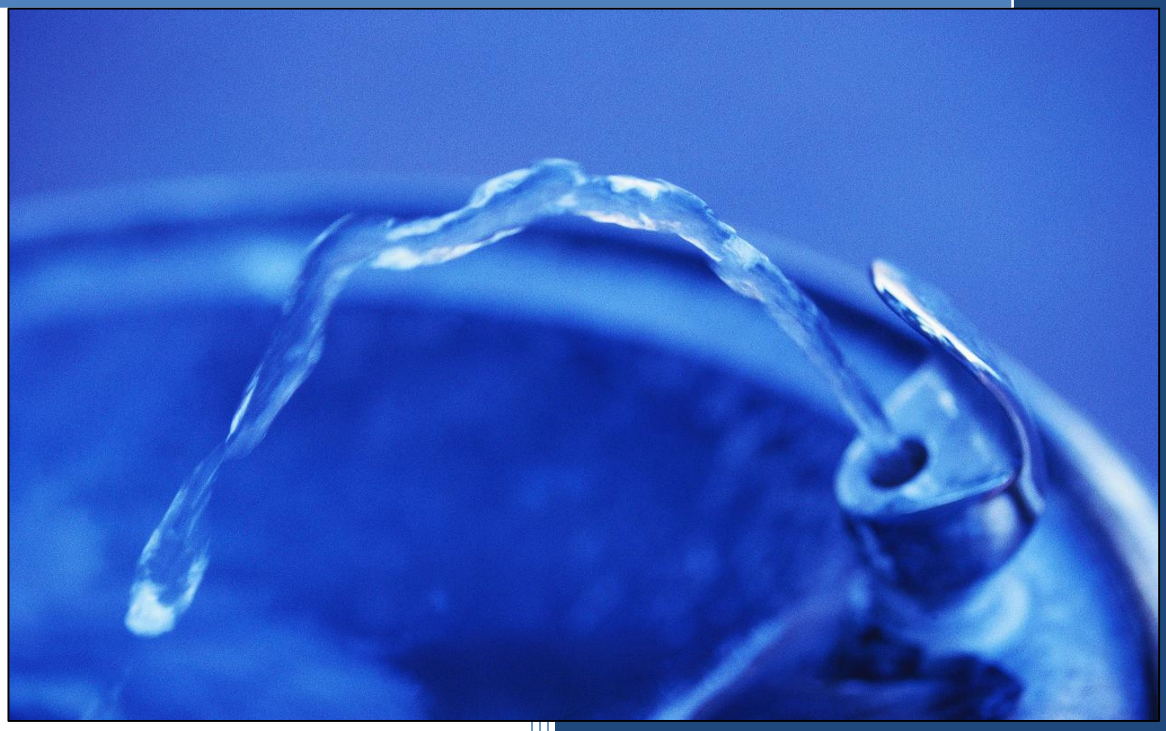
# National Drinking Water Advisory Council Meeting Summary, December 11-12, 2013



Prepared for:
United States Environmental Protection Agency
Office of Ground Water and Drinking Water
1201 Constitution Avenue, NW
Washington, D.C. 20004

# Table of Contents

# Attendees

**National Drinking Water Advisory Council (NDWAC)**
Jeanne-Marie Bruno, Park Water Company, California
Marilyn Christian, Harris County Public Health and Environment Services, Texas
Jessica Godreau, North Carolina Department of Environmental and Natural Resources
Mayor Hilliard Hampton, II, Inkster, Michigan
Jill Jonas, Department of Natural Resources, Wisconsin
Caryn Mandelbaum, Environment Now, California
Marcia St. Martin, New Orleans Sewerage & Water Board, Louisiana
Sonya Massey, Alabama Department of Environmental Management
James McCauley, Lower Brule Rural Water System, South Dakota
Olga Morales, Chair, Rural Community Assistance Corporation, New Mexico
Howard Neukrug, Philadelphia, Pennsylvania
Bob Vincent, Florida Department of Health
Craig Woolard, Public Works, City of Bozeman, Montana
Mae Wu, Natural Resources Defense Council, D.C.

**Centers for Disease Control and Prevention (CDC) Liaison**
Max Zarate-Bermudez, (Phone) MS MPH, Ph.D., Epidemiologist, Division of Emergency and Environmental Health Services, National Center for Environmental Health, CDC, Atlanta, GA
Kimberly Jones, Ph.D., Professor and Chair, Department of Civil and Environmental Engineering, Howard University, D.C.

**U.S. Environmental Protection Agency (EPA) Attendees**
Elizabeth Behl, Director of Health and Ecological Criteria Division, OW OST
Ron Bergman, Acting DD, DW Protection Division, OGWDW
Eric Bissonette, Acting DOD, OGWDW
Eric Burneson, Acting DD, Standards and Risk Reduction Division, OGWDW
Bob Cantilli, ORD/EPA
Tom Carpenter, U.S. EPA, SAB
Lisa Christ, Branch Chief, Standards and Risk Reduction Division, OGWDW
Elizabeth Corr, ADD, DW Protection Division, OGWDW
Rachel Carlson, OGWDW
Lesley D'Anglada, Microbiologist, OST/OW
Carol Demarco. U.S. EPA
Jerry Ellis, OGWDW
Michael Finn, OGWDW
Holly Green, Protection Division OGWDW
Peter Grevatt, OD, U.S. EPA OGWDW
Suril Mehta, OCHP/EPA
Nancy Stoner, U.S. EPA Acting Assistant Administrator for Water
Betsy Pale, U.S. EPA
Nicole Shao, ORD/EPA
Michele Schutz, OGWDW

Lameka Smith, OGWDW
Genevieve Soule, OIG/EPA
Rich Weisman, OGWDW

**Designated Federal Officer (DFO), NDWAC**
Roy Simon, OW/OGWDW

**Members of the Public**

Public Attendees December 11, 2013
John Arnett, Copper & Brass Fabricators Council
Scott Biernat, Association of Metropolitan Water Agencies
Jessica Edwards Brandt, D.C. Water
Miranda Brannon, U.S. Air Force
Lia Brune, American Water Works Association
Dave Clark, Rural Community Assistance Partnership
Alex Gonzalez, U.S. Army Corps
Dain Hansen, IAPM
Mike Keegan, National Rural Water Association
Vanessa M. Leiby, The Cadmus Group, Inc.
France Lemieux, Health Canada
Frank Letkiewicz, The Cadmus Group, Inc.
Chris Lindsay, IAPMO
Dave Lipsky, New York City Department of Environment
Beth Messer, Division of Drinking and Ground Waters, Ohio EPA
Anne Murray, The Cadmus Group, Inc.
Darrell Osterhoudt, Association of State Drinking Water Administrators
Amanda Palleschi, Inside EPA, Newsletter
Eugene Pinzer, HUD, OHHLHC
Chris Reimer, National Ground Water Association
Alan Roberson, American Water Works Association
Stephanie Salmon, Plumbing Manufacturers International
Anne Sanding, State Department
Abbey Schneider, Association of California Water
Anne Speisman, U.S. Army Corps
Robert Stewart, Rural Community Assistance Partnership
Jim Taft, Association of State Drinking Water Administrators
Lynn Thorp, Clean Water Action
Pat Ware, Bloomberg, Bureau of National Affairs Inc.

Public Attendees December 12, 2013
Scott Biernat, American Metropolitan Water Association
Adam Carpenter, American Water Works Association
Nicole Condon, D.C. Water
Dave Lipsky, New York City Department of Environment
France Lemieux, Health Canada

Deirdre Mason, Association of State Drinking Water Administrators
Chris Reimer, National Ground Water Association
Steve Via, American Water Works Association
Lynne Thorp, Clean Water Action

# Meeting Summary: Wednesday, December 11, 2013

WELCOME AND REVIEW AGENDA

*Olga Morales, NDWAC Chair; and Peter Grevatt Office Director, EPA Office of Ground Water and Drinking Water (OGWDW)*

[Chris Wiant was the only NDWAC member not in attendance. Max Zarate-Bermudez participated via telephone.]

**Ms. Morales** welcomed everyone, both the general public and members of the Council. She then welcomed Peter Grevatt noting it was his first time at a Council meeting and that he came to this position shortly after the last meeting in October 2012. Ms. Morales extended a very warm welcome to the new Council members who she had not yet had the opportunity to meet. She stated that the next couple of days would cover very important topics including Lead, Copper, and Algal Toxins. She apologized for moving the meeting to a later time but wanted to make sure everyone got in safe and sound. Ms. Morales then asked Mr. Grevatt to begin the National Drinking Water Program Update.

**Dr. Grevatt** questioned how well people could hear at the edge of the room and asked them to tell him if they couldn't. Dr. Grevatt welcomed everyone to Washington, and noted that he was glad they could make it. He thanked the Council for all of their organization and for putting up with travel difficulties. He noted that they were a tremendous group for the Drinking Water Program and will play a key role in providing advice to the Administrator. Dr. Grevatt gave a special thanks to the new members and those that will soon be rotating off the Council and mentioned that Ms. Morales has been serving as Chair for three years.

**Ms. Morales** responded by saying yes this was her second term and her last meeting. She stated that it had been a delight and great to be part of making recommendations to the Administrator. She commented to the new Council members that she knew they would enjoy being part of the Council and told them to make sure they protect the nation's drinking water.

**Dr. Grevatt** then noted he wanted to take a quick moment to properly thank Ms. Morales for her service. He continued by stating that Ms. Godreau, Ms. St. Martin, Mr. Woolard, and Ms. Massey were also wrapping up their terms with this meeting and he wanted to thank them. Mr. Grevatt stated that he was pleased to announce Ms. Jonas had agreed to serve as Chair of NDWAC moving forward and thanked her for agreeing to do that. He then specified that they are in the process of recruiting five new members and there was a Federal Register notice that went out and will close on the 20th of December. He encouraged the Council to reach out to people they thought would be strong participants in NDWAC and asked that they make sure their names get sent to him as well.

