g/dL}$, even in homes with the highest water lead levels. ...Water was collected from homes with a high probability of having lead service pipes; the March 2004 BLL screening program was limited to families living in homes with the highest water lead levels, and the routine blood lead surveillance program focused on identifying children at highest risk for lead exposure. For these reasons, the percentages of BLLs $>5 \mu\text{g/dL}$ or $>10 \mu\text{g/dL}$ reported probably are higher than those found in the general population."

In conjunction with the release of the CDC MMWR, CDC also prepared an internal agency "Talking Points" memo produced to me via FOIA (Figure 3). The memo's "main message" was that "There is no indication that DC residents have blood lead levels above the CDC levels of concern ... as a result of lead in water."

Talking Points / Q's and A's – D.C. Lead Issues (3/30/04)

Main message: There is no indication that DC residents have blood lead levels above the CDC levels of concern of 10 micrograms per deciliter for children 6 months – 15 years old and 25 micrograms per deciliter for adults as a result of lead in water.

Figure 3. CDC MMWR "Talking Points" Main Message.

The CDC's reassuring conclusion brought a collective sigh of relief from government officials and anxious parents. Reinforced at numerous press conferences and in sworn testimony by the paper's DC DOH co-authors, including Dr. Lucey and Dr. Stokes, it rapidly fostered a new – albeit false – understanding regarding one of the best-understood and widely studied environmental health hazards. The "no significant harm" echo chamber reverberated with statements such as the following:

"Overall, what we have been finding, and again this is primarily from the CDC publication that just came out this week...we have not found evidence that lead in the water has increased the percent of elevated blood lead levels in young children, so that is very, very good and important information."

Sworn Testimony of Dr. Lucey to the DC Council, April 1, 2004

"...that's good news, that's good news....the homes we went to with the public health service, that had the highest levels of lead in the water, greater than 300 ppb and this was published last week March 30 in the Morbidity and Mortality Weekly Report. 201

people who live in those homes with the highest levels of lead in the water. Zero. None. Zero out of 201 had elevated blood lead levels...."

Dr. Lucey at the Mayor's Press Conference, April 7, 2004

"None of the 201 persons we tested who live in homes with the highest measured levels of lead in the drinking water (i.e. > 300 parts per billion (ppb)) had elevated blood lead levels."

Written Testimony of Dr. Lucey, US Senate Oversight Hearing of Drinking Water in the District of Columbia, April 7, 2004

Not to be outdone in exploiting the public relations opportunity that the CDC MMWR created, DC WASA hired a consultant, Tee L. Guidotti, MD, MPH, via a contract with George Washington University, who was to meet regularly with the CDC and DC WASA on DC lead in water issues through at least late 2007. In the immediate aftermath of the CDC MMWR publication, Dr. Guidotti made numerous public statements about the insignificance of very high lead in water levels (> 300 ppb):

"Dr. Tee Guidotti...has advised the Water and Sewer Authority...that: A discernable effect on BPb <blood lead> of children requires at least sustained levels of 300 ppb."

Jerry N. Johnson, former General Manager, DC WASA, Testimony to US Senate Committee on Environment and Public Works, April 7, 2004.

"Drinking water is at most a minor source of lead for children. Drinking water may contribute a small amount if *sustained* exposure."

Tee L. Guidotti report to DC WASA, see also May 6, 2005; *Washington Post*, May 9, 2005.

CRITICAL INFORMATION OMITTED FROM THE CDC MMWR

The public, and apparently some of the agencies themselves, had been successfully duped. The CDC MMWR may have been authoritative but it was not trustworthy – the paper's conclusions were skewed by omission of several critical facts. Just how skewed, was not to be revealed, until my colleagues and I published a peer reviewed journal article in 2009 that proved hundreds (and in all likelihood thousands) of children had their blood lead elevated above the CDC level of concern as a result of exposure to DC's contaminated drinking water from 2001-2004.²³ Our paper was recently acknowledged with an award for Best Science paper appearing in the prestigious journal *Environmental Science and Technology* during 2009.

Details of my initial concerns regarding omission of critical data in the CDC MMWR were provided in two letters to the CDC Office of Scientific starting in 2007. Both of my letters are currently available on-line.²⁴ I await, and defer to, two forthcoming investigative reports by the US House Committee on Science and Technology and the Washington DC Office of Inspector General for additional information about actions of the CDC and DC DOH co-authors. In this section, I mention 4 representative omissions (which are not necessarily the worst ones) so that the remainder of my testimony can be placed into context. Thereafter, I reveal what I currently know about the authors' knowledge and rationale for each of these omissions.

First, the portion of the CDC MMWR that was to be most cited in testimony and press coverage, involved blood lead testing for a group of 201 DC residents who lived in homes with over 300 ppb lead in their flushed tap water. These residents had volunteered for a special water lead sampling event conducted by DC WASA in 2003, and had been informed that their tap water was severely contaminated (> 20 times the 15 ppb US EPA lead action limit) several months to a year before DC DOH began testing residents' blood. By the time their blood lead was collected for the CDC MMWR study in March 2004, the residents had been taking measures to protect themselves from the high lead in water for an extended period of time. Given that the half-life of lead in blood is on the order of 28-36 days,²⁵ by the time these residents' blood was drawn for analysis, **the evidence of harm** would have largely disappeared from their blood. Ironically, in contrast to statements in the CDC MMWR and associated sworn testimony suggesting that the "worst case" of lead exposure had been captured in this study, this particular group of 201 residents tested, were actually amongst the *least* likely groups in the city to show evidence of harm from high lead in water. The CDC's discovery that none of these residents had elevated blood lead, therefore, provided little or no insight into what their blood lead had been months to a year before taking actions to protect themselves.²³

Second, the CDC MMWR authors did not reveal detailed knowledge, in their possession, proving that virtually all of the 201 residents targeted for their study were taking active protective measures, as anyone would if told months to a year previously that their drinking water was contaminated with astronomical levels of lead. Specifically, a spreadsheet I obtained from the DC DOH via FOIA revealed that for residents who answered a DC DOH questionnaire and had an indicated blood lead collection date, all but 6 (of the 201) were using bottled water or a filter. Of 174 residents who answered a question about bottled water use, 130 indicated "Y" and 44 indicated "N." Assuming that Y meant "yes" (i.e., consistent with the symbols used for lead filter use in the paper and in the spreadsheet), then 75% of the residents who responded to the questionnaire were using bottled water. Moreover, none of the 6 residents who were potentially drinking tap water (without use of filters or bottled water) were children. The only statement appearing in the CDC MMWR that even alludes to some of these critically important facts, was a confusing single sentence that made no mention whatsoever of bottled water use:

"Of the 201 residents, a total of 153 (76%) reported drinking tap water, and 52 households (53%) reported using a water filter."

Sworn verbal testimony by Dr. Lucey, sometimes mentioned the use of water filters but repeatedly emphasized that the researchers had determined that a majority of residents in their study "were drinking tap water." The precise question in the DC DOH questionnaire asking residents about their consumption of tap water is important, and has never been produced to me. For example, the residents may have been asked "how much tap water do you generally consume," which might have caused residents to provide answers based on their experiences in the months to a year before they had been told their flushed water was contaminated with more than 300 ppb lead. If that were the case, the answer might not have any relevance to their water consumption in the weeks, months or year before their blood lead was finally analyzed in March 2004. To my knowledge, Drs. Lucey, Stokes and Brown never once publicly mentioned that their data demonstrated that 75% of their supposedly "worst case" DC residents were drinking bottled water.

Third, at no point did the CDC MMWR authors discuss, acknowledge, or cite a single reference to decades of prior scientific research that unambiguously linked elevated lead in water to elevated lead in blood, and which could have put their novel MMWR conclusions into context. The impact of this omission was amplified by the authors' repeated statements in public press conferences and under oath that virtually nothing had been known about links between lead in water and lead in blood prior to conducting the CDC MMWR study. For example, responding to DC City Council Members' questions about the health effects of lead-contaminated drinking water and with Dr. Stokes at his side, Dr. Lucey asserted that:

"...What we have been doing here in the District of Columbia for about the last 5 weeks, that is, we are trying to generate scientific data to answer that question because the answer doesn't exist in the medical literature...we published this article in the CDC MMWR...trying to answer the question...What is the correlation between the EPA action level of 15 ppb, or really any concentration of lead in the water, and the effect on health, even as assessed through blood lead levels? It seemed to me the best way to try to answer this question, after not finding the answer in the medical literature, after not finding the answer by talking to lead experts within at the Department of Health or at the Centers for Disease Control.....that's my answer, to generate the data."

Testimony of Dr. Lucey, DC Council Hearing, April 1, 2004

Indeed, the first lawmaker exposed fully to the picture portrayed by the CDC MMWR enthusiastically asserted that when it came to links between lead in water and lead in blood:

"...there is no real data out there to see the correlation. So we really do believe, by the enormous amounts of blood testing that we are doing related on this lead in the water issue, we are doing a public service not only for the District of Columbia, but for the United States of America and probably even the World on this issue...."

DC Council Member Carol Schwartz, Mayor's Press Conference, April 7 2004

Taking on the role of medical pioneers, the CDC MMWR authors even spoke about speculative bio-mechanistic theories, which are flatly contradicted in the scientific literature, to support the astounding CDC MMWR "no significant harm" discovery:

"<Lead from water> may not get into the bloodstream as readily as potentially, inhaling dust, or eating a chip which has large concentrations of lead...we're learning that, and we really did not know what we'd see."

Lynette Stokes, *Your Health Matters*, aired May 2004

Fourth, the CDC MMWR omitted knowledge about the high degree of uncertainty, as to which DC residents had what type of service line pipe. The CDC knew that DC WASA's database regarding service line material occurrence was little more than a guesstimate, because the data sent to CDC was grouped into three categories: 1) homes with lead service lines, 2) homes without lead service lines, and 3) homes suspected to have lead service lines. Even these categories grossly misrepresented the utility's knowledge, because DC WASA later revealed that there were thousands of more lead service lines in DC than they initially suspected. DC WASA's underestimation of homes with lead service lines was important because it confounded the

CDC's analysis, and also, because residents known to be living in homes with lead service lines have historically been targeted for specialized public health protection by DC WASA and DC DOH. Some of the strongest evidence of childhood elevated blood lead from water, was later linked to homes in which DC WASA had only suspected had a lead service line.²⁶

For the CDC MMWR, the actual blood lead data for residents living in homes with suspected lead service lines were analyzed, but no mention of this analysis, or even an acknowledgement that the data existed, was to appear in the published paper. The analysis indicated that of 144 DC residents tested in homes with suspected lead service lines in 2000 (before lead in water was high), only 12 (or 11.5% of the total) had blood lead ≥ 10 ug/dL. But for 141 residents tested in 2001 (when lead in water was high) 18 (or 18.4% of the total) had blood lead ≥ 10 ug/dL. A similar increase occurred in 2003 versus 2000. The trend in this dataset showing increased incidence of elevated blood lead for these residents, after the lead in water had increased, was contradictory to the conclusions eventually published in the CDC MMWR.