NATIONAL DRINKING WATER PROGRAM UPDATE

*Peter Grevatt, OD, EPA Office of Ground Water and Drinking Water (OGWDW)*

**Dr. Grevatt** gave a brief background summary of his career. He explained that he joined the Office of Ground Water and Drinking Water a little over a year ago. He commented that it is a tremendously exciting time to be doing work in the Office of Ground Water and Drinking Water; however, added that the challenges they will be facing will be very familiar to everyone in terms of the funding gap. He stated that the gap was in the range of almost $400 billion which is a big number and there is significant need. Dr. Grevatt told the Council that they were all going to play such an important role in helping the Agency because it will require a lot of creativity to figure out how to best do the work. He noted that this was because they are in a time that they could almost be certain that their resource dollars will not be enough and consequently they had to figure out how to do the work they do more efficiently and protect the environment.

Dr. Grevatt stated that the infrastructure gap was amazing to him as a relative newcomer to the drinking water area. As an example, he commented that there are 25,000 water line breaks a year in the United States. He added that on top of that there are other factors at play that affect the country's drinking water like the fact that according to the census the population will increase by 100 million people between now and 2016. He continued by noting there has also been an overwhelming impact of climate change. As an example, he noted Hurricane Sandy or the recent floods in Colorado wiped out a number of drinking water systems, and explained that there are so many very significant events that are causing a change in expectations because climate change is a huge source of pressure. He stated that these all cause big impacts on our resources: population increase, where people live, and climate change. He explained that these are the top three sources of impairment and do not always act independent of one another.

Next, Dr. Grevatt discussed EPA's priorities. The first priority noted was source water protection, which he stated is an ongoing challenge because it is not a regulatory area. Mr. Grevatt recommended integrating what is done under the Safe Drinking Water Act with actions under the Clean Water Act to protect drinking water sources. He noted that it is important to understand that it is much more expensive to treat contaminated water than to keep it clean.

He then stated that EPA continues to focus on ground water storage in multiple parts of the country. Dr. Grevatt commented that there was an important connection between source water protection and storage because he was not just thinking about what is on the surface but what is underground and that they have to protect the ground water because so many communities rely on ground water as their source of water. He then gave the example of using aquifers for ground water storage and how it is important to ensure you have enough water when you are in drought. However, there are specific steps to safe and successful implementation of aquifer storage programs. He noted the use of them is only going to increase over time given the kind of droughts people are challenged with.

The next priority Dr. Grevatt mentioned was aquifer exemptions which are part of the Safe Drinking Water Act. He explained that due to astounding factors in the United States there has been a dramatic increase in domestic energy production which is great for the country, but does raise some concerns like the fact that aquifer storage can be exempt from the regulatory

requirements of the Safe Drinking Water Act and can be exempt in a variety of environments including energy producing areas. He noted the Agency will have challenges going forward trying to understand a consistent way of working closely with the states on how to work through these issues.

Next, Dr. Grevatt discussed climate change and the impacts it has on the water infrastructure. He explained that the supplemental funds that Congress provided to respond to Hurricane Sandy specifically to enhance resiliency of drinking and wastewater treatment facilities. Dr. Grevatt said they are working with New York and New Jersey as they implement the use of the $600 million that was provided. He noted that they do not have the results of those projects yet but they should be coming in next year. Dr. Grevatt further explained that they have also hosted a number of workshops in the Water Security Division which focused on the interaction of energy and water sectors to promote collaboration during the days and months following a disaster. Dr. Grevatt explained that the key is you cannot start when the disaster happens; you have to have a plan in place prior to it. He added that they have also developed the CREATE tool to help utility owners and operators assess risks and evaluate options for mitigating them.

Dr. Grevatt next explained the EPA's Safe Drinking Water Information System (SDWIS) databases and how the federal version (SDWIS/FED) stores the information EPA needs to monitor approximately 156,000 public water systems, while the state version (SDWIS/STATE) is a database designed to help states run their drinking water programs. He explained that they want to modernize the system and are in the process of upgrading to SDWIS next-gen/SDWIS prime so that it will support potential drinking water violations and help the states streamline and work as efficiently as possible.

Under the state drinking water SRF program, one of the major challenges has been that they have unlimited applications. Dr. Grevatt noted that about $1.8 billion of the DWSRF funds provided to EPA have not yet been spent, but they are committed to continuing the process of working through the applications with states to reduce contaminant levels by 20 to 30 percent over next couple of years.

Dr. Grevatt concluded by discussing how small systems are one of the largest challenges the Agency faces in terms of resources available to them and costs of small drinking water systems. He stated that they have been working in close partnership with other agencies like USDA to try and give them as many resources as possible and help the small systems deal with their challenges. Dr. Grevatt went on to note that key things on agenda for this meeting are lead and copper. He then stopped and asked if anyone had any questions they wanted to ask, and said, if not, he would be here for the entire two days of the meeting and would be happy to address questions at any time.

**Mr. Neukrug** commented that the list of key issues Dr. Grevatt gave is similar to others he has seen of 21st century water industry challenges. He added that there have been dramatic improvements to water quality in the last 35 years and it is in large part due to EPA and the SDWA.

**Dr. Grevatt** said thank you and noted that the challenge ahead is to make sure they can continue and further enhance the quality of water across the country. He stated that if they think about the challenges in Indian Country and small systems they are big challenges and that is why EPA reaches out to the Council for guidance and input.

**Ms. Godreau** stated that Dr. Grevatt references a letter sent to Florida regarding ASR and that she would be interested in seeing it if he could share it.

**Dr. Grevatt** said yes they would be glad to do that and although they reference Florida in it, they think it would be important and relevant to other states so they would be happy to do that.

**Ms. Morales** commented that she would like to remind the Council that if they have questions they should put their name tag up and that it is her job to moderate the discussion based on the order in which she sees the tents go up.

**Dr. Grevatt** noted that he had a few more words about something and then would turn the floor to Mr. Burneson. He stated that the main topics of the first day will be an overview of regulatory actions related to drinking water and a detailed discussion of the long term revisions to the Lead and Copper Rule and that they are both regulatory priorities for the Agency in the drinking water sector. He noted that NDWAC was engaged in the long term revisions to the Lead and Copper Rule a couple of years ago and EPA is now bringing back key issues because initially a stakeholder workgroup addressing the key issues was not created. He explained that they need more input from a very diverse sector, a workgroup representing every aspect of the lead and copper interests--which he did not feel had been done in the previous discussions. Dr. Grevatt explained that there are five areas they are looking to the Council to for input: where sampling is done, what the sampling procedure should be, and how to best move forward with partial or full lead service line replacement. He stated that there are over 10 million lead service lines, which would have a large cost if we required their removal. Additionally, he noted removal of lead service lines raises a number of issues that focus on environmental justice and protection. Dr. Grevatt explained that when we first consulted with the NDWAC we asked for input on each of these issues separately. However, because all of these regulatory provisions must work together to bring about the desired result of equitably reducing exposure to lead and copper, he most wanted NDWAC to focus on thinking carefully how the different pieces of the rule fits together to get the desired outcome. He noted that this was the main reason they were coming back to the Council for more input. Dr. Grevatt said that tomorrow they would be talking about algal toxins and drinking water. There are a number of people from EPA who will be describing the Agency's actions to get information to states and drinking water systems out about harmful algal toxins and he wants to have an initial discussion with the NDWAC about what more could be done.

DRINKING WATER REGULATORY DEVELOPMENT ACTIVITIES

*Eric Burneson, Acting Director, Standards and Risk Management Division, OGWDW*

**Mr. Burneson** thanked everyone, introduced himself and explained that during the last Council meeting he was Chief of the Targeting and Analysis Branch and is now the Acting Director of Standards and Risk Management Division.

Mr. Burneson presented a status report on EPA regulatory development activities and discussed the following topics:

- The regulatory process and how the boxes in the slides all represent risk management and regulatory processes, noting that each stage needs increased specificity and confidence in the type of supporting data used (e.g. health, occurrence, and treatment).
- Contaminant Candidate List (CCL): EPA has to make regulatory determinations on whether or not to regulate five contaminants on the CCL every five years. EPA has started work on CCL4 and it must be out by 2014. Mr. Burneson reported that they are working on issuing a draft CCL4 for public comment in 2014 and that roughly a year after they issue the draft CCL they will issue the final.
- All information on Unregulated Contaminant Monitoring Rule 3 (UCMR3) is available on the web (http://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/ucmr3/index.cfm). The final rule for UCMR3 came out in May 2012 with monitoring taking place Jan 2013 – Dec 2015; reporting through mid-2016.
- UCMR 3 Preliminary results were first posted November 5, 2013 (http://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/data.cfm). Mr. Burneson noted that the results will be updated quarterly and that the UCMR 3 minimum reporting levels (MRLs) are based on analytical method quantitation limits that are comparably lower than UCMR 1 and UCMR 2 MRLs. As a result of the comparably lower reporting levels more frequent detection of UCMR 3 contaminants are being reported than in previous UCMRs. He explained that because the minimum reporting levels are based on technical ability to measure the contaminant, not on a health effect, EPA is providing health based reference concentrations to provide context for the measurements of contaminants found in drinking water. These reference concentrations are provided for 20 of the contaminants and are based on available information such as CCL3 Contaminant Information Sheets, EPA Health Advisory Table, and Human Health Benchmarks for Pesticides. These reference concentrations are being provided so that measured concentrations of contaminants in drinking water may be judged relative to health-based concentrations rather than method-based reporting limits.
- Regarding summary points of the preliminary data, he noted that very few of the measurements were above the reference for the VOCs; of all the PFCs we only had concentrations for two of them; and that monitoring will continue through the end of 2015 and the report will be distributed in 2016.
- EPA held stakeholder meetings in May 2013 focused on methods for unregulated contaminants UCMR 4. He stated that the Agency will be initiating a workgroup process for UCMR 4 and are working towards purposing the rule on this in 2015.