According to the Federal Register (2000), scientific misconduct via *falsification* refers to "... changing or omitting data or results ..." so that the overall presentation is inaccurate.²⁷ Further, "A finding of research misconduct requires that (a) There be a significant departure from accepted practices of the relevant research community; and (b) The misconduct be committed intentionally, knowingly, or recklessly; and (c) The allegation be proven by a preponderance of the evidence." In response to the question "Aren't there circumstances when omission of data or results is appropriate?," the Federal Register states that:

"....omission of data is considered falsification when it misleads the reader about the results of the research."

Internal agency documents provided to me via FOIA in late 2009 shed light on important aspects of the authors' knowledge about the omission of data. Although the record is incomplete, it strongly suggests that several CDC MMWR co-authors did not see a draft copy of the paper before a "nearly final" version was distributed by Dr. Brown on March 23, 2004 – seven days before the paper was published. Two days before the distribution of the "nearly final draft," one co-author wrote a comment about the study of the 201 residents with > 300 ppb lead in their flushed water. He asked about the government employees who questioned the residents:

"Did they ask about bottled water."

On March 23, 2004 at 12:04 pm, Dr. Brown e-mailed a copy of the "nearly final draft" to several potential co-authors, with a message that included the following statement:

"By COB today I need every officer who believes he/she contributed sufficiently to merit authorship to forward an email to Dr. Mary Jean Brown at <e-mail> which states that you've read the final draft, concur with the results, and your involvement is sufficient to merit authorship."

Dr. Brown's e-mail message did not solicit her co-authors' feedback on the content of the nearly final draft. It just gave the recipients slightly less than five hours on a workday, to decide whether or not they wanted to be listed as co-authors. Again, the record in my possession suggests that many of the recipients had never seen the paper prior to this time. Despite these

constraints, a few recipients responded with questions and comments, gently revealing concern about some of the key omissions in the draft they had received. Specifically:

One co-author, responding at 1:17 am on March 24, 2004 -- already well after Dr. Brown's ambitious deadline of "COB" -- sent an e-mail response that included several co-authors, asking:

"Do we want to mention that many of DC residents (couldn't give you #'s though) have been drinking bottled water before any of this went public? Or does that just confound the data some more?"

An e-mail from another co-author, date deleted, but presumably written after the previous comment, stated:

"I am not sure if the bottled water consumption would skew the data, but it does present another piece that might confuse the reader."

Still another e-mail, date deleted, but written in response to Dr. Brown's March 23 e-mail, revealed that some of the co-authors clearly knew about the long time that had elapsed between the water testing the previous year (i.e., 2003) and the blood lead testing during the month of the paper's writing (i.e., March 2004). It also indicated how the disclosure of this gap in the paper would be important to help the CDC MMWR readers understand "why currently no persons have blood lead levels above the levels of concern":

"Do you want to point out that the water samples that were tested in many of the homes were done last year, but the blood lead measures were determined this month? Between those two time periods, some people stopped drinking water supplied by WASA; some people starting using filters, and some people had the lead supply lines to their home replaced before blood lead levels were measured. **The point is that this may help to explain why currently no persons have blood lead levels above the levels of concern**" (bold emphasis added).

The fact that the above remarks were unsolicited suggests that the co-authors who took the initiative to write them may have felt especially uncomfortable with the omissions. Moreover, it may explain their rather passive tone and unassertive suggestions for changes. It may also be the case that other co-authors had similar concerns, or even other concerns, but Dr. Brown's e-mail indicated that there was no time or even the opportunity to raise them. I have no evidence that Dr. Brown ever responded to any of the above co-authors. However, in the end, Dr. Brown did not reveal the important facts the authors possessed, and which are clearly mentioned in the above e-mails, in the published CDC MMWR. Instead, she proceeded to publication with a version of events, that was, at a minimum, a reckless presentation of what the blood lead level data meant.

In relation to her decision not to make any mention of bottled water use, in 2009 Dr. Brown shared her rationale via e-mail to a reporter, who forwarded the answer to me for comment:

"This was not included in the report because CMDR Tim Coté, US Public Health Service, a partner in the investigation, had reported that he found on average only a 1 $\mu\text{g}/\text{dL}$ difference in the average BLL comparing those who did drink water with lead levels greater than 300 ppb to those who did not (4.6 compared to 3.6), **making the**

information about use of bottled water incidental to the overall findings. CMDR Côté planned to publish these data himself... (bold emphasis added).

Neither of Dr. Brown's reasons for omitting this critical information are sound, either ethically or scientifically. Certainly, the fact that 75% of the residents in her study were using bottled water is not "incidental" to the results of the research, and the revelation that the authors were entitled to withhold this critical information from the current paper for a possible later publication is outrageous.

Other critical omissions occurred not by failing to put important information into the paper, but by actually editing important information out. For example, before the "nearly final draft," a version of the CDC MMWR featured the following conclusion about blood lead levels for residents in homes with "suspected lead service line" before and after lead in the city's drinking water spiked:

"In addresses with suspected lead service lines, the percent of test results ≥ 10 ug/dL showed an increase, however, there were fewer than 50 test results available for these addresses between 2001 and 2003..."

This version of the paper also included a graph that illustrated the incidence of elevated blood lead for residents living in "suspected lead service line" homes increasing from 11.5% in 2000 (when lead in water was low) to 18.4% for 2001 (when lead in water was high). The incidence of blood lead ≥ 10 ug/dL was also much higher in homes with suspected lead service lines, versus lead service lines, which might also be important, given that homes with lead service lines had obtained more public health interventions not offered to homes with suspected lead service lines. Sometime before the "nearly final draft," the above facts and associated text were deleted. Again, all mention of "suspected lead service lines" was deleted from the CDC MMWR.

Three more important editorial changes even occurred **after** the 3/23/2004 "nearly final draft" had been signed off on by the CDC MMWR co-authors. Such changes clearly violate CDC policies for clearance of publications. For example, the "nearly final draft" featured the sentence:

"Elevated levels of lead in the water are a public health concern."

This key sentence was completely deleted from the CDC MMWR.

The "nearly final draft" version of the paper had also qualified the conclusion about the lack of elevations in blood lead levels above 10 ug/dL:

"However, neither longitudinal surveillance data nor BLL testing in addresses with the highest water lead levels indicate that exposure to lead in tap water in Washington, DC resulted in blood levels above 10 ug/dL, **although this cannot be completely ruled out**" (bold emphasis added).

In the published paper, the same conclusion appeared without the qualifier, and with a change of words that created a major shift in perception and certainty:

“The findings in this report indicate that although lead in tap water contributed to a small increase in BLLs in DC, no children were identified with BLLs >10 μ g/dL, even in homes with the highest water lead levels.”

Replacement of “although this cannot be completely ruled out,” with “even in homes with the highest water lead levels,” was a regrettable shift in emphasis.

The “nearly final draft” version of the paper, also had at least one clear reference to a citation about prior research linking lead in water to lead in blood, which stated:

“Consistent with previous work...<water lead > levels well above the EPA action level of 15 ppb may result in an increase in the percent of blood lead levels ≥ 5 ug/dL.⁵”

Although none of the documents in my possession allow me to see what reference “5” is, this statement and citation to prior research were also completely deleted from the published CDC MMWR. The deletion supported later public presentations that virtually nothing had been previously known about links between lead in water and increased blood lead.

Ultimately, others will have to pass judgment on actions of the CDC MMWR authors in relation to these and other omissions of data, and other critical information from the CDC MMWR. But the record is clear, that at the height of a historic public health crisis, the CDC crafted an account of the public health impact that was destined to mislead not only the public, but also the public health and scientific communities nationally and internationally about the lessons learned from the DC Lead Crisis. The CDC not only deleted the statement that “Elevated levels of lead in the water are a public health concern” from the wording and skewed presentation of research results in the research paper, but in the process, deleted this fact from the public consciousness. Even more egregious than possible falsification and scientific misconduct, is CDC’s repeated refusal to correct the scientific record, or highly misleading statements made about the work (as will be revealed in the sections that follow), because their inaction magnified and perpetuated the CDC MMWR’s harmful repercussions.

IMMEDIATE REPERCUSSIONS OF THE CDC MMWR CONCLUSION

The damaging repercussions of the CDC MMWR conclusion and the associated public relations campaign (including the CDC “Talking Points” memo) cannot be understated. Some of the impacts were realized even before the paper was published. Specifically, on March 18, 2004, Dr. Brown sent a draft copy of the CDC MMWR to her US EPA R3 contact with the subject line “Re: EPA cite for 40 ppb.” Shortly after Dr. Silbergeld’s testimony on March 5, 2004, Dr. Brown had queried US EPA about their unambiguous health warning concerning the dangers of elevated lead in water, which was featured prominently on the agency’s website in 2 locations:

“...lead at concentrations of 40 ppb or higher poses an imminent and substantial endangerment to the health of children and pregnant women.”

By transmitting the draft CDC MMWR, Dr. Brown communicated to US EPA the obvious: that the forthcoming CDC publication would find no evidence for elevated blood lead in DC children who had been exposed to water lead levels far above the US EPA’s 40 ppb threshold. Days later, on March 26, 2004, US EPA R3 and US EPA HQ, who were under intense criticism for their

own role in the DC Lead Crisis, and all too willing for an excuse to hide their true understanding of health impacts of elevated water lead on children, removed all versions of the 40 ppb warning from their websites without any announcement or explanation. Earlier that week, responding to concerns of a US EPA scientist about the dubiousness of certain statements relating to the plumbing sources of lead in DC water, a US EPA R3 manager frankly revealed the agency's vulnerable state of mind at the time:

“..this is being driven as much by public relations and politicians as what makes sense most other ways.”

Rick Rogers, Chief of the Drinking Water Branch, US EPA R3, March 23, 2004

At around that same time, US EPA R3 posted confusing and ambiguous information about the health effects of 15 ppb lead, on a special web page that the agency designed for DC residents:

"The Action Level for lead is 0.015 milligrams per liter (mg/l) which is equivalent to 15 parts per billion (ppb). For copper, the Action Level is 1.3 mg/l or 1,300 ppb. This Action Level was not designed to measure health risks from water represented by individual samples. Rather, it is a statistical trigger value that, if exceeded, requires more treatment, public education and possibly lead service line replacement"
(<http://www.epa.gov/dclead/oversight.htm>).

The US EPA R3 statement that the 15 ppb lead action limit “was not designed to measure health risks from water represented by individual samples” was then cited repeatedly by the CDC MMWR authors in sworn written/oral testimony under oath starting April 1, 2004. The fact that this new “public health message” had been specially crafted for DC and, to my knowledge, was not replicated on any other US EPA web pages, was never revealed to the public. Upon hearing Dr. Lucey read US EPA's confusing message in the immediate aftermath of the CDC MMWR publication, one reporter wrote in amazement:

"This incredible information was offered by the city's interim medical director, Dr. Daniel Lucey just hours before a U.S. Senate committee held public hearings on the issue of the city's drinking water. Lucey seemed as baffled by the website admission as TBR. If the EPA standards don't measure the health risk, why have them? How can there be an action level, triggering specific action by state and local officials, when the health risk level hasn't been determined? Is the EPA engaging in CYA (cover your @\$) or does it really not know what level of lead contamination constitutes a risk for individuals? ... The EPA's admission that it is completely ignorant is unconscionable."

The Barras Report (TBR), April 10 2004

The combination of: 1) the CDC MMWR's skewed “main message” that exposure to more than 300 ppb did not elevate residents' blood lead above levels of concern, 2) the authors' failure to cite, discuss or acknowledge prior contradictory human health research in the CDC MMWR or in public testimony, and 3) the US EPA's removal of the agency's 40 ppb health warning and dissemination of confusing new language, created a public relations coup that protected the agencies' interests at the expense of public health.

The CDC MMWR was immediately cited by revisionists, who defended the agencies responsible for the DC Lead Crisis, and concluded that the real problem was the public's uninformed "hysteria":

"The ongoing hysteria about lead in D.C.'s drinking water is much ado about nothing, according to a new report from the Centers for Disease Control and Prevention... Despite this three-ringed media-lawyer-government circus, there is no actual "problem." No health effects whatsoever have been attributed to the lead in D.C.'s water... the EPA can reasonably claim "no harm, no foul" with respect to the unintended consequences of its actions this time." (<http://www.washingtontimes.com/commentary/20040405-095052-3607r.htm>)

This "no harm" message was delivered brazenly to the US Congress in May 2004, when an invited witness used the CDC MMWR to assert that while DC did not do the best job of informing the public about the 2001-2004 contamination, the agencies involved had been proven correct in trying to prevent citywide panic by downplaying the dangers of the unprecedented lead in water elevations and by hiding information from the public:

"The notification provisions of the Safe Drinking Water Act are also too inflexible. Every community must notify the public when violations occur. ... the problem is that these notifications are not educating people. Instead, they are being used to trigger alarm scenarios that are amplified by the media. The resulting crisis mentality is not educating the public, it's scaring them needlessly. ...I am not saying they did the greatest job on earth... It is worth noting that D.C. was correct in its assessment that the lead issue didn't warrant a panicked response. The science and the history related to lead exposure strongly indicates that lead in drinking water—even at levels that are multiple times higher than federal standards—does not warrant the frenzied reaction we've seen in D.C. A recently released Centers for Disease Control and Prevention (CDC) study reinforces these findings. It found that the elevated lead levels in D.C. water did not raise the level of lead in anyone's blood to a level of concern."

Statement of Angela Logomasini, Competitive Enterprise Institute, Testimony to US House Government Reform Committee, May 21, 2004

The CDC MMWR was also prominently cited in, and clearly tempered, all subsequent investigations into the DC Lead Crisis in Congressional Hearings, the GAO investigation, and newspapers.¹⁶⁻²⁰ Afterall, if the CDC had proven that under the worst case in Washington DC no one experienced blood lead elevations above their level of concern, then the potential health implications of the DC Lead Crisis were also "below concern" by definition. What little debate there was about health effects, was relegated to nebulous discussions about "how safe is safe," and the possible impacts of lead on health if blood lead had been only "slightly" elevated (but well below the CDC level of concern).

LONGER TERM REPERCUSSIONS OF THE CDC MMWR

The CDC MMWR was intended to influence decision makers. The CDC itself notes that the MMWR readership "...consists of physicians, nurses, public health practitioners, epidemiologists and other scientists, researchers, educators....,"³ and as was emphasized in the CDC MMWR "Talking Points" memo:

"The use of complementary data, in this case existing childhood blood lead surveillance data combined with current BLLs in residents of homes with the highest water lead levels, provided important information for decision makers. Such data are essential to identifying and responding to populations at risk."

Dr. Brown herself provides a first-hand illustration in how the "important information for decision makers" was to be applied henceforth in the public health community. On July 16, 2004, when lead in DC water was still astronomically high but the CDC MMWR had been solidly embraced and had gone unchallenged for over three months, Dr. Brown e-mailed CDC MMWR co-author Dr. Stokes to affirm that the DC Lead Crisis was effectively over. The first sentence of her e-mail read:

"Now that there is a better understanding of the public health impact of lead in the drinking water in the District, I hope we will be able to focus on the issue of lead-based paint hazards."

In the aftermath of the CDC MMWR, Dr. Brown also applied her wisdom to edit a memo entitled "LEAD, WATER, PAINT AND CHILDREN." Excerpts of the memo read:

"Childhood lead poisoning is making headlines once again, this time because of the drinking water scandal in Washington, DC. ...At the same time, policy makers and parents alike must keep in mind that drinking water is only one way that children are exposed to lead. Lead-based paint and dust hazards in children's homes pose far greater risks to children than lead in drinking water.... The higher lead levels in the District's water over the past three years have undoubtedly raised children's lead levels, probably by an average of one or two micrograms per deciliter. **Of course, children who drank water with lead levels many times the EPA action level may have experienced greater elevations**" (bold emphasis added).

Dr. Brown's written editorial comment regarding the bold sentence above? "I guess I wouldn't say this."

After the CDC MMWR had eliminated lead in water as a public health concern, the possibility that "decision makers" would learn anything useful from the DC Lead Crisis relative to mitigating lead in water hazards vanished. Investigative reporting by the *Washington Post* in late 2004, demonstrating that numerous water utilities from around the US were conducting misleading testing of lead in water, created relatively little impact locally and nationally.²⁸ The Lead Free Drinking Water Act,²⁹ a Congressional bill that had gained momentum in the early days of the DC Lead Crisis to fill obvious gaps in the US EPA Lead and Copper Rule, failed on three separate occasions (2004, 2005, 2007). The Paul Hastings lawsuit was dropped. And Washington DC's first ever lead poisoning prevention bill was passed in 2008, only after the DC City Council eliminated all references to drinking water that had been recommended by key members of the District's lead poisoning prevention community.

The US EPA, relieved by the CDC findings and by the determination that they could reasonably claim "no harm, no foul," cited the research repeatedly. Eager for even broader coverage of the CDC MMWR conclusions, a US EPA R3 employee wrote to the CDC:

“One story that should be told to a larger audience is the results of the historic blood lead level analysis... I thought a good way to do that would be the development of a short paper summary of those results either as a joint EPA/CDC paper or just CDC or CDC and DC DOH.”

E-mail from Rick Rogers, Chief of the Drinking Water Branch, US EPA R3,
January 7, 2005

US EPA R3 even offered to hire sub-contractors to assist with the writing of this paper. When CDC did not take up the offer, US EPA R3 went ahead on their own, and paid for the creation and distribution of blood lead fact sheets and other materials re-hashing the results of the CDC MMWR and other misleading information, at least some of which was later proved false. CDC reviewed and approved these materials, which featured the following conclusion:

“Residents with high lead levels in their tap water did not have elevated blood lead levels. DC DOH also tested people who live in homes with elevated lead in their tap water (over 300 ppb). Of the 201 residents from 98 homes with elevated lead in their water, no children aged 6 months to 15 years had blood lead levels over 10 mg/dL.”

Revised version of blood lead fact sheet accessed May 10, 2006 at
http://www.epa.gov/dclead/BloodLevelsFactSheet10_06_rev.pdf

Most personnel at the responsible agencies were not held accountable for their role in the crisis, and some who were partly responsible for its precipitation and handling, were even rewarded. In March 2005 the US EPA R3 “Lead Response Team” received the highest recognition the agency offers for outstanding employee performance, as announced in an e-mail from the Director of the US EPA R3 Water Protection Division:

“I am very pleased to report that...members of the DC Lead Response Team...took the Gold!!!...The Gold Medal is the highest Honor Award granted by the Agency. It is ... for distinguished service of major significance to environmental improvement and to public service.”

Jon Capacasa, US EPA Region III, March 22, 2005

More than matching US EPA’s eagerness to celebrate the landmark discoveries in the CDC MMWR, DC WASA gave its own regurgitation of the “no significant harm” conclusion:

“The results of the tests confirmed that there was **no identifiable public health impact** from elevated lead levels in drinking water.”...“It is important for customers to understand that although environmental lead exposure can be very hazardous over a long period of time, large numbers of tests conducted by the D.C. Department of Health in 2004 have detected **no measurable health effects** from potential exposure to lead in drinking water in the District of Columbia.” (bold emphasis added)

DC WASA Web page and Mailing to Consumers, January 10, 2006

To further enhance the visibility and scientific credibility of the CDC MMWR’s “historic blood lead level analysis,” starting in 2005 DC WASA funded Dr. Guidotti to re-package the CDC MMWR data and other misleading information into a peer-reviewed publication. Fortified with

an erroneous timeline and numerous additional inaccuracies and omissions, the Guidotti paper – published in 2007 – effectively re-wrote history and portrayed DC WASA’s and DC DOH’s management of the DC Lead Crisis as a model public health response. Following in the pioneering footsteps of the CDC MMWR, Dr. Guidotti’s main conclusion was that “There appears to have been no identifiable public health impact from the elevation of lead in drinking water in Washington, DC.”