- In order to make a determination to regulate a contaminant it must to meet three criteria:
    - Adverse effect on health of persons.
    - Known to occur, or there is substantial likelihood that the contaminant will occur, in a regulated Public Water System (PWS) with a frequency and at levels of public health concern.
    - Presents meaningful opportunity for health risk reduction for persons served by PWS.
- SDWA requires EPA to make regulatory determinations for ≥5 CCL contaminants every five years. The potential outcome of regulatory determinations are:
    - No regulatory determination (insufficient data to assess).
    - Positive determination (a finding of yes for all three of criteria).
    - Negative determination (not enough information and one of the three criteria not positive), usually in that case EPA develops a non-regulatory health advisory.
- Status and Next Steps for Regulatory Determinations 3 (RD 3):
    - Evaluating the health and occurrence information to identify which CCL 3 contaminants have sufficient information to make to the preliminary regulatory determinations.
    - Expect to publish preliminary RD 3 for public comment in 2014.
    - After evaluating and considering public comments, expect to publish final RD3 early 2015.
- In regards to perchlorate, Mr. Burneson reiterated that although EPA is developing a proposed perchlorate standard they continue to evaluate available data on perchlorate occurrence, as well as the feasibility of treatment technologies to remove perchlorate and examine the costs and benefits of potential standards. Actions taken so far:
    - Public stakeholder meeting held in September 2012.
    - Consulted with the National Drinking Water Advisory Council in October 2012. Mr. Burneson explained that in the 2012 Chicago NDWAC meeting they discussed the cost information and received recommendations from the EPA Science Advisory Board on how to determine the MCLG using best available science.
- He stated that they are not taking the approach to use the traditional methodology for deriving an MCLG. The SAB recommended that given the available data, EPA should derive a perchlorate MCLG that addresses sensitive life stages through physiologically-based pharmacokinetic/pharmacodynamic modeling. SAB identified EPA and FDA PBPK models; however, neither of the existing models is able to predict outcomes for all the sensitive life states identified by SAB.
    - EPA is working with FDA to evaluate options for PBPK modeling to meet the SAB recommendations in deriving a perchlorate MCLG.
- Carcinogenic VOCs Group or cVOCs as it is referred to by the Agency.

    - Considering regulated (TCE, PCE and others) and unregulated carcinogenic VOCs (cVOCs).
    - Assess potential cVOCs for the group based upon similar health effect endpoints; common analytical method(s); common treatment or control processes; and occurrence/co-occurrence in drinking water.
    - Evaluate options for setting a cVOC MCL(s) and examine the feasibility of analytical methods & treatment technologies, and costs/benefits for the group.
    - EPA expects to hold consultations in early 2014 and to propose a regulation in late 2014.
- For the Six Year Review, the1996 SDWA Amendments require EPA to review and, if appropriate, revise existing National Primary Drinking Water Regulations (NPDWRs) every six years.
- Review of Long Term 2 Enhanced Surface Water Treatment (LT2) Rule is a companion to the six year review. Mr. Burneson noted that they have been conducting that review which involves the assessment and analysis of data/information on occurrence, treatment, analytical methods, health effects, and public health risks. Have held three stakeholder meetings to solicit/gather information on the Round 1 monitoring results/bin placement, analytical methods improvements, uncovered finished reservoirs, and microbial toolbox options. In closing, Mr. Burneson stated they expect to the complete review on the same the schedule as CCL3 (if not sooner).

**Ms. Wu** asked if there any plans to do anything about the eight contaminants on UCMR3 that you don't have reference concentrations for.

**Mr. Burneson** responded that those eight contaminants are ones they will consider for future rounds of regulatory determination and we will continue prioritize those to have reference concentrations in the future.

**Ms. Wu** asked if they have any sense of how long it will take for them to see anything for perchlorate.

**Mr. Burneson** replied that they are working as aggressively as possible. It is difficult science that not a lot of people can do. He noted they are hoping something might be available in a little less than a year.

**Mr. Vincent** asked if there are any other groupings of contaminants that lend themselves well other than the cVOCs.

**Mr. Burneson** replied that there are other contaminants that they identified as potential groups like nitrosamines, etc. He explained that some of the identified contaminants are on the CCL and are currently being monitored while others are not so they are in the process of evaluating which ones may be addressed under the six year review.

**Mr. Vincent** asked if there was any change in the status for low risk/high consequence of microbial legionella.

**Mr. Burneson** responded that the pathogen is one that they continue to evaluate. He explained that legionella is one of the contaminants that the surface water treatment rules seeks to address through the treatment techniques for disinfection. He also noted that there have been a number of legionella outbreaks and it would be subject to review under future national primary drinking water regulations.

**Dr. Jones** asked if, in the SAB report, there was an interim approach that recommended the use of modeling along with empirical data to determine the impacts of hypothyroxinemia in pregnant women and the effect on life stage development.

**Mr. Burneson** replied that they are considering an interim approach. He explained that modeling represents one of the most likely paths forward, but that they are looking to see if there is quicker way to get certainty and information other than through the use of the PPK model.

**Mr. Burneson** continued with his presentation on Drinking Water Regulatory Development Activities (see attached presentation).

- He gave an overview of the 1989 Total Coliform Rule (TCR) and explained that the Federal drinking water rule was first established in 1989. It is the only microbial drinking water rule that applies to all (~155,000) public water systems (PWSs) in the U.S. He noted that the rule requirements pertain to both community and non-community systems and the primary objectives of the rule are: ensure integrity of the distribution system; indicate whether treatment is effective; and indicate possible fecal contamination.
- SDWA requires EPA to review and revise, as appropriate, each NPDWR no less often than every six years. In 2003, EPA reviewed and decided to revise the Total Coliform Rule (TCR). In July 2007, EPA convened the Total Coliform Rule Distribution System Federal Advisory Committee (TCRDSAC), consisting of 15 organizations. In Sept 2008, TCRDSAC deliberations concluded with a signed Agreement in Principle (AIP) that included recommendations on how to revise the TCR. In July 2010, EPA proposed and solicited public comment on the RTCR, which had the same substance and effect as the TCRDSAC recommendations. In February 2013, and after considering 134 public comment letters, EPA promulgated the final RTCR.
- Key Provisions of RTCR.
    - Monitoring.
    - Assessment and Corrective Action (Find and Fix): Mr. Burneson noted that the most significant revision was assessment and corrective action.
    - Seasonal Systems: Define “seasonal systems” and requires them to have start-up procedures and sampling during high vulnerability periods.
    - Public Notification (PN).

- Guidance and Implementation: Mr. Burneson stated that the Agency is focusing on guidance and implementation. PWSs are expected to comply three years after publication (by April 1, 2016). Some states have indicated that they may pursue early implementation. EPA HQ held the first webinar on the rule requirements in April 2013; planning to host additional, more specific training to regions and states for implementation through Spring, 2014. The Agency also expects to release Guidance Manuals in the next one to two years.

- Reduction of Lead in Drinking Water Act: Amends SDWA Section 1417 – Prohibition on Use and Introduction into Commerce of Lead Pipes, Solder and Flux.
    - Mr. Burneson commented that most significantly it changes the definition of "lead-free" by reducing lead content from 8% to a weighted average of not more than 0.25% in the wetted surface material (primarily affects brass/bronze).
    - He also pointed out a typo in the slide; it is effective January 4, 2014.
    - He explained that one of the key issues discussed was how the Act addressed fire hydrants. He noted that EPA determined that fire hydrants were subject to the requirements; however, considerations would be taken to see the availability of fire hydrants that meet the lead rules. He stated that they got a wide variety in their answers. The systems commented that they already have a lot of hydrants in the inventory that will not meet the new definition of lead free effective January. Consequently, currently the Act exempts fire hydrants. The Agency still plans to develop drinking water regulations that incorporate a low lead definition.

**Ms. Morales** asked if there were any questions at this time.

**Mr. Neukrug** asked whether the Fire Fighters Union has voiced any concerns regarding the effects of lead exposure for fire fighters.

**Mr. Burneson** responded no, he was not aware of any concerns that have been expressed by them. He continued he did know that the Fire Chiefs Association did participate in the webinar he mentioned.

**Ms. Godreau** noted that an issue they raised at the last meeting was the concern that water systems are being required to invest resources in their treatment systems for contaminants that have been identified in EPA's regulation development process. She then asked what is happening to identify where that contaminant is coming from and if there are other regulatory programs in place that the dischargers are being required to follow.

**Dr. Grevatt** commented that this is an important focus of what they are doing in the Agency and with the Source Water Collaborative. There are lots of contaminants out there from many different sources and the big thing is to identify one main source. One example of this is brominated disinfection by-products. The sources are scrubbers and power generation. He explained that they are currently working to see how we can address that issue. It is important that they ensure they aren't just moving a contaminant from one environment into another.

**Ms. St. Martin** asked if there was anything being done concerning fluoride in drinking water?

**Mr. Burneson** stated that the MCL for fluoride is 4 mg/L and that EPA has re-evaluated fluouride health effects and exposure in preparation for reviewing the MCL. He also noted that the CDC has proposed changes to their recommended fluoridation levels. He explained fluoride is a rarity because it is good for us at low levels and in certain cases water systems are adding it while in others they must remove naturally occurring fluoride.

**Ms. Morales** asked if Max had any questions for Eric.

**Dr. Zarate-Bermudez** noted in regards to the key considerations of RTCR and how seasonal systems have been defined, a major concern of the CDC is the definition of seasonal systems. He then asked if Eric knew the definition and where he can find it.

**Mr. Burneson** responded he personally did not know the definition off the top of his head, but knew section 1412 of the SDWA is where he can find the definition. He added they could also ask Tom Grubbs who is present in the room.