The Guidotti paper came under fire in 2009. In response to press coverage that raised serious questions about the integrity of the work, Dr. Guidotti himself e-mailed a “Dear Colleague” defense, which stated that his paper’s conclusions had received the CDC’s stamp of approval:

“The data are valid and the conclusions were agreed upon by the Department of Health, EPA, and CDC.”

Tee L. Guidotti, e-mail communication to “Clean Water Network,” Feb. 2, 2009

At the request of an Independent Review Panel that examined only two of numerous concerns about the integrity of the Guidotti paper, the “no identifiable public health impact” conclusion was eventually removed, and Dr. Guidotti himself apologized for writing the unfounded statement. Remaining allegations about the Guidotti paper have not been addressed (for the complete list of allegations, see letter to the journal *Environmental Health Perspectives*):²⁴

The dangerous “lesson” of the DC Lead Crisis as packaged in the CDC MMWR began to achieve its goal of influencing decision makers and policy, and spread quickly to cities across the US and even internationally (Figure 4). A pattern formed. Whenever a significant problem with elevated lead in potable drinking water of homes, schools or other buildings was discovered, local public health officials and reputable scientists referenced the conclusions of the CDC MMWR as the most authoritative and – in the understanding of many – “only” reliable information on the subject. Again and again, consumers that had just learned about risks of lead contaminated water in their community, were assured that consumption of over 300 ppb lead in Washington DC had not caused an increase in blood lead of concern.

Clearly, the main message and unambiguous conclusions of CDC's Chief of Lead Poisoning Prevention, Dr. Brown, had been transmitted down through the chain of command of the public health community. The fact that individuals with expertise in science and public health accepted the preposterous absurdity that consumption of lead in water over 300 ppb did not elevate the blood lead of even a single child over the CDC’s level of concern, despite the scientific understanding that existed prior to 2004 (Table 1 and associated discussion), is testament to the enormous persuasive power that the CDC wields over the public and the public health community. When the CDC’s research is based on sound scientific reasoning and reliable data, this power can be wielded to great benefit. But when it is based on faulty reasoning and misleading data it can create untold harm. This was the case with the CDC MMWR.

“Parents should not be overly concerned about lead in Seattle schools' drinking water because it is unlikely any child has been harmedThe chances of neurological damage are "extremely, extremely low," says Dr. Catherine Karr, director of the Pediatric Environmental Health Specialty Unit at the University of Washington. ...A public water utility in Washington, D.C., discovered that 163 homes with lead service pipes had lead levels over 300 ppb in flushed-water samples from their taps....None of the adults or children had an elevated blood lead level, even though most reported drinking tap water.”

(“Seattle Schools Lead Danger Disputed,” *The Seattle Times*, July 16, 2004,
http://seattletimes.nwsourc.com/html/education/2001981032_lead16m.html)

“The Board of Water and Light's effort to replace lead service pipes to 14,000 Lansing area homes understandably raised concerns regarding the potential threat of lead exposure for persons consuming BWL water. However, our evidence suggests this community-wide concern has reached an unjustified level. ...our water supply represents only a marginal threat, if at all. ...dramatic data come from a U.S. Centers for Disease Control and Prevention study in Washington, D.C. That study found that among 201 residents from 98 homes with water lead levels exceeding 300 ppb, no one - child or adult - had a blood lead level that was above the CDC's level of concern... We all should be concerned about the health threat from environmental lead. But the scientific evidence shows that lead in water makes, at best, a marginal contribution.”

(Dr. Dean Sienko, *Lansing City Pulse* [Editorial], September 5, 2004)

“...a joint study by the D.C. Department of Health and the Centers for Disease Control and Prevention (CDC) published in March 2004..... described efforts ...to conduct blood lead monitoring for residents of homes whose drinking water test indicated a lead concentration greater than 300 ppb. None of the 201 residents tested were found to have blood lead levels exceeding the levels of concern for adults or children, as appropriate.”

Testimony of John Stephenson, GAO, US House Subcommittee on Environment and Hazardous Materials, July 22, 2004

“Montrealers living in homes whose lead levels exceed provincial standards don't have anything to worry about, says McGill chemistry professor Joe Schwarz. “The best studies ..surveyed really large numbers of homes..in Washington, D.C., ...they got thousands of people to actually give blood and they found that although the water level was sometimes as high as 300 parts per billion, which is astounding, it didn't influence the blood levels.”

(Joel Goldenberg, “No worry on water,” *The Suburban*, 2007)

Figure 4. Representative quotes of those applying the CDC MMWR to public policy and health messaging.

SPECULATION REGARDING CDC's MOTIVATION

Dr. Brown's actions, and those of the CDC, to allow such an egregious and historic violation of basic scientific principles, and to jeopardize the public's health and trust, are mystifying. In this section I highlight information that might help shed light on some of the reasons behind the unfortunate decisions that were made.

The dramatic reduction of blood lead levels in children over the last few decades is a public health triumph. Phase-outs of lead in gasoline, lead solder in canned food tins, lead paint, and reduced levels of lead in drinking water due to the Lead and Copper Rule created landmark improvements in public health. I would be the first to acknowledge Dr. Brown's contributions to this spectacular success story. However, childhood lead poisoning has still not been eliminated and further work is clearly needed.

One would assume that the CDC Lead Poisoning Prevention Branch would exert leadership to ensure that all lead health threats are acknowledged properly and addressed as best as possible within existing financial and regulatory constraints, but I do not believe that this is how the CDC is approaching childhood lead poisoning prevention today, or did so in the past. For example, historical accounts of US EPA's efforts in the early 1990s to regulate lead in drinking water reveal that the then CDC director of the former Center for Environmental Health "...railed against doing much in drinking water because he did not want to disarm lead in paint."³⁰ The same viewpoint, that health concerns related to lead in water somehow compete with and threaten the CDC's efforts to address lead in paint, seem to persist at the CDC to this day.

Almost a decade after the passage of the US EPA Lead and Copper Rule of 1991, a President's Task Force adopted a strategy to eliminate childhood lead poisoning by 2010. The focus was the elimination of lead paint hazards. Underlying the narrowness of the Task Force's approach was the assumption that "The U.S. Environmental Protection Agency (EPA) has... placed strict limits on the amount of lead in drinking water..." and thus that lead at the tap was already being addressed.³¹ Such misunderstandings of the scope and effectiveness of the US EPA Lead and Copper Rule also permeate the CDC's literature. In reality, the US EPA Lead and Copper Rule does not put any limit whatsoever on the allowable lead in residential tap water (9% of collected samples can be any value whatsoever), and the regulation does not address the vast majority of child care centers and schools. Indeed, a recent 2009 *Associated Press* article demonstrated that lead levels in thousands of schools nationwide have problems with elevated lead in water,³² and many schools have some taps dispensing water lead concentrations well over the CPSC acute health threshold or even hazardous waste levels.³³

Maintaining a strict focus on lead paint as the primary cause of childhood lead poisoning, even at the expense of potentially serious non-paint lead sources, seems to guide much of the CDC's and Dr. Brown's work and reasoning. Characteristically, a few years ago, the Chief of the CDC's Lead Poisoning Prevention Branch responded to a peer-reviewed article about the relationship between lead in blood (BPb) and lead in contaminated soil by castigating the researchers for, amongst other things, not placing adequate emphasis on lead paint. In her critique, Dr. Brown mentioned the article's failure to cite "...the compelling body of scientific evidence demonstrating that deteriorated lead-based paint and the contaminated dust and soil it generates is highly correlated with BPb levels in children."³⁴

The perplexed authors responded that the subject of their paper was lead in soil, not lead in paint, and that:³⁵

"We are concerned that people working at agencies that should champion the reduction of lead exposure do not appreciate the fact that multiple sources of lead have accumulated in urban environments and that all major sources and reservoirs need full attention if we expect to meet the goals of Healthy People 2010 (2005) [the national program that aimed to eliminate childhood lead poisoning by 2010]."

Why, when writing about the worst lead in water contamination event in modern history, would Dr. Brown in her CDC MMWR paper, commit a much more serious scientific omission, and not cite the compelling body of scientific studies demonstrating that lead in drinking water can be highly correlated to blood lead? A clue to Dr. Brown's tunnel-vision mindset can be found in a quote in the *New York Times*, which appeared on September 30, 2003, just months before the *Washington Post* broke the story on the DC Lead Crisis:

"Lead paint remains the most concentrated and readily accessible source, and nothing should detract from our interest in eliminating it," said Dr. Mary Jean Brown, chief of the lead poisoning prevention branch at the Federal Centers for Disease Control and Prevention in Atlanta."³⁶

Indeed, from the earliest phases of the lead crisis and well in advance of data collection for the CDC MMWR, a key concern expressed amongst the public health community that follows Dr. Brown's leadership, was that the unprecedented media attention focused on DC's lead in water problems would draw attention and funding away from efforts to control lead paint.³⁷ The handling of the DC Lead Crisis, and omission of critical data and deletion of key words and phrases from the CDC MMWR, suggests that Dr. Brown may have been blinded by her commitment to bolster her crusade against lead paint, and illustrates exactly how far she was willing to go in preventing a non-paint lead source from detracting focus from it.

In 2005 when I first began to suspect serious problems with the CDC MMWR, one of Dr. Brown's colleagues told me confidentially that no matter how distorted the CDC MMWR proved to be or how serious the wrong-doing, Dr. Brown would never willingly correct the public health misconceptions her work had created. At first I was in disbelief. But more than 6 years after the publication of the CDC MMWR, and more than 4 years since Dr. Brown was clearly made aware of serious problems with the CDC MMWR's main message, Dr. Brown has doggedly failed to clear the scientific record of the misunderstanding that she herself created and promoted. In the end, unfortunately, one has to wonder if the repercussions of the CDC MMWR were exactly as Dr. Brown intended.