**Mr. Grubbs** replied that as part of the Federal Advisory Committee process that Eric referred to, there was a confirmation of increased disease from systems that only operate part of the year. It's the startup and shut down process that affects the occurrence of contamination as it is dependent on pumping and it doesn't occur all year in seasonal systems. He noted that they provided a recommendation but it didn't go any further. They requested that the final definition include a system that only operates part of the year. A more specific requirement would be that every seasonal system has to conduct a startup operation.

**Dr. Zarate-Bermudez** asked if he looked in the RTCR would he find this definition.

**Mr. Grubbs** replied yes and that on the EPA website you could just look for RTCR and the preamble and definition is there.

**Ms. Godreau** noted that related to fire hydrants are they not covered under previous requirements, is that accurate?

**Mr. Burneson** commented that the Act changed the language to exclude pipe, pipe fittings and fixtures that are exclusively used for non potable purposes and listed several types of excluded pipe fittings. He noted; however, that hydrants are not included in the list of exempted fixtures under the Act. He explained that EPA is currently working on a reevaluation of its answer to the requirements for hydrants to be lead free.

**Ms. Godreau** stated from what she has seen in terms of emails. Nationally systems felt blindsided by that interpretation. It is extremely important to look at some way to extend the timeframe to comply. Two months to prepare is not satisfactory.

**Dr. Grevatt** thanked her and noted that they have heard that from many people and will take that into consideration.

**Ms. Morales** stated it was time to break for lunch.

LEAD AND COPPER RULE LONG-TERM REVISIONS: BACKGROUND AND INTRODUCTION OF KEY ISSUES OF NDWAC CONSIDERATION
*Eric Burneson, Acting Director, Standards and Risk Management Division, OGWDW*

**Ms. Morales** asked the Council members to introduce themselves since it was not done at the beginning of the meeting. All present Council members introduced themselves. She then asked if there were questions they needed to address from before lunch.

**Dr. Grevatt** asked if everyone could hear them and asked all speakers to be mindful and to use the microphones.

**Ms. Morales** turned the floor to Mr. Burneson to start.

**Mr. Burneson's** presentation aimed to provide the NDWAC with background on the Lead and Copper Rule Long-term Revisions in general, and to highlight for the Council five areas where EPA is currently considering a range of regulatory revisions and is seeking detailed stakeholder input. He focused on the background on the Lead and Copper Rule, key areas for rule revisions that would benefit from in depth stakeholder input, and lastly EPA's proposed stakeholder working group structure and timeline.

He stated that the goal of the LCR is to protect public health by minimizing lead and copper levels in drinking water, primarily by reducing water corrosivity. The rule applies to all community water systems (CWSs) and non-transient non-community water systems (NTNCWSs). In discussing the LCR's background, Mr. Burneson noted the requirements of the action level (AL) is exceeded and explained that public water systems that exceed the lead action level, in two consecutive six-month monitoring periods, after installing CCT and/or SOWT, must replace at least 7% of LSLs annually.

- Systems can do full or partial LSLRs, or "test out" a LSL if all samples from the line are at or below the lead AL.
- Systems must replace the portion of the LSL they own.
- Systems must offer to replace the private property owner's portion at his or her expense and the system is not required to replace the privately-owned portion.
- Systems conducting partial LSLRs must:
    - Notify customers at least 45 days prior to replacement about the potential for increased lead levels.
    - Collect samples within 72 hours of replacement and provide results within three days of receipt.
    - Systems can discontinue LSLR whenever lead tap samples are at or below the AL for two consecutive six-month monitoring periods; the system must recommence if samples subsequently exceed the AL.

*It was at this point in the presentation that due to being behind schedule, Mr. Grevatt announced that they would break in the presentation and allow for Public Comment.*

PUBLIC COMMENTS TO THE EPA NATIONAL DRINKING WATER ADVISORY COUNCIL ON THE LEAD AND COPPER RULE

*Presentation #1: Dave Lipsky, PhD., New York City Department of Environmental Protection*

**Dr. Lipsky's** presentation pertains to the New York City Department of Environmental Protection (NYC DEP), which operates the country's largest unfiltered water supply and provides clean drinking water to more than eight million city residents, which strongly supports LCR revisions that promote meaningful health protection benefits for their citizenry, and which correct some of the problems with the existing rule construct. However, with a system that has almost 7,000 miles of water mains, and over one million service connections, there are substantial challenges in implementing the LCR, so the rule revisions need to remain flexible to account for differences in the size and characteristics of different water supply systems. The following are some of the issues that DEP is concerned with and should be considered when evaluating recommendations for revisions to the LCR:

- Clarify the objectives of the LCR.
- Address service lines that are privately owned.
- Copper sampling.
- Criteria for site selection.
- When to collect samples.
- Where to collect samples.
- Local Health Department.
- Partial Lead Service Line Replacement.

*Presentation #2: Yanna Lambrinidou, PhD., Parents for Nontoxic Alternatives; and Paul Schwartz, BA, Water Alliance*

**Dr. Lambrinidou and Mr. Schwartz's** presentation focused on public health, which, in the presenter's view should be EPA's goal for the long-term revisions. The presenters believe that the first step toward constructive deliberation must be acknowledgment of the following critical facts:

*Lead service lines (LSLs), whether intact or partially replaced, can pose a serious public health risk, especially to the populations most vulnerable to lead (i.e., developing fetuses, infants, and young children), even when public water systems meet the LCR Lead Action Level (LAL) of 15 ppb.*

The information the presenters provided highlighted the following key points:

- Twenty-two years after the LCR's promulgation, lead-contaminated drinking water is (a) far more prevalent than often assumed, and (b) a significantly greater contributor to children's total blood lead levels than usually acknowledged (and possibly the primary source of lead for many fetuses, infants, and young children across the US).
- "Acute exposure to lead particles with concentrations like those detected in Washington, DC (multiple samples >700 ppb, with the highest measurement at 20,000 ppb in 2007; 200 ppb in 2011) and "City B" (580 ppb in 2011) during periods of compliance with the LAL, can expose pregnant women to a daily lead dose exceeding that in 1900 abortion pills."
- Sampling under the LCR does not reflect "worst case" conditions as stipulated by the Rule. In public water systems where samples of water sitting in LSLs have been collected (a practice that goes above and beyond current LCR monitoring requirements), lead levels tend to be significantly higher than those reported by public water systems to EPA's federal compliance database, the Safe Drinking Water Information System (SDWIS). As a result, LCR-mandated monitoring can mislead water utilities, their customers, and state and federal officials into believing that lead corrosion is successfully minimized, when in fact taps in consumer homes dispense significant concentrations of lead and place communities, especially vulnerable people, at high risk of exposure.
- Although developing fetuses, infants, and young children may be exposed to lead in drinking water on a daily basis, the monitoring practices in place for the detection of (a) lead in water, and (b) lead in blood, are not well-designed to capture links between the two. In fact, it can be argued that these practices are designed to miss such links.
- The LCR currently does not address a major potential cause of elevated lead levels in drinking water. Evidence increasingly suggests that physical disturbances to LSLs, which occur on a daily basis in public water systems throughout the US, can cause significant increases in drinking water lead levels for undetermined periods of time.
- NDWAC's LCR recommendations of 2011 include advice that, if adopted, would prolong the public's exposure to lead in drinking water.

After the Public Comment presentation, Mr. Burneson continued with his presentation and explained that the reasoning for the working group stemmed from 2011 when EPA consulted with the NDWAC on key areas of LCR rule revisions. Since 2011, EPA has further analyzed those key areas and is seeking greater, in depth, stakeholder input. Consequently, to facilitate this input, EPA is forming a working group to provide NDWAC with input and recommendations on five key areas for revision to the LCR outlined in this presentation. The proposed initial key issues from the working group are:

- Sample site selection criteria for lead and copper.
- Lead sampling protocol.

- Public education for copper.
- Measures to ensure optimal corrosion control treatment.
- Lead Service Line Replacement (LSLR).

**Dr. Zarate-Bermudez** asked if they would make available the public comment presentations.

**Mr. Burneson and Mr. Simon** both replied yes, they will be available on the NDWAC website.

COUNCIL DISCUSSION ON LEAD AND COPPER
*Ms. Vanessa Leiby of the Cadmus Group as facilitator*

**Ms. Leiby** noted that they would now take a few minutes to ask any clarifying questions on Eric's presentation and she will try and call on everyone.

**Dr. Grevatt** commented that there are two important parts of the issue: the Lead and Copper Rule and then the process of the working group and that it might benefit them to separate the two things.

**Ms. Jonas** asked if with NDWAC there was a plan to have a spring NDWAC meeting and if not will there only be one meeting in the fall. Will there be an opportunity for the NDWAC to join the webinars, not as participants but just to get the background information?

**Dr. Grevatt** responded that they anticipate the working group will be providing some sort of report back to NDWAC to help provide them background information. He added that he thought it would be perfectly appropriate for all interested members to listen into the webinar. He noted that he didn't think it should be a requirement, but would encourage members to do so because at some point down the line they will have to think back to the information they heard.

**Mr. Neukrug** commented that it was fascinating listening to Dr. Lipsky as they share a lot of common ground. He continued by stating that everyone probably agrees with page 19 of the EPA paper for long term revisions. He noted that he too thought it is a good paragraph that probably everyone in the room could agree on. He did, however, think the five topics are little more limiting and commented that he wasn't sure if these five issues will get them where they need to go.

**Dr. Grevatt** thanked everyone for the input, both regarding the process for the working group and issue he raised. He then clarified that the purpose is not to say this is how it will go, rather to offer up a structure for the Council to respond to. The same with the key issues, so if the working group looks at them and says this will limit them that is something EPA definitely wants to hear. He concluded by saying, if there is something about the structure that is limiting, they want to know.

**Ms. Leiby** added that this was one of the key areas they wanted to have some input on.

**Ms. Wu** asked about water quality parameters.

**Mr. Burneson** replied that it is going to depend on a system by system basis. Depending on the water quality the system is trying to treat.