One final example gives insight not only to Dr. Brown's motivation, but also to her temperament, which tragically feeds her conduct. In early 2009 when some lead poisoning prevention advocates from the Alliance for Healthy Homes, Clean Water Action and Parents for Nontoxic Alternatives in Washington DC began to try and correct the record, and to start promulgating more accurate public health messages and policies about lead in drinking water, Dr. Brown reacted with outright hostility and began to spread the word to lead poisoning prevention officials and advocates across the country that she was being unfairly attacked by an

"unholy alliance" seeking to get her fired.³⁷ This was not true, the groups' longstanding work on the issue had in fact never focused on Dr. Brown, and what they were actually doing was directing efforts to persuade the CDC to correct the takeaway message of the CDC MMWR. But as a major funder of the nation's lead poisoning prevention community, Dr. Brown's power would have been sufficient to deter many stakeholders from joining the call for CDC's accountability. In fact, Dr. Brown succeeded in intimidating some Alliance for Healthy Homes board members into restraining the staff's advocacy, because they worried she might damage the organization's reputation and jeopardize its funding. Ultimately, in late 2009, one Alliance for Healthy Homes employee who led the organization's work on the issue was not offered employment when his organization merged with another national healthy housing nonprofit that receives significant CDC funding. This employee, who has offered decades of laudatory service to the goal of childhood lead poisoning prevention, was explicitly told that he would be a financial liability to the organization because his advocacy work on the CDC MMWR had upset Dr. Brown.³⁷

In the end, I have come to suspect that the CDC and Dr. Brown were driven, at least in large part, by an over-zealous, misguided, and unscientific compulsion to exclusively focus attention and funding on the lead source they consider most important. Their "mission" may have even contributed to "missing" hundreds (and quite possibly thousands) of cases of elevated blood lead in Washington DC children due to contaminated water from 2001-2004,²³ and twisting the DC Lead Crisis into a public relations coup for lead paint, rather than acknowledging it for the environmental health tragedy it was.

For those interested in further elaboration on CDC and Dr. Brown's motivation, see Appendix 1.

MOTIVATION FOR MY OWN JOURNEY WITH THE CDC

The first time I read the CDC MMWR, based on my knowledge of prior research, I knew its conclusions were a scientific impossibility. On the other hand, I also knew that the neurological harm to DC children could not be undone, steps were seemingly underway to partly mitigate the worst of DC's lead in water contamination, and if lessons could be learned from the DC Lead Crisis that could prevent future harm, perhaps a "cover-up" of the public health impact was not the worst thing that could have happened. I expected that the responsible agencies would work hard to redeem themselves and once again make themselves worthy of the public trust. Moreover, while I had suspicions and concerns about the CDC MMWR from the start, I did not know, with certainty, the true extent of the falsification that had occurred until late 2009. Early on, I simply assumed that the authors had tried to faithfully present the data and their methods, and perhaps, something along the way unintentionally went awry.

For a while I flirted with theories that the accepted laws of chemistry, biology and physics did not apply to Washington DC children, and that the lead in DC's water was somehow not harmful. A colleague, research chemist Michael Schock at the US EPA, had discovered that DC's lead problem was linked to formation of Pb(IV) rust on the lead pipes, as opposed to Pb(II) rust per prior conventional wisdom. Devising and conducting experiments throughout 2004 to test the hypothesis that Pb(IV) in water might not be harmful if ingested by DC consumers, I eventually proved to myself that there was no scientific support for such an explanation. The accepted laws of nature would apply. By late 2005, alarmed by the growing influence of the

CDC MMWR, concerned about its implications for public health not only in DC but also nationally and internationally, curious about the quality of the science and data the CDC had used to arrive at its conclusions, and confused about how two millennia of human experience with harmful effects from lead in water could be rendered irrelevant almost overnight – I resolved to pursue this issue via investigative science.

Additional factors gave me resolve to begin this particular journey. I had heard engineers at water utilities cite the CDC MMWR as justification to “game” the Lead and Copper Rule sampling requirement, by conducting water monitoring for lead in ways that almost guarantee compliance with the standard, even when serious lead in water contamination was present. I began to cringe at public health meetings in the US and Canada when officials inevitably laid the CDC MMWR on the table, and stated that it was their duty to publicly downplay the adverse impacts of water to avoid needlessly alarming the public. Indeed, wasn’t that the takeaway lesson from the DC Lead Crisis and applied by Dr. Brown herself? Of course, unfortunately, their reassuring public health messages would make it far less likely that precautionary measures would be taken seriously by the public, and that children and developing fetuses would be protected from harm. This highlights the impacts on the public of misconduct in public health research, via distortion and misinformation, “which ripples from the large scale of federal organizations to the personal level of individuals.”³⁸

I was appalled at the actions of US EPA R3 and US EPA HQ, who in late March/early April 2004, selfishly and cowardly gutted the health basis for their own lead in water regulation, by replacing clear and understandable warnings with misleading gibberish. The US EPA even stood silent, in April 2004, when they were publicly ridiculed in DC for arriving at their 15 ppb lead in water action limit by “pulling a number out of a hat.”

Lead in DC Public Schools. I was also particularly disturbed by behavior of DC WASA and US EPA R3 employees. To this day, for example, I believe that the 2004 sampling at DC Public Schools was devised to hide problems with elevated lead in water. When the testing was complete, DC WASA trumpeted the “good news” about the relatively low incidence of lead in water hazards, reassuring DC residents that all was well, without revealing the flawed water collection methods that could have missed serious lead problems. Some of the methods used were later effectively banned by the US EPA for that very reason. As a result, I believe, DC WASA ensured future needless harm to DC schoolchildren, in partnership with US EPA R3, which backed the water utility up on their claims. It took me 3 years to confirm and expose the fact that there were very serious problems with lead in much of the DC school system, with some taps dispensing lead concentrations over hazardous waste levels (>5,000 ppb).³³ Still, the CDC MMWR conclusions seemingly rendered the health implications of that work insignificant.

Partial Lead Service Line Replacements. My worry was reinforced when, in 2008, in partnership with a coalition of public health advocates in DC, we discovered that DC WASA’s 5-year and \$100 million “accelerated” lead in water “remediation” program was not nearly the success that DC WASA and US EPA R3 had claimed. Thousands of lead water pipes were dug up and replaced with copper pipe, but only the publicly owned portion of the old lead pipe was replaced. The privately owned portion was left in the ground. This program of partial lead service line replacement-worsened lead in water levels in many homes for an undetermined duration. For years the agencies repeatedly claimed in public and in written scientific reports

(again contradicting decades of prior experience and research), that partial replacements in DC were not causing lead to spike:

"... there was no immediate change, or immediate increase in lead levels in the tap water"... "there is no evidence that the lead levels increase"... "remove half the lead...you have a lot less lead in your tap water as a result."

Rick Rogers EPA R3, Interview on WAMU Radio, May 2004

In 2004, I had testified to the US Congress that partial lead service line replacements were a waste of money and that my research had shown the procedure could increase residents' risk for lead exposure. After years of denial and false statements by DC WASA and US EPA R3, I eventually proved that the two agencies had themselves collected hundreds of data points showing severe problems with DC residents' exposure to high lead in water, following DC WASA's partial lead service line replacement "remedy" at their homes.

But the public health implications of our work were to be neutralized by what was becoming a well-oiled tag team effort by Dr. Guidotti and the CDC. Dr. Guidotti provided testimony and "public education" at community meetings, asserting that even the highest levels of lead in DC's water after partial lead service line replacement (sometimes exceeding 100,000 ppb) probably did not pose a health risk. Dr. Guidotti wrote:

"It has been alleged that spiking lead levels after partial lead service line replacements present a health risk. This is probably not correct."

Testimony of Dr. Guidotti, March 10, 2008

The CDC attended two of several DC WASA public meetings on this issue, and consistently supported Dr. Guidotti with silent acquiescence, no matter how outrageous the George Washington University professor's proclamations. The CDC repeatedly refused to answer direct questions from DC residents, that could have put Dr. Guidotti's testimony into some context. At these meetings, DC WASA distributed written "public education" materials embellishing on the already ludicrous CDC MMWR conclusion. For instance, the water utility's fact sheet stated that:

"In 2004, the CDC analyzed results from a District Department of Health examination of blood lead levels among children during the period of elevated lead levels in tap water at many homes. According to the CDC report, there were no children, from a sample group of 201, identified with blood lead levels above the CDC *level of concern* (>10 micrograms/deciliter) that were not explained by other sources, primarily the conditions of the household paint."

Even ignoring the already distorted analysis of the 201 residents portrayed in the original CDC MMWR, clearly, the CDC MMWR never looked at 201 children. The CDC MMWR itself stated that only 17 of the 201 targeted "worst-case" residents were under the age of 6. Moreover, the CDC MMWR study involved no environmental risk assessments at the homes of DC children with elevated blood lead levels. Finally, although the CDC MMWR implied that virtually all detected blood lead elevations in DC were due to lead paint, it never stated this.

When two DC public health advocates called on the CDC to demand that DC WASA correct the misleading presentation of the CDC's own research results, the CDC failed to do so. A CDC employee who claimed to have consulted a CDC lawyer, claimed that there was nothing CDC could do to redress the inaccuracies in already distributed versions of DC WASA's fact sheet. However, the official assured the two advocates that he would request all future versions of the DC WASA fact sheet prior to dissemination in order to correct any misleading statements. Despite that assurance, the fact sheet was once again distributed on May 1, 2008 with the same misleading language in place.

As perplexing as CDC's behavior was in relation to the above incident, what was going on behind the scenes was even worse. Unbeknownst to either myself or the DC residents who were pleading with the CDC in 2008 to correct Dr. Guidotti's and DC WASA's assertions that lead-contaminated drinking water does not pose a significant public health concern, the CDC had been researching the impacts of partial lead pipe replacements on blood lead levels of DC children probably since at least 2005.³⁹ Based on accounts of individuals who attended a November 2007 meeting between EPA, CDC, DC DOH and Dr. Guidotti, and as substantiated in later e-mails in my possession, the CDC actually had data in late 2007 that indicated public health risks from DC's partial lead service line replacements. It was not until February 2009, long after the time when disclosure of their results could have been used to prevent more needless harm to DC children, and to properly guide public debate, that CDC eventually issued online an "important update" based on their research in DC:

"CDC's Healthy Homes and Lead Poisoning Prevention Branch has conducted an epidemiological study of the relationship between children's blood levels and lead water service lines. **Our preliminary results suggest that when lead service lines are partially replaced, that is the public portion of the line from the the main to the meter is replaced, children are more likely to have blood lead levels greater than or equal to 10 µg/dL, compared to children living in housing with either undisturbed lead service lines or service lines that are not made of lead**" (bold emphasis added).