**Mr. Woolard** asked, in regards to the makeup of the working group, who would be on it and compose that group?

**Mr. Burneson** responded that an important component is going to be membership by the NDWAC members, as well as a number of organizations representing states, public health, environmental consumer groups, etc. EPA has some folks potentially identified, but we are looking to include a broad range of expertise.

**Mr. Woolard** noted that there are two types of people he would suggest. Some elected official as it would be important to have the perspective of a body responsible for protecting those rates. Additionally, he added the downstream impacts on the wastewater side might be an unintended consequence worth considering including.

**Ms. Leiby** asked if there were any other questions.

**Ms. Morales** asked if they had thought about including any water system representatives.

**Mr. Burneson** responded, yes and they will be looking for representatives from a variety of sizes of systems.

**Mr. Woolard** stated that after he said that paragraph was good, he circled one word "equitably". He then asked how the word was meant and interpreted by EPA.

**Dr. Grevatt** noted that one of the ways they were thinking about the word "equitable" was in regards to the ability to pay for full or partial LSL replacements.

**Mr. Woolard** commented he was hoping they were referring to government participation.

**Dr. Grevatt** responded they have not decided on any specific people yet and that they are just trying to get an advance start on who should be part of this working group. He added that this is not to say they want to have a working group of 50 people, rather they have to figure out the right size to have productive progress, but need to make sure they have all the right perspectives.

**Ms. Jonas** stated that the revolving loan funds could be considered for how some of these issues might be dealt with.

**Dr. Grevatt** replied he thought they would be open to talking about these things and some of the issues the Council has brought up might already be addressed. He explained that he is not encouraging the Council to brainstorm what the categories should be, but the feedback is important as it will help with organizing meetings.

**Ms. St. Martin** added that Homeowners Associations should be part of the working group. She noted that they are not direct customers but they are impacted.

**Dr. Zarate-Bermudez** asked how they see inviting the CDC to the working group.

**Mr. Burneson** replied they do not plan to include the CDC in the working group and that the statute requires that they consult with the CDC and the Department of Health and Human Services separately.

LEAD AND COPPER RULE LONG-TERM REVISIONS: SAMPLE SITE SELECTION, SAMPLING PROTOCOL, AND OPTIMIZED CORROSION CONTROL

*Lisa Christ, Acting Branch Chief, OGWDW, Targeting and Analysis Branch, Standards and Risk Management Division*

**Ms. Christ's** presentation aimed to get the NDWAC to help EPA with the working group. The intent is to focus on five key areas of the Lead and Copper Rule including the way the samples are collected at the tap; getting some input on how EPA might adjust the lead sampling protocol; optimized corrosion control treatment; what that means; and if EPA should consider re-optimization for systems that already have corrosion control in place.

She noted that the current site selection criterion for lead and copper establishes a tiering system for prioritizing the selection of sampling sites based on the likelihood of the sites to release elevated levels of lead and copper; for lead, sites with lead service lines, lead pipes, or copper pipes with lead solder; for copper, copper pipes with lead solder. The tiers are broken down as follows:

- Tier 1: Single family residences with lead pipes, a lead service line, or with copper pipes with lead solder installed after 1982. 50/50 mix of both types of sites.
- Tier 2: Multi-family residences with a lead service line or with copper pipes with lead solder installed after 1982.
- Tier 3: Single-family residences with copper pipes with lead solder installed before 1983.

In reference to sample site selection criterion, Ms. Christ stated that it important to make sure it's something that could easily be implemented by the system or homeowner. For most systems the most samples they are required to collect is 100. There can be variability not only between system "a" and "b", but also within a system's distribution system, consequently making sure we monitor at those sites were the highest lead and copper levels might be found is critical (see presentation on NDWAC website).

Ms. Christ presented two example stakeholder questions for sample site selection criteria at the end of the first section of her presentation:

1. How should sample site selection criteria be developed to capture the highest risk sites for lead and copper in a simple and cost effective way?

2. At what sites should lead and/or copper samples be collected to be representative of the greatest release for each contaminant?

**Mr. Neukrug** noted he felt that perhaps the hypothesis for this LCR discussion was wrong. Instead of continuing to attempt to improve the sampling procedures for at the tap samples – which will still not give either a statistically valid result as to whether corrosion control has been optimized nor whether a segment of the population has been exposed to lead in their drinking water, that we instead look to just jump to the desired end result: optimized corrosion control, education and outreach and lead material removal from the system.

**Ms. Christ** replied that the purpose is to evaluate the effectiveness of corrosion control.

**Mr. Neukrug** stated that there are more scientific measures to identify when you have optimized corrosion control then to do this almost random selection of homes.

**Dr. Grevatt** commented that as Lisa said, she is describing in large part how things are operated today, as she said the way the rule operates is trying to set up a process to identify those systems for which corrosion control is not operating in an effective manner or those systems which do not have corrosion control and need to. He explained that he thinks the issue Mr. Neukrug raises is completely appropriate and that the approach of identifying systems is not going to be an effective approach. He noted that they do want to hear what the Council thinks will be more effective. The rule has not operated and tried to identify every person in the system. It's really just corrosion control.

**Mr. Burneson** stated that ultimately the goal is to improve corrosion control and trigger greater actions. To more cost effectively identify systems that must take greater actions, sites selected with the greatest likelihood to have lead or copper if it is corroding. For example, identify the plumbing materials that would most likely be leaching lead, go to those households, and see if there are elevated levels.

**Ms. Mandelbaum** noted that her question may have been partially addressed by Eric's comment about cost effectiveness in regards to tiering. She then repeated the definitions of tier 1 and 2 and stated that to her this seems inverted. She then asked if there was a different purpose for setting the tiers as they are and does EPA suspect that they will be switched with the new rule?

**Ms. Christ** replied that is definitely something they would want input from the working group on. She told Ms. Mandelbaum she thought she was correct. Consequently, rather than getting controls of single vs. multi, perhaps they should look at lead service line site as more of a priority than ones that are not served by a lead service line. She noted that where they are most likely to see the highest level of lead will tell them how effective the treatment is.

**Mr. Burneson** commented that the sample regime they have in the rule that they are asking for input on it a treatment technique. He noted that corrosion is evident in stagnant pipelines. In multi-family residents, the water can't sit still for six hours, which is why it's more likely to show up in single family homes because the test can be properly performed.

**Ms. Godreau** stated that when it is mandated that all samples must be included in a system's calculations it encourages them not to do the monitoring to see what responses to the changes are occurring because the concept of having to include repeat sampling results, whether positive or

negative, doesn't make sense. She added that it is not only which samples are included, but also the locations of where those samples are taken.

**Dr. Jones** asked how much new science is being considered for making these proposed changes. Or are they based on an improvement of what is already known? How much new science information do we have to add to the decision?

**Ms. Christ** replied new science is being considered but that she couldn't list out all of the science.

**Dr. Jones** responded if Ms. Christ felt as though it was enough or if more needs to be collected?

**Ms. Christ** replied that she thought they have enough to make the decision. She further explained that the reason they are doing the webinars and face to face is to share all of that information.

**Mr. McCauley** asked what dictated where the sampling is done in multi-family homes.

**Mr. Burneson** explained that for a multi-family location a first draw tap sample is collected after water has sat in pipes for six hours. It is not taken from where the water comes into the building; it's taken from in the building. He noted that its complicated plumbing and they have to wait for that stagnation period.

**Ms. Christ** continued on with her presentation stating that one important note is focusing on how samples are collected for lead. She explained that they think the first draw sample protocol is appropriate for copper, but are looking at something different for lead. She explained that the goals and objectives of the rule change for sampling protocol are to establish procedures that result in a water system having a set of samples that will assess the corrosivity of the water being provided and/or indicate if the corrosion control is effective in reducing lead and/or copper corrosion from lead service lines (LSLs) and plumbing materials. Ms. Christ then further explained the background of lead sampling protocol and the potential revisions for it (see presentation on NDWAC website).

Ms. Christ presented two example stakeholder questions for lead sampling protocol at the end of the second section of her presentation:

1. For systems with LSLs, what does a cost-effective lead sampling procedure look like that captures lead where concentrations are likely highest?

2. What is an appropriate number of samples to be collected by a water system that will indicate if the corrosion control is effective in reducing lead? In reducing copper?

**Ms. Mandelbaum** asked if there had been a pilot program that had EPA representatives doing the sampling and if there is a record of the cost effectiveness. Have there been a dedicated number of representative that review the protocol that water utilities give to users to do the sampling?

**Mr. Burneson** replied that whether or not protocol is effective is one of the things they will ask the working group to evaluate based on their expertise in their field/region. The existing rule requires system to provide users with written instructions and they have to submit these to the state for approval.

**Ms. Morales** stated that her experience is that the state would approve the instructions.

**Ms. Christ** noted that occasionally homeowners don't want officials in their home collecting samples, which is why we allow homeowners to collect samples for first draw.

**Ms. Bruno** explained that she remembered stories about finding places to take samples and recommends that the instructions to customers have to be simple or expectations need to be reduced.

**Dr. Woolard** agreed with Jeanne-Marie.

**Mr. Neukrug** had the same comment and stated that when looking at page 8 of the EPA document in regards to the objectives of the sampling protocol, he would propose that all utilities be required to optimize for corrosion control.

**Ms. Godreau** asked if there had been any thought in regards to the concept of coupon testing or alternative means. She stated that first draw sampling is really not practical for utilities to do themselves because it requires having someone sit in the driveway, waiting for someone to let them in. The issue is not that utilities are choosing to delegate sampling it's because of the impracticality of first draw being done by utility staff.

**Ms. Christian** asked whether the clarification was more concerned with corrosion control or health effects. She asked if the protocol was strictly for corrosion or health effects.

**Mr. Burneson** replied that the purpose of sampling is to enhance the performance and make sure corrosion control is optimized with the goal of protecting public health and that this is the most effective means of doing so. The overall goal of the treatment technique is to lower lead exposure. To respond to a point made by Jessica-in terms of are there other ways to do this other than household monitoring? Coupons simulate a distribution system and control location, so they don't have to worry about homeowners. He explained that there is some research they have that looked at and yes they are focusing on making a modification to the existing protocol, but one thing they have to do is look at most effective way to monitor corrosion control and that feeds into it.

**Ms. Jonas** commented that she struggles with this idea a little bit because in the last 20 years it has been evident that lead service line removal can be effective in removing lead. She then asked if there are any communities that removed all lead service lines and were able to meet corrosion control levels.

**Mr. Burneson** replied the only one he was aware of is Wisconsin.

**Ms. Jonas** asked in order to deal with the issues we are trying to deal with regarding lead and copper- are there other ways they should be thinking about this entirely? She explained she struggles with how much flexibility the Council and the law have to do something a bit more creative.

**Mr. Burneson** responded that the group has flexibility to give EPA recommendations. He noted that EPA has given the Council a starting place of what they believe to be most relevant. He noted that they obviously have obstacles when it comes to changing statutes, but definitely thinks it's appropriate to raise issues.

**Ms. Wu** asked if in regards to a goal he was talking about corrosion optimization. Or is there a broader goal within the scope of the workgroup to look beyond corrosion and really look at public health?

**Mr. Burneson** replied that that is what he said. He explained that EPA's goal is to further reduce lead and copper exposure. He noted that they have a lot of ideas as to what is the most effective means to do that which is why they have such specific questions. He stated that they would then like for them to evaluate the structure and provide additional suggestions.

**Dr. Grevatt** stated that this was a great question and thus far he can say that the conversation they are having is exactly what he was hoping they would have. He explained that the reason they are bringing these issues to the NDWAC and the working group is to get diverse input on the issues. He noted that the statutes we have drive the regulations. If NDWAC has the perspective that a number of the approaches will limit in terms of overall goal then they want to hear ideas about how to do it differently. He explained that stating the framework is all wrong and throwing it out that's not what they are asking for, but they would like their perspective and ideas incorporated into the framework.

**Ms. Morales** commented that it's a relief to hear that they are having this discussion because several of the Council members before put together the recommendations to the Administrator. She added that she didn't know if there is a right or wrong way to do it and a lot of elements were difficult for them to come up with. She explained that they, however, didn't have an opportunity for a working group but she is very glad that they brought it back and all the same issues the Council originally had are now being readdressed.

**Dr. Woolard** said that he thinks it is important for the working group to change the rule because currently there is not a common understanding of it. It's a complicated rule as it sits right now. He explained that the working group needed to start with a common understanding of where they are and how we got there before they determine how to change it and whether or not it should be thrown out.

**Mr. Vincent** noted that the technical support workgroup will have a lot of information and that it is critical in that a lot of the questions being discussed are answered in the literature but it won't be easy to tease out. Consequently, presenting that information to them will save them some

time. He added that they already have some of these answers in mind and if they could bring that information to light for the working group it will save a lot of time.

**Ms. Christ** continued on with her presentation by discussing Optimal Corrosion Control Treatment. She explained that the goals and objectives of the rule change for Optimal Corrosion Control Treatment are to enhance the process for systems to improve the effectiveness of their corrosion control treatment; ensure adequate incentives for optimization; and provide greater clarity about treatment optimization. Ms. Christ then further explained the background of Optimal Corrosion Control Treatment and the potential revisions for it (see presentation on NDWAC website).

Ms. Christ presented two example stakeholder questions for Optimal Corrosion Control Treatment at the end of the third section of her presentation:

1. What are the challenges to optimizing corrosion control treatment and what are some of the lessons learned from implementing corrosion control treatment?

2. How can LCR requirements be structured to encourage OCCT and retain enforceability?

**Ms. Godreau** commented that this one is the bear. She explained that they are over 20 years into the rule and they don't know as a state, how to deal with it. She noted that they don't know what the levels should be etc. and that it has all eluded them to date. She stated that she was not sure how they tackle this topic, but knows it will be a huge issue.

**Mr. Neukrug** stated that he thinks that every utility in the country should optimize corrosion control regardless of any action level exceedance. He noted that he doesn't think they need an MCL to get there and that they have a clear opportunity to just require it as a treatment technique.

**Dr. Zarate-Bermudez** commented that he recommends that the working group review the public comments by Susan Cannon that were shared by Roy back in November with the Council. In regards to this issue, page 13 suggestion number 4 of her presentation will help.

**Mr. Burneson** replied that he can commit to sharing all of the comments that came from that.

LEAD AND COPPER RULE LONG-TERM REVISIONS: COPPER PUBLIC EDUCATION AND LEAD SERVICE LINE REPLACEMENT
*Lisa Christ, Branch Chief, OGWDW, Targeting and Analysis Branch, Standards and Risk Management Division*

**Ms. Christ's** presentation sought to provide the NDWAC with background on the existing LCR requirements for public education and lead service line replacement (LSLR); highlight for the Committee the types of regulatory revisions that EPA is considering; and preview the type of detailed stakeholder input EPA is seeking from the Working Group and the NDWAC Committee. She explained that the goals and objectives of the copper public education rule

change was to improve the health of consumers by motivating consumers to take actions in reducing exposure to copper in drinking water in systems with elevated copper levels. Ms. Christ then further explained the background of copper public education and the potential revisions for it.

**Ms. Christ** presented two example stakeholder questions for copper public education at the end of the first section of her presentation:

1. What does effective copper public education language look like which increases awareness of the health effects, yet is simple and cost effective?

2. If public education materials or informational statements are required, what information should be included?

**Ms. Morales** stated that when it comes to public education on copper, one of the things that it needs to be tied into is the public education for lead. Right now we have information for lead and copper and that information is together right?

**Ms. Christ** replied that systems are not required to provide public education on copper. The only current requirement to report about copper is in the CCR or if there is an actual violation.

**Ms. Morales** commented that copper can be an issue regardless of a known violation, particular in areas where water can be stagnant. She then asked how they can get that information out to new and existing housing developments. She added that this is the kind of information that is provided to public health facilities, permitting facilities, those kinds of places that address where to build new developments and also existing customers. Copper public education needs to be approached differently than public notification. She posed the question with whom do you have to form partnership with or who do the utilities need to form partnerships with to make that information available.

**Mr. Vincent** stated that in 2006, NDWAC had a workgroup on copper and lead communication, primarily on lead and there was a lot of good information there. He explained that they target physicians for information about blood lead level and who would be susceptible. One good example of this is the New York Health Department outreach mentioned today by Dr. Lipsky.

**Mr. Woolard** noted that one concern he has is when they start talking about information on building materials because then you start to run into building codes etc. and that could cause quite a stir.

**Ms. Bruno** said she would prefer the education on copper be targeted to those with the highest amount of risk. She added a certain amount is good for us, and she doesn't want to confuse the public.

**Ms. Christ** continued her presentation and introduced the topic of lead service line replacements. She noted that goals and objectives of lead service line replacement rule change were to remove sources of lead in the distribution system; encourage optimization of CCT to prevent lead

leaching; address environmental justice concerns associated with LSLR; and maintain and enhance enforceability of the LCR. Ms. Christ then further explained the background of lead service line replacements and the potential revisions for it. Ms. Christ presented two example stakeholder questions for lead service line replacements at the end of the second section of her presentation:

1. When optimization does not bring lead levels under the AL how should systems reduce exposure from LSLs in a way that protects public health, is feasible and assures equitable protection among the system's users?

2. What are the environmental justice concerns associated with LSLRs? How can an even distribution of benefits be achieved, to avoid either disproportionate health or economic impacts?

**Mr. Neukrug** asked how EPA deals with low-income customers when it comes to fixing their lead paint program. Is there a comparable program we could use for water?

**Ms. Christ** replied that Housing and Urban Development department helps people deal with lead paint.

**Mr. Neukrug** asked, isn't this the same thing?

**Ms. Christian** responded that she does the lead based program and stated that there is a comparable HUD program- Healthy Homes. She added if she can't get it into the lead based program she is working on, she could get it in Healthy Homes. She asked if there was something like that for water.

**Ms. Christ** replied that the drinking water program does have something like that where each state will come up with their own prioritization for the SRF funding and noted they could encourage them to incorporate this and ask them to prioritize that list with other drinking water contaminations.

**Ms. Christian** stated that if it's an owner that is renting to low income it's totally forgiven and there is no returning of the funds. She stated that she assumes with the state loan they would be expecting money to be coming in.

**Ms. Christ** replied, yes.

**Ms. Christian** asked in regards to the filter pitchers-that is just a short term solution while the lead service line is being replaced, correct? She added they are not intending it will be long term and have to keep giving the customer pitchers and know when the pitcher has exceeded its life span.

**Ms. Christ** replied they are not thinking they would require public water system to provide the filter pitchers to customers indefinitely. The idea is if they have science demonstrating that there

will be that spike in contamination, then they are saying they would provide them for that time period.

**Mr. Burneson** explained that that one question is what the appropriate use of pitcher filters is in these situations. He noted that this is just one of the issues and tools that might be available and they are asking for the Council's input.

**Ms. Godreau** noted in regards to the definition of control, it sounds like even if it's on private property a system could attempt to take control because they have construction requirements. She added that she needed more clarification because if she didn't misunderstand how could they call that control?

**Ms. Christ** explained that the definition of control that they are contemplating is the part of the distribution system under control of the water system in that they have the authority to go in repair, make improvements, and replace that portion of the service line.

**Mr. Burneson** replied that for the purposes of this evaluation they have defined control as ownership i.e. "if you don't own it you don't have control." He noted that they have entertained other definitions of control and they were sued. He explained it is a question of whether or not they should make another run at redefining control and if it should go beyond ownership. He asked if a water system has the ability to go and do repairs is that control? This would be one means of saying the water system has control of the entire service line and therefore should be responsible for replacing it.

**Mr. McCauley** commented that removal has nothing to do with liability. He explained if a water system goes to a homeowner about a replacement-the homeowner will give them access because most people are looking on the side of cost.