The ethics of how CDC conducted its "research work" given extensive prior knowledge about lead spikes after partial pipe replacement, their duplicity in covering up what was actually occurring to children in these homes, and their failure to inform the public about their knowledge of the potential harm throughout the numerous public meetings on this subject in 2008, strikes me as highly unethical and deserving of future scrutiny. Yet it is also completely consistent with CDC's past actions, to withhold and control any information that may cast doubt on their message that lead in water is not a significant public health concern.

DC WASA Sampling Inconsistent with Intent of LCR. The coalition of concerned DC residents also discovered that since 2005 DC WASA, again with the full knowledge and approval of US EPA R3, had achieved compliance with the Lead and Copper Rule by monitoring DC's water via the use of a sampling protocol that required flushing taps for 10 minutes the night before sampling. In the water industry, pre-flushing is understood as a well-known method to game the US EPA lead standard, by temporarily reducing lead concentrations at the tap. After reviewing the coalition's appeal of DC WASA's protocol, Cynthia Dougherty, the Director of US EPA HQ Office of Ground Water and Drinking Water, determined in a letter to the coalition that flushing on the eve of compliance sampling was inconsistent with the intent of the Lead and Copper Rule:

“We believe that [requesting flushing only in the households participating in the sampling] goes against the intent of the monitoring protocol, since it changes the normal water use of the homeowners in the sample.”

However, without acknowledging or giving any consideration to the potential ramifications of DC WASA’s 4-year-long reliance on the flawed flushing practice – in terms of reported compliance with the Lead and Copper Rule and associated potential health impacts on DC residents – Ms. Dougherty closed her letter by reinforcing the CDC’s lead source hierarchy:

“Thank you for bringing this matter to our attention. However, **we hope that this new issue does not deflect from the importance of addressing more serious sources of lead** in housing that your association has highlighted in the past. The nation has a goal of eliminating childhood lead poisoning by 2010 and, while our program is focused on reducing exposure from drinking water, **it is critical for us to not lose sight of the importance of directing resources and attention at more serious sources**” (bold emphases added).

With this letter, US EPA shamelessly abdicated all responsibility for having allowed DC WASA to achieve compliance with federal lead standards via the use of a sampling protocol that violated the intent of the Lead and Copper Rule, and that may have hid years of problems with lead in water contamination. Moreover, it forcefully downplayed the health risks from lead-contaminated drinking water, knowing full well that the community it was addressing had just recently experienced the most severe lead in water crisis recorded in US history, and that the preponderance of scientific evidence – including work by US EPA’s own scientists – had predicted that serious public health harm should have occurred.

In short, I began this journey with the CDC, and have been able to sustain it in the face of repeated agency backstabbing and personal attacks, because I was convinced that lead in water does sometimes pose a serious public health concern, and that innocent children in DC, all over the US, and around the world have been put in harms way by the deception of the CDC MMWR.

TRYING TO GET THE FACTS FROM THE CDC

I started my investigation into the CDC MMWR via a FOIA request to DC DOH on October 23, 2005. In this FOIA, I asked for all information related to the “300 ppb” study in the CDC MMWR and certain e-mails written by Dr. Stokes, who was the listed 1st author of the report. I followed up with dozens of phone calls and e-mails through February 2006. The DC DOH FOIA Office did not return a single phone call, e-mail, or otherwise acknowledge that I existed. I submitted a FOIA appeal in early February 2006, which resulted in the DC Mayor’s Office ordering DC DOH to produce the information I had requested within 20 days. The 20 days came and went without DC DOH even acknowledging the Mayor’s order. The Mayor’s Office then threatened to report the DC DOH FOIA officer for misconduct. On April 27, 2006, the DC DOH FOIA officer informed me that Dr. Stokes had left DC DOH shortly after I had submitted my FOIA for information about the CDC MMWR, and that her e-mails had been destroyed. He refused to tell me exactly when she left. DC DOH repeated this maneuver in early 2008, when I submitted a similar request for e-mails of CDC MMWR co-author and DC DOH employee, Christine Onwuche. Within weeks after submission of my FOIA, Ms. Onwuche too had left DC

DOH, and the e-mail records I had requested had been destroyed. The maneuver is illegal, because from the moment a FOIA request is received, the FOIA Office is supposed to protect the integrity of the requested documents.

A couple of months into my phone call and e-mail marathon trying to reach DC DOH in relation to my October 23, 2005 FOIA, I realized that DC DOH was going to stonewall my access to any information about the CDC MMWR, and I began making dozens of attempts to contact the editor of the CDC MMWR series for a few simple answers to my questions. The editor did not return my phone calls, e-mails or letters. I then decided to submit my first FOIA to the CDC on December 27, 2005, with a request for e-mails between DC DOH and CDC related to the preparation of the CDC MMWR. On May 17, 2006 I submitted to the CDC a second FOIA for the data used in the “300 ppb” study. To date, I have submitted more than 10 FOIA requests to the CDC, any one of which makes for a compelling story of governmental abuse of the public and credible scientists, but I will limit my testimony to these two CDC FOIAs as examples.

Playing the CDC Shell Game. Sharing of data amongst scientists, and responding to straightforward questions about research methods, is central to the conduct of good science. These concepts seem to be foreign to the DC DOH and CDC. Given the 1) “historic” nature of the CDC MMWR findings concerning DC residents who were supposedly consuming water with over 300 ppb lead, 2) numerous associated sworn testimonies about the 300 ppb study to the DC City Council and the US Congress, and 3) the CDC’s stated desire to have the CDC MMWR impact policy and having great success in doing so (Figure 4), I assumed I would receive the data behind this study within weeks after requesting it from DC DOH on October 23, 2005 and then again from the CDC on May 17, 2006. Instead, the two agencies played what I consider to be an irresponsible and unethical shell game, implying that the data existed, but appearing to act as if they could not figure out whose responsibility it was to produce them.

On April 13, 2006, the DC DOH FOIA officer informed me that the data for the CDC MMWR were housed at the CDC. He also stated that he had been in contact with the CDC about my request, but that I would have to submit another FOIA directly to the CDC. I did so on May 17, 2006. On May 31, 2006, I received a spreadsheet via e-mail from DC DOH, without any written explanation. This spreadsheet obviously included some data related to the 300 ppb study, parts of which I cited earlier in connection to DC residents’ bottled water use. But the spreadsheet raised dozens of questions and in many ways was completely inconsistent with the information presented in the CDC MMWR. Eight months later, on January 23, 2007, the CDC informed me that that the 300 ppb data was “housed at the FDA.”

In summary, more than 4.5 years after first requesting the 300 ppb data, nothing that could possibly be the blood lead data behind this historic analysis in the CDC MMWR has been produced to me. In fact, I am highly doubtful that the blood lead data portrayed in the CDC MMWR ever existed, and have come to suspect that at least some of that data is a complete fabrication.

Pages from the CDC’s FOIA Playbook. A chronology of my first FOIA to the CDC, submitted on December 27, 2005, highlights the abusive practices of the CDC FOIA Office in relation to those seeking critical information about the agency’s environmental public health practices. After following up my FOIA request with 5 e-mails and voice messages that were

never answered, on April 16, 2006 I decided to file an appeal concerning the CDC's delay in responding to my request.

Over 7 months later, on November 3, 2006, I received a phone call from the CDC FOIA Office. They stated that my documents had been ready to mail for 4 or 5 months, but that because I had filed an appeal, the release of the documents had been placed on hold. If I wanted to receive the documents I had been waiting for, I first had to withdraw my appeal. I immediately memorialized this bizarre "Catch-22" conversation in an e-mail to the FOIA officer, and withdrew my appeal. Later that day, the CDC FOIA Office mailed me a letter that did not contain the documents I had just been promised. Rather, the letter stated that the agency was withholding the documents, and if I did not agree with their action, to submit an appeal. The appeal clock would have to be restarted. Dismayed at CDC's childish antics and mind games (i.e., Sike!), I promptly resubmitted an appeal on the FOIA, to replace the appeal CDC had just duped me into withdrawing – not that it mattered because FOIA appeals were ignored at CDC as well. More than 2 years went by without a response of any sort.

In a letter dated January 21, 2009, a day after the Obama administration took office, my hopes were raised when I received a letter from the CDC stating in part:

"This letter is a response to your November 2006 Freedom of Information Act (FOIA) Appeal for specific documents between CDC and the D.C. Department of Health during the 2004 lead crisis. I apologize for the delay in responding to your request. This office has experienced a significant turnover in staff, and we are working through our backlog of requests. ... If you are still interested in receiving the requested information, please contact <name>...If you are no longer interested in the information, you need to do nothing."

I immediately responded that I was still interested in receiving the documents.

When the US House Committee on Science and Technology began investigating the CDC MMWR in March 2009, I had still not received the documents I had requested, and I made the Committee aware of CDC's FOIA abuses. Perhaps because of that, in early November 2009, I received a phone call from a CDC FOIA officer, asking me yet again, whether I still wanted the documents from my 2005 FOIA. I said that I did.

Finally, in a package dated November 20, 2009, nearly 4 years after my initial FOIA request, the CDC released to me 108 pages of documents. While I am grateful for finally getting a partial response, numerous pages are clearly missing for reasons that I do not understand. For example, only every other page of the CDC MMWR drafts was included (i.e., page 1, 3 and 5), so it is possible that I was given a single-copied version of double sided originals. This week I reinitiated efforts to get a full response to my 2005 request.

I close by noting that in the past 4-plus years I have experienced numerous other abuses by the CDC, but will mention one last one that strikes me as especially flagrant. I am pursuing my investigation as a volunteer, and as such I routinely submit requests for a fee waiver. The CDC has repeatedly denied my requests, on the grounds that my FOIA will not "advance the understanding of the general public as distinguished from a narrow segment of interested persons," and that the "public's understanding of the government" will not be "substantially

greater as a result of the disclosure.” I mention this because I have had to pay the CDC several thousand dollars, much of it toward CDC employees’ salary, for the privilege of being abused by their FOIA system. I also freely disclose to anyone who reads this document —the CDC has determined that my research and testimony does not enhance the general public’s understanding of government operations.