**Ms. St. Martin** noted that when they were working with EPA and Justice Department, there was an issue of private party and the fact that if the private property owner does not correct the defect, the water system as the ability to deny water service if they fail to comply with regulations.

**Mr. Neukrug** stated that if a utility is deemed to have "control" over a homeowner's lead service lines, they also have control (or ownership) over ALL service lines and consequently have responsibility for their repair and replacement. In this case, every house service line in the country would be under the ownership of water utility which would cause a significant cost impact to the customer.

**Dr. Woolard** shared that he had some concern about requiring public education and filters that are not in their control. He added that these issues have to be thought through.

**Ms. Leiby** asked if the working group would be thinking about acute as compared to endemic.

**Mr. Burneson** replied that the MCLGs are based on exposure over a lifetime. He added that a nuance that they are contemplating in regards to compliance and a point-of-use devise that is

connected in a homeowners sink. Those devises need to be properly maintained by the water system-they can't just give them to the consumer and not follow-up. He explained that what they were talking about was something a little different in that the responsibility would be that of the consumers to maintain it with the instructions they are given. He noted that they are not contemplating making the water systems go back and swap out the cartridges etc.

**Ms. Godreau** commented that she thought it was important to mention the information that came from the Science Advisory Board about the potential negative health impacts of PLSLR and the letter that was sent by NDWAC to EPA. She added that it might be a good idea to share that letter so the workgroup can have some context as to the actions that were taken on the issue by NDWAC a year ago.

**Ms. Morales** stated that with point-of-use they once again have the same constraints as when the utility were to hand pitchers to the user. She asked when they talk about treatment under the kitchen sink, the question is, who will have the responsibly to maintain it? There is a liability issue of going into someone's house and that is why utilities tend to shy away from these methods.

**Ms. Wu** asked if there are statutory provisions in regards to point-of-use and whose responsibility it is to maintain it.

**Mr. Burneson** replied that SDWA requires point of use devices to be owned and operated by the water system. He also stated that the Agency does have recommendations for the point-of-use technology as appropriate for arsenic and radionuclides; however, he added that he couldn't speak to the rate at which systems had embraced them. He explained that his recollection was that Arizona is one state where point-of-use was aggressively pursued by the state. They have been in use, but there are varying evaluations of how successful they have been.

**Ms. Morales** explained that the concern is that one of those households decides not to do it or maintain it properly. In this case it's all for nothing and the system falls out of compliance.

**Dr. Jones** shared that she teaches at a University and did a study in class and asked how many people changed their filters and essentially none did. She added that it is important to have some follow-up to ensure POU devices are being maintained if you put the responsibility into the hands of the consumer.

**Ms. Jonas** noted that she couldn't think of anything the states could do to have that type of oversight or who would have the resources.

**Mr. Neukrug** stated in reference to the education piece—if they could educate consumers on using the filter- then they could educate them on maintaining it.

**Dr. Grevatt** commented that he wanted to observe on this point, explained they had introduced a wide open topic and there were a couple of things they had touched on including either full or partial line replacements and the topic of whether or not it is appropriate to use point-of-use and how that would work. He added that both of these topics were wide open in terms of looking for

input from the Council as to the right way to put it together. He stated that they need the working group's input to help think through what is the right way to implement it all. He then told the Council that part of what they need to think about is how these different pieces fit together and what the overall goal of it all of it is.

**Ms. Morales** noted that based on last round on lead and copper that the Council had and the information provided by Science Advisory Board that proves that partial lead replacements aren't even working, she suggests the working group think outside of the box and come up with other types of treatment technologies. Partial line replacements haven't given the expected results and there is a very high concern in levels right after it's replaced. She added that although a full line replacement might be more of an investment; it's a long term solution rather than just putting a band-aid on it.

**Ms. Jonas** stated that she thought the working group they suggested is the way to go. She continued by stating that she thought the questions they put on the table don't have all of the nuances that the Council wants to see in the initial language but it doesn't stop them from getting to the complexities of the rule. She added that she would like some of the direction of the working group to be how can they can simplify the rule and make it less costly. Ms. Jonas concluded by saying what she had heard from EPA throughout the day was that they are open to new ideas. Her number one suggestion-make it more efficient, make it simpler.

**Mr. McCauley** added, he thought everyone liked the HUD idea.

**Ms. Messer** commented that EPA said think outside the box and consequently, they really could consider HUD. Regardless of lead service line replacement, how much more can you get into someone's home then looking at the paint? She added if they truly wanted to reduce lead in people's homes and they looked at the water, they could reduce water in lots of people's homes.

**Ms. Jonas** said they need to remember this is a health issue and the reason they are talking about it is because of contaminants.

**Dr. Woolard** noted that he worries about point-of-use and to say to the system they will change them out really puts the entire burden on the utilities.

**Mr. Burneson** explained that the statute is very clear about the responsibility of how they maintain the system. He added that he supposed they could explore the issue noting it was clear in regards to a point-of-use system, but there might be some wiggle room with pitcher filters.

**Dr. Grevatt** identified that one thing he would add regarding the comment Helen made about HUD and saying tongue and cheek that everyone likes the HUD proposal. Their lead paint program has been expanded to be the Office of Healthy Homes and we have been working with them and other agencies to think about it in more of a holistic way. We have had some preliminary conversations with them about their ability to replace lead service lines in those houses they control-but not the ones they don't. He added that he believes it is a worthwhile endeavor but they don't have enough resources to cover it all.

**Mr. Burneson** noted that he wanted to remind everyone that they are asking that members of NDWAC volunteer to be part of the working group.

**Dr. Grevatt** added that he would like to motion for NDWAC to move forward with support for the working group.

**Ms. Morales** stated that she would like to go around the table and ask for everyone's individual feedback before they get into the motion.

**Ms. Jonas** noted that she supported the formation of the working group.

**Ms. Christian** added she fully supported the need for the working group to be formed.

**Ms. Massey** commented that she agrees with the concept of the working group. She added that one thought she had regarding partial service line replacement is that it doesn't solve the issue of corrosion and consequently it would still be a partial-partial fix.

**Mr. McCauley** said that he agreed with the workgroup. He further explained that if there is a portion of the system that isn't protected it doesn't do any good. He concluded that he would ask the workgroup to think outside the box.

**Mayor Hampton** stated he supported the working group.

**Mr. Neukrug** noted he supported the working group.

**Ms. Bruno** added she supported the working group.

**Ms. Godreau** explained that this was the most difficult rule for the states to understand and she supported the working group and welcome the opportunity to participate.

**Ms. Mandelbaum** commented that she supported the working group, but added that Eric put out a vigorous timeline so she did suggest extending the timeline because she thought it would take a bit of time away from their regular obligations.

**Ms. Wu** stated that she supported the working group and thought it would be good to see real life instances.

**Mr. Vincent** noted that he supported the working group and thought it will be a steep learning curve, but that they will do well (with info available).

**Dr. Woolard** added he thought the working group was critical because the rule is one of the most difficult and costly to implement and if they aren't careful it could get even more costly. He added that he thought it was important that they look at everything.

**Ms. St. Martin** stated that she really supported the working group and in regards to who should be involved she would suggest building codes standards/state code standards as a resource.

**Dr. Zarate-Bermudez** noted that many of the Council members had expressed why it's important to create this working group and he agreed with all of it.

**Dr. Jones** commented that she thought the working group was a great idea.

**Ms. Morales** said that she definitely supported the formation of the working group and echoed what Jessica said regarding it being one of the most complicated rules to implement from the utility level. She added that what she had heard from the Council is that they would like to move forward with the working group. Ms. Morales then stated that she had a question for Eric and Peter and asked how flexible they were on the time frame-noting that they had identified wanting to start next month. She asked if they were married to the timeline.

**Dr. Grevatt** replied that he was not saying they are necessarily committed to a twelve month time frame; however, as they had heard in public comment throughout the day, they are dealing with a contaminant that is a known health threat and there is a perspective out there saying, "alright EPA what are you waiting for? When are you going to deal with this issue?" He added that the desired result is very important for them to get at as soon as possible. There may be some flexibility with the schedule, but from the public's perspective this is one of the most important regulatory issues that need to be dealt with.

**Ms. Morales** replied that she did agree, but just looking at the complexity of this issue, she wondered if twelve months was sufficient time to explore the whole and come up with something reasonable.

**Dr. Grevatt** commented that they talked about a twelve month period for the working group as a timeline to have something to bring back to NDWAC for NDWAC to evaluate and review. He added that they could look at the timeline and that he heard what Ms. Morales was saying. He then asked Ms. Morales if they could revisit the issue and reiterated the fact that he wanted to set them up for success.

**Ms. Morales** asked if EPA would be ok with the working group coming back in six or nine months if they weren't were they thought they should be.

**Dr. Grevatt** replied they will have to see and stated that he didn't want to make a commitment one way or another until they can lay out a specific work plan for how everything will go. The first step is to identify who the individuals will be and then how often they need to get together. He added if they just come back and say they aren't where they need to be, we are not going to say its ok to fail, but at the same time we want to set the working group up for success from the beginning.

**Ms. Morales** commented she understood and was sure EPA would do what is right. She then asked how many members of the Council they were hoping to have on the workgroup.

**Mr. Burneson** replied at least one, but that they didn't have an exact number. He added that in the past on other workgroup they have had two to three.

**Dr. Grevatt** stated that they are going to come to a point where the working group will bring a product back to the Council for consideration. He added that he would lean closer to three because it important that they have people participating in the discussion from the beginning. However, he noted they are not looking for half the NDWAC members to raise their hand.

**Ms. Morales** asked if they would be ok with individual members coming to them.

**Dr. Grevatt** replied that he didn't think they need names right away, rather they should set a timeline for individuals to volunteer and then if enough people do not volunteer EPA will circle back with the Council. He concluded by stating he was confident there would be a couple people on the Council that will see this as important enough to volunteer.