CDC REFUSED TO CORRECT THE SCIENTIFIC RECORD

When I began this journey 5 years ago, the last thing I ever wanted was an exhausting, voluntary ordeal, that would ultimately cost me tens of thousands of dollars in FOIA charges alone to the agencies, and which would lead to the unpleasant experiences which culminate in today’s testimony. The record shows I did everything in my power to avoid this from happening. However, that was not the path that fate, or Dr. Brown or CDC’s actions, would choose for me.

Through my FOIAs of CDC and DC DOH, Dr. Brown was well aware of my serious concerns about the CDC MMWR since at least late 2005. Safely ensconced behind the twin parapets of an abusive FOIA Office and a Science Office that would spare no effort to avoid upholding accepted standards of scientific integrity (see later section), Dr. Brown must have felt empowered to ignore me. Reporters who raised substantive questions about the CDC MMWR based on facts I provided them, were rebuffed by the CDC press office, with statements that either questioned my integrity, intellect and intentions. I was once told they stated:

“No one has a problem with our paper except an Engineer with no formal training in, or appreciation of, public health.”

Despite my dismay at CDC’s arrogance, misconduct, and growing concern about serious problems with the CDC MMWR, I did my very best to work within the system and to stop the harm it was creating. After more than a year and just a few weeks after discovering Dr. Brown had actually authored the paper (she is listed as the 18th author), I wrote an e-mail that was both a plea for correcting the record, and an ultimatum (Figure 5). At that point, January 11, 2007, Dr. Brown could have avoided all of the revelations presented in this testimony, the US House Investigation into the CDC, and exposure of her actions skewing the data and analysis of the CDC MMWR, which she clearly knew about. To repeat this point for emphasis, had Dr. Brown corrected the CDC MMWR’s public health message in early 2007, and stopped the harm it was (and would continue) to perpetuate, I would have dropped the matter. Her supreme arrogance and unfortunate temperament would not allow herself to do so.

Ms. Brown and Mr. Shaw,

For more than a year now, I have been trying to get simple answers to questions I have about the MMWR authored by Stokes et al. regarding blood lead and lead in D.C. potable water. I was given Ms. Brown's e-mail by a reporter (Rebecca Renner) who claims she was told Ms. Brown is actually first author on the study. Through Ms. Renner, I have been told that Ms. Brown has been made aware of specific and credible questions about the integrity of data used in the report discussing the blood lead sampling of persons with 300 ppb lead in their drinking water.

I have requested, via FOIA of CDC and DC DOH, the raw data for this study and no one can provide it to me. The data that I have been given, and which cannot possibly be the data used for the study, are highly suspect and obviously suggest falsification has occurred. The listed first author (Ms. Stokes) has never responded to my legitimate questions about the study or the data. The prior editor of MMWR also did not respond to my questions about this study.

I already feel this study has done a great deal of harm. Most recently, I discovered that an elementary school in Marathon N.Y. justified not telling parents of > 200 lead in some school water samples, based in part, on data derived from the CDC/MMWR study.

At one point Ms. Renner and another reporter mentioned to me that various remedies to the situation were being considered by Ms. Brown and CDC, including everything from a published clarification of the article's conclusion to an investigation. I waited for a remedy while trying to find innocent explanations for the obvious problems with the study. But it was later stated that nothing of the sort was being planned.

Unless I hear from you before next Tuesday at 5:00 pm (January 16), I have decided to document my concerns to the CDC Associate Director of Science. At present, lacking the innocent explanation that I have been trying to find for more than a year now, my report will document suspicions of scientific misconduct by Ms. Stokes and the CDC/DC DOH study authors. Specifically, falsification of data foremost among other concerns.

I regret that it has come to this. It was my hope that I would be given the data and reassurance I have requested from the listed first author (Ms. Stokes), and when that failed to try and get answers from MMWR, and then finally from my FOIA of CDC. Instead I have been given a run-around for more than a year while the findings of this study have spread throughout the public health community and caused undeniable harm. In the event that either of you want to take my questions seriously and work to a reasonable solution I would be willing to speak with you. Since I did not previously know that Ms. Brown actually authored this study and I just discovered there is a new editor of MMWR, neither of you have been involved in my prior communications. Some news stories that mention issues related to my concern about the study are below.

Marc Edwards
Charles Lunsford Professor of Civil Engineering

Figure 5. Text of 1/11/07 e-mail to CDC's Dr. Brown and CDC MMWR Editor Shaw.

CDC OFFICE OF SCIENCE RIDES TO THE RESCUE... OF DR. BROWN

When Dr. Brown refused to correct the scientific record, my personal ethics and that of other engineers to “hold paramount the safety, health and welfare of the public,” dictated that I take my concerns to the appropriate authorities. In this case, that was the CDC Office of Science. At first I was hopeful. In the beginning, they at least responded to my e-mails. But thereafter, their treatment of me fell into the routine of abuse with which I had become so familiar via the CDC FOIA office. I will not force the reader to relive my ordeal here and now, nor do I wish to do so myself. Suffice it to say that my unsuccessful communications with the CDC Office of Science via e-mail, letter and phone numbered in the hundreds.

The bottom line is that, according to my perception and experience, the CDC Office of Science worked very hard trying to justify why it was their duty to do absolutely nothing to address my concerns. Ignoring their own written procedures, they played childish word games, trying to make me give up and go away. To this day I doubt that they investigated my allegations. But if they did, and they found no evidence of the problems outlined herein, they are even more ethically challenged than I believe to be the case as I compose this testimony.

One lowlight of the experience was when the CDC Office of Science was used, as a cheap public relations ploy, to further sustain the illusion of Dr. Brown's trustworthiness and that of the CDC MMWR. In an April 11, 2009 press release that the office of CDC's media relations issued to respond to a negative media article about the CDC MMWR, the CDC claimed the following:

“Scientific integrity is CDC’s hallmark.....CDC’s Office of Science takes any such allegation very seriously; it thoroughly investigated this complaint and found no evidence of scientific misconduct.”

I eagerly await the report of the US House Committee to see just how serious, and how thorough this “investigation” of my allegations actually was.

WHAT REALLY HAPPENED TO DC’s CHILDREN DURING THE DC LEAD CRISIS

After exhausting all hopes that anyone at the CDC would demonstrate a shred of scientific integrity or backbone in acknowledging problems with Dr. Brown’s behavior, or even express the slightest concern about children who were still being left unprotected from elevated lead in water due to the CDC MMWR’s flawed message, I gave up trying to resolve my concerns through CDC’s broken system.

In early 2008, I collaborated with Dana Best, MD, MPH at Children’s National Medical Center (CNMC) in Washington DC, which is a hospital with a reliable and robust database on blood lead levels of DC children. Along with Virginia Tech graduate student Simoni Triantafyllidou, we conducted a very simple and straightforward analysis which was eventually written into the paper “Elevated Blood Lead in Washington D.C. Children from Lead Contaminated Drinking Water: 2001-2004” and published in the peer-reviewed journal *Environmental Science and Technology*.²³

Given the authority of the CDC and Dr. Brown on the subject of lead health effects, and presumptions of most scientists about high standards of scientific integrity at the CDC, getting our paper through the scientific review process was difficult. One reviewer had concerns about publishing our paper, because it cited some data collected via FOIA, and was disturbed that this information would give readers the impression that CDC and other agencies did not supply their data willingly. Another reviewer stated that the paper should not be accepted because it “relies on a lot of data the authors did not collect, were apparently not involved in the original studies, and with which they do not provide sufficient information concerning the conditions and methodology under which the data were collected.” In other words, because the CDC and Dr. Brown would not follow established principles of scientific conduct and share information/data with us, reviewers were reluctant to approve publication of our own paper. In writing the final draft, I therefore had to create an imaginary world, in which the CDC’s actions were interpreted in an unreasonably positive light. I even wrote the following in reference to the CDC MMWR:

"Differences in conclusions between this work and the earlier CDC study are mostly attributed to the type of analysis and interpretation..."

This statement should not be construed as support for Dr. Brown’s analysis in the CDC MMWR. Our research determined that the decades of prior peer-reviewed literature, demonstrating that lead in water can be a serious public health concern, were correct. It further demonstrated very strong links between elevated lead in water and lead in blood for the most vulnerable children in DC from 2001-2004. Our work directly refuted the CDC MMWR “main message” that there “*is no indication that DC residents have blood lead levels above the CDC levels of concern...as a result of lead in water.*” It also exposed the misleading work of the CDC’s close collaborator in DC, Dr. Guidotti and his DC DOH co-authors, who published a misleading paper which concluded that “*There appears to have been no identifiable public health impact from the elevation of lead in drinking water in Washington, DC.*” Based on our analysis, hundreds, and in all likelihood thousands, of DC children had their blood lead elevated above the CDC level of concern as a result of elevated lead in water from 2001-2004.

EPILOGUE

Since publication of our paper, the CDC has doggedly defended the CDC MMWR against all criticism. The paper stands on the agency’s website to this day, unscathed, a monumental public health fiasco, where it continues to mislead and place children all over the world in harm’s way. Contradicting 2000 years of human knowledge and experiences related to adverse health effects from lead in drinking water, for a contaminant that is perhaps the best-known environmental neurotoxin -- how can anyone trust CDC’s integrity on more controversial subjects?

Some have said that my experiences and testimony prove that “science works,” and that falsification by scientists will always get exposed. That is simply not the case. Science is no match whatsoever for the bullying, abuse of authority and lack of integrity of powerful government agencies. Had I not volunteered nearly 10,000 hours of my time to expose wrongdoing by these agencies, spent tens of thousands of dollars of my family’s funds, sacrificed my personal life and career, and endured years of back-stabbing and personal attacks by the CDC and other agencies, I am doubtful that lead in water would ever again have been seriously

considered a public health concern. Indeed, as I write this testimony, I am still uncertain that this will occur.

I also thank all those who volunteered to work with me on this effort. I am humbled by, and stand in awe of, the sacrifice of scientists, victims and activists who stand against agency misconduct, many of whom end up destroyed or disillusioned in the process. Although no one emerges from these experiences unscathed, collectively, our actions do make a difference.

CONCLUSIONS

As long as the CDC continues to defend the CDC MMWR, the agency will not have a shred of scientific credibility. As I first stated publicly in May 2006, the CDC MMWR has to be retracted.

To the extent that my experiences with individuals in the CDC Lead Poisoning Prevention Branch and the CDC Office of Science are any indication, there is a culture of scientific corruption in branches of this important agency, and there is no evidence that it has the capability for self-correction. I know highly ethical and outstanding scientists in other parts of the CDC, and I sincerely hope that they too, will not face insurmountable obstacles in achieving the public good.

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APPENDIX 1: ADDITIONAL SPECULATION ABOUT CDC MOTIVATION

In retrospect, when the DC Lead Crisis became front-page news on January 31, 2004, it presented both problems and opportunities for the CDC and their DC DOH colleagues. Both agencies had been almost exclusively focused on and trained to address lead paint hazards, and this “worldview” would have been undermined by finding significant adverse health impacts from the crisis. On the other hand, if it were found that lead-contaminated water could not be linked to a single DC child with a blood lead elevated above the CDC level of concern, the problems would be eliminated and the agencies’ approach would be vindicated.

The problems were multi-fold. First, from the earliest phases of the crisis, the public health community worried that the unprecedented media attention to lead in drinking water could divert public attention and funding away from addressing lead paint.³⁷

Second, in the weeks just before the publication of the CDC MMWR, media attention was shifting to DC DOH’s ignorance about, and mismanagement of, DC’s lead in water issues.⁴⁰ Contrary to initial claims that DC DOH first learned about problems with high lead in water in January 2004, the *Washington Post* was on the verge of informing the public that DC DOH’s knowledge went back to October of 2002. In particular, former ASTDR employee and CDC MMWR co-author Dr. Stokes was in the cross-hairs, because in October 2002 she (together with other DC DOH officials) “ignored the mounting health threat and failed to issue clear instructions to residents about how to reduce their risk of lead poisoning.”⁴⁰ Although obviously responsible for her actions, Dr. Stokes’ inattention to the water problem fully conformed with the CDC’s “lead-paint-centric” approach to childhood lead poisoning prevention, so any further press coverage of Dr. Stokes’ lapses would also risk drawing attention to deficiencies in CDC policies. The CDC MMWR, rushed to publication just one day after this *Washington Post* article, effectively immunized both Dr. Stokes and the CDC from further criticism.

Third, any serious investigation of who knew what and when at DC DOH, would have led to public revelations about agency bungling that went far beyond anything that had ever been previously revealed in the press. Specifically, on September 26, 2001, a DC WASA employee called the DC OIG hotline and reported that DC WASA had “intentionally” hidden many lead in water test results from early 2001 that “exceeded the EPA action limit.”¹⁴ Also, later research would demonstrate that at this exact time frame, DC WASA was collecting data showing that DC’s water lead levels were spiking to dangerous levels and that hundreds of DC’s children had elevated blood lead levels due to exposure to the high lead in water.²³ It is now undisputed that DC WASA and US EPA R3 knew that the US EPA water lead action standard would likely be exceeded by July 19, 2002, and had certainly knowledge of some problems as far back as August 2001.¹⁴

My FOIA request of US EPA reveals that on June 21, 2002, a DC DOH water quality division employee wrote a letter to US EPA R3 requesting funding for “a lead service line replacement program.” It seems likely the employee knew something was amiss relative to lead in water and its health impacts for DC residents, because the employee later indicated to US EPA R3 that during April 2002, she had tried to get geographic data on elevated blood lead levels of children from the CDC-funded DC Lead Poisoning Prevention Program staff, and link it to information on the location of lead pipe. In response to her June 21, 2002 request for action, on July 24, 2002, US EPA R3 and DC WASA disingenuously stated that “testing has shown lead levels to

be below Federal action levels” and “water quality testing...has consistently supported the position that our...lead and copper levels are below the action level.” This, despite the now undisputed fact that both agencies knew about the forthcoming lead action level exceedance at least 5 days earlier (if not months and months earlier).

In the July 24th, 2002 response, US EPA R3 told the DC DOH water quality division that DC WASA had addressed “your concerns about the health effects of lead levels in the District’s drinking water supplies.” Clearly, the episode represents a lost opportunity by the agencies to address substantive lead in water health effects for DC children, nearly 20 months before the frenzied activities by the CDC and DC DOH in response to the *Washington Post* story in early 2004. It is quite likely that the DC DOH water quality division employee did not get cooperation from the CDC-funded childhood lead program in early 2002 when she tried to draw links between elevated blood lead in DC and occurrence of lead service lines. At a minimum, in early 2002, the efforts of the DC DOH water quality employee represented a chance for the agencies to “connect the dots” and address the spike in childhood lead poisoning that was occurring throughout DC due to contaminated water at that time.^{14,23}

Fourth, public testimony and the CDC’s “Talking Points” memo that accompanied the release of the CDC MMWR, stated clearly that the CDC became involved in the DC Lead Crisis on February 16, 2004. In fact, three questions in the CDC “Talking Points” memo, directly or indirectly, addressed the question of when CDC first became involved in the DC Lead Issue, and why the CDC was not doing more. The facts indicate that the CDC’s statement was not completely accurate. Putting aside the likelihood that some CDC staff and DC DOH Lead Poisoning Prevention program knew about possible water-lead problems in April 2002, the CDC had also funded the DC DOH’s grossly dysfunctional DC Lead Poisoning Prevention Program for years, and was acutely aware of serious shortcomings in the DC DOH’s management of data and its poor record keeping. For example, a few months after the publication of the CDC MMWR, some CDC employees were alerted to forgery of blood lead records at the DC DOH, and to the fact that thousands of blood lead test data from 2003 were missing.⁴¹ Perhaps because of the enormous public health implications of the news for DC residents, as well as serious questions that would be raised about the integrity of the CDC MMWR that relied on this incomplete data, the CDC did not report the information about the data forgery and the missing blood lead data to appropriate authorities.⁴¹ The agency’s inaction suggests both complicity with DC DOH and duplicity in the CDC’s actual commitment to protecting public health. Once again, had the CDC MMWR acknowledged even a single case of childhood lead poisoning from water, it is reasonable to assume that an investigation into DC DOH’s failing lead poisoning prevention program would have revealed serious deficiencies under CDC’s oversight.

Fifth, if the CDC’s DC investigation had concluded that lead contaminated water could cause childhood lead poisoning, this could potentially interfere with a game-changing legal case of national importance that offered the possibility of billions of dollars from former lead-pigment makers for lead paint remediation. A landmark lawsuit against lead paint companies, initiated in Rhode Island in 1999, seemed to be heading towards a historic settlement which could require the defendants to pay billions in funds to rid Rhode Island homes of lead paint hazards and ultimately might create similar programs nationwide.⁴² To date, the CDC has not produced documents that I have requested about Dr. Brown’s involvement in this lawsuit; however, in 2007 Rhode Island apparently did consider that Dr. Brown serve as a “Special Master” to oversee spending the funds from the lawsuit, a proposal which the defendants protested.⁴³

Indeed, an October 2002 article about Dr. Brown's recent research on lead in Rhode Island, stated that "She <Brown> added that the study may aid plaintiffs waging legal battles against lead paint manufacturers, mentioning one case in Rhode Island that recently resulted in a hung jury."⁴⁴

To my knowledge, lead in water was never raised as a potential lead source in the Rhode Island lawsuit. However, if the DC Lead Crisis were shown to have caused demonstrable harm, it could have provided another significant argument for the former lead paint defendants, weakened the Rhode Island lawsuit, and jeopardized the potential procurement of billions of dollars nationally for lead paint remediation. Indeed, Lead and Copper Rule monitoring results and a recent article in the journal *Environmental Health Perspectives* (EHP) have revealed chronic problems with lead in the tap water of Providence, Rhode Island, and I am aware of relatively high lead in water of other Rhode Island cities.⁴⁵

As for opportunities, they were also significant, for those interested in generating new funding sources to mitigate lead paint. First, any public relations coup about the supposed lack of harm from water, provided a high profile platform that CDC could (and did) use to drive home its belief that even in the midst of the largest lead in water contamination event in modern history, the only significant health concern in DC was lead paint. Two events, removal of the language from the US EPA website about the dangers of 40 ppb lead in water, and Dr. Brown's removal of the statement "Elevated levels of lead in the water are a public health concern" from the CDC MMWR, were separated at most by 3 days in late March 2004.

Secondly, the CDC's handling of the DC Lead Crisis not only protected lead paint advocates' drive for a Rhode Island legal settlement, but it was also used to create new opportunities for funding for lead paint from the water industry. For starters, the DC DOH lead program obtained millions of dollars of funding from DC WASA in early 2004 for blood lead tests, environmental assessments and software to track lead poisoning. National funding aspirations were also significant and could be cultivated. As revealed in a recent EHP article, one of Dr. Guidotti's colleagues and 2007 paper co-authors made a presentation at the 2009 American Public Health Association conference, about a Portland, Oregon program, in which water utilities could pay for lead paint remediation, in exchange for not having to fully optimize corrosion control to minimize lead in water concentrations according to federal regulations. The EHP article stated:⁴⁵

"Portland instead spends \$500,000 annually on a public education campaign and lead paint abatement program. 'This approach was a win-win for community public health, reducing lead exposure across the community and across media of exposure, especially for children,' says David Leland, manager of the Oregon Department of Human Services Drinking Water Program.... 'Look at the hierarchy of concern for lead,' says Leland. 'Number one was the lead from gasoline in the air, before it was banned. Now it's paint,' he says."

"...Jim Elder, who headed the EPA drinking water program from 1991 to 1995 <stated> 'Portland's choice between optimum corrosion control and public education is a "covert form of cap and trade'..."

Finally, funding for lead paint programs were to be cut by 25% in draft federal budgets, as revealed in a *Washington Post* article just days after the MMWR was released.⁴⁶ A few weeks later, on April 29, 2004, the CDC MMWR was used to update the President of the United States

on what the CDC had done lately in relation to “Protecting Health Care Consumers,” and also provided an opportunity to reiterate the high exposure risk from lead paint relative to lead in water. An ATSDR and CDC e-mail with the subject “CDC Topics for Secretary Thompson to Discuss with President Bush,” mentioned that in relation to the DC Lead Crisis, CDC had helped:

“...address pressing consumer questions about the lead exposure. Scientists found that.....there was no evidence that it caused an increase in the number of children in the District with blood lead levels ≥ 10 ug/dL (our level of concern for individual children). Support to the district continues with development of a comprehensive assessment of lead sources in children’s environments, including lead paint and leaded house dust.”