**Ms. Morales** stated that if anyone was comfortable volunteering right away they should feel free to do so; however, if they want to think about it would it be ok to get back to EPA by the end of the month.

**Mr. Burneson** noted that they want to schedule a meeting in January so the end of the month would be good.

**Ms. Godreau** asked if they could imagine a scenario where there will be different participants based on the topics or was it all or nothing.

**Dr. Grevatt** noted that he thought it was important to have some continuity, but that there was some flexibility if there was a particular member of the Council who had a particular interest and only wanted to contribute to the working group in regards to that topic.

**Ms. Godreau** stated that she made a motion that the NDWAC create a working group to bring viable options to the full Council to help develop recommendations to EPA regarding necessary revisions to the Lead and Copper Rule.

**Ms. Christian** replied that she second the motion.

**Ms. Morales** asked the Council to vote on the motion and it was a unanimous vote in favor of the motion. She then thanked the Council for all of their comments and feedback and then concluded the first day of the NDWAC meeting.

# Meeting Summary: Thursday, December 12, 2013

RECAP OF FIRST DAY DISCUSSION

*Olga Morales, NDWAC Chair; Peter Grevatt OD, EPA Office of Ground Water and Drinking Water (OGWDW); and Roy Simon, DFO, OW/OGWDW*

**Ms. Morales** thanked everyone for yesterday. Ms. Morales also stated that there was a lot of good discussion yesterday and she hopes to have as much of a productive day today. She then gave Roy the opportunity to address administrative issues.

**Mr. Simon** asked everyone to please talk directly into the microphone. He stated that we would run throughout the morning to the break and then would take the group picture.

**Ms. Morales** thanked Mr. Simon and stated that we would discuss a very interesting topic today-Algal Toxins. She mentioned we have experts who are ready to educate us on the topic, but she stated she would like to give Peter a chance to talk.

**Dr. Grevatt** thanked everyone very much. He said he thought yesterday was a fantastic day and he appreciated all the work done. He mentioned that those hard questions that people asked that seemed out of turn, he didn't view it that way, so he thanked the Council for that. He stated that in his view that is really what everyone is here to do—to bring expertise and the Council is counting on everyone to bring the hard questions that might not be obvious. He said that yesterday we talked about a legacy issue, lead and copper, and we could argue many different uses within the drinking water sector and he certainly won't expect that to change. He stated what we're talking about today is an issue that I think of as a little more of an emerging issue, it's one that many folks around the country haven't yet had to deal with or haven't had a good understanding of how they ought to address these issues. He noted that harmful algal toxins are clearly a very serious health issue and we know that exposure to algal toxins can cause serious health effects and can be fatal in some cases. He said it's not a new issue; however, the tipping point for him in wanting to bring this to the Council is to share the Ohio story. He stated that to his knowledge this is the first time we have had a drinking water system shut down. Algal toxins were found in their finished drinking water. And the inability to remove those toxins was big; we have to discuss those issues. He doesn't perceive that case was a one off kind of thing. So everyone is concerned about the increased incidents of algal toxins as they may impact drinking water sources. He said we know some but not enough about the effects of low level exposure to these toxins and that we know some but perhaps not enough about the effective ways to treat these toxins. It's an issue that has a mix of strategies to address. Some strategies could include regulatory strategies. He mentioned that in the future there might be a primary drinking water regulation and that we know that we have issues around source water. He mentioned that there are concerns relating to climate change that handles the incidents of these sources and the Council asks everyone to think broadly about a number of issues. What do we know and how effective can we communicate to audiences that need to hear this? Are there people that need to be brought into the conversation? He stated that the state of Ohio has done a great job reaching out broadly across the country and brought this to our attention as Division Directors. He said he is very excited about today and looking forward to the discussion and then turned it back to Olga.

**Ms. Morales** said that personally down on her side of the world, she hasn't seen this particular issue, so she is very interested in working with small communities about issues like this. She invited the Council to keep an open mind because this is beyond the regulatory approach.

**Dr. Grevatt** mentioned that Nancy Stoner is also very interested in this issue. She was very eager to engage with NDWAC and part of what you will see both around the table here, in terms of our participation is that across the Office of Water, we are very engaged here not only on the situation but more wide spread. Having the folks here from around EPA that have done a lot of work on this already is beneficial.

**Ms. Morales** mentioned that in 2011 Nancy Stoner wrote a letter about the issue of nitrification and how it's a good opportunity to learn more about what is being done and discuss how to improve it.

## ALGAL TOXING AND DRINKING WATER

*Olga Morales, NDWAC Chair; Peter Grevatt OD, EPA Office of Ground Water and Drinking Water (OGWDW); Beth Messer, Assistant Chief, Drinking Water, Division of Drinking and Ground Waters, Ohio EPA; Elizabeth Behl, Director of Health and Ecological Criteria Division, OST/OW; Lesley D'Anglada, Ph.D., Microbiologist, OST/OW; Acting Director, Standards and Risk Management Division, OGWDW; and Holly Green, Chief, Prevention Branch, Drinking Water Protection Division*

### Ohio's experience with algal toxins

**Beth Messer** thanked everyone for having her at the meeting. She stated she is happy to talk about Ohio's experience. She compared algal toxins to most of the other emerging contaminants and regulatory development as Eric discussed yesterday. Most emerging contaminants are largely undetected, unseen, can't smell, or taste (see presentation attached). But, she stated that you can do all these with algal toxins. She mentioned they are not going to have the luxury of allowing a lot of time to do regulatory development for this very visible contaminant. USEPA and Ohio are doing the best they can with the information out there. She stated that they are pushing through until the science is there but will be expected to answer difficult questions before that. She said the majority of cyanobacteria toxins have been predominantly microcystin.

She explained that in 2009, Ohio got the results from the 2007 National Lakes Assessment and they were concerned about some results. Some detections in the Grand Lake Saint Mary's had significant mycrocystin. In 2009, Grand Lake in St. Mary's did have raw water detections of concern and posted advisories for recreational use. They did not see it in the finished water. The highly agricultural city has struggled with the DBP rule and had to increase treatment for the system to serve 10,000 people. By the time they started looking at algal toxins; they had a very specific treatment train and weren't seeing any detections. Then in 2010, they had a bloom of aphanizomenon and microcystic and not only could you see it, but you could smell it. Again, she said they had a recreational issue but didn't see it in finished water. They posted advisories. The bloom was detrimental to all the tourism in the area. There were pet deaths and likely human health impacts due to recreational exposure based on 2010 blooms. Ms. Messer stated that it got

a lot of attention and it has since become a poster child for HABs. She said they had other issues at other inland lakes. She mentioned they also saw it in Woodsfield Reservoir in September 2010. Despite very high raw water levels for microcystin, they didn't see it in finished water. She said there were a lot of headlines, lots of attention, and questions on whether or not people could drink the water from those sources. They had 48 human illnesses and five deaths all due to recreational exposure. She mentioned that in another big recreational area in Ohio, Lake Erie had the worst bloom in 30 years in 2011. There are 10 public water systems using the western basin as a source. The bloom spread into the central basin where there were 13 PWSs. In 23 public water systems, they saw no finished detections. They had two really bad high profile blooms in two years and the media attention has been consistent ever since. Ms. Messer displayed a satellite picture of the bloom. She showed the bloom surrounding the Islands and said this was one of Lake Erie's biggest tourist attractions. That made these blooms an even bigger deal. What they did to prepare after the bloom in 2009 was to develop a harmful algal bloom response strategy. They update it every year and defined the bloom response and sample procedures. She said they had to use whatever tools they can to determine when, where and how long to sample. They still were not seeing it in the finished water- so how long should they keep sampling so that it's no longer a risk? This was all very voluntary and water systems had been willing to let them take samples. A lot of systems were doing their own sampling. Ohio bases monitoring on: once they determine there is a bloom, they will do algal identification with a microscope. The proximity to the public water system intake is taken into consideration. The water system's treatment is also a consideration. If sampling is needed, Ohio the analysis unless PWS can do it themselves.

**Dr. Grevatt** asked what picture was shown on the last slide.

**Ms. Messer** replied that picture on left was the raw water sample, and the one on right was the finished water sample.

**Ms. Messer** continued by saying the other thing they had to do for the response strategy was figure out what the levels of concern for algal toxins and for microcystin, etc. were. She said they looked up data that was out there and worked with the toxicologist to come up with threshold ranges of what advisories were feasible. She explained that depending on the population, age, or type of exposure you look at, you can come up with different numbers and those can be really hard to explain to the public. She stated they would like to see some consistency but without some additional input and other sources, it would be hard to do. Ms. Messer showed a slide of their harmful algal blooms report. She stated there was direct link to all the results and all the samples. They were put on the site as well as eight other waters systems that are willing to share their data. She mentioned there is at least one water system that does not share data.

**Dr. Grevatt** asked on the previous slide where the levels where shown—how is the state of Ohio determining the threshold levels? You have the "do not drink" advisories, how close are those levels? How much of a safety factor is built into the levels?

**Ms. Messer** replied that they looked at other numbers that other organizations used; one of those being the World Health Organization's numbers. There is a need for acute numbers and it's not clear if the numbers out there are chronic. She said the health effects vary greatly and they tried

to come up with numbers based on recreational exposure. They used data for one thing and applied it to drinking water. What are the health effects that are most commonly associated with drinking water? She stated they don't know what all the end points are and could do a better job of figuring those out and getting that information to the health reporting networks. Are the levels protective enough?

**Dr. Grevatt** thanked her and said that was very helpful.

**Ms. Messer** continued talking and went into how the NOAA satellite imagery is used. She said NOAA takes the satellite imagery and they do a prediction for them. They can tell what the concentrations of the bloom are and put it in a color image. Ms. Messer showed a slide with two images—the image on the left is a picture NOAA took and the one on the right is a prediction on what the blooms will do in a few days. She stated that it helps a lot in figuring everything out. She mentioned that the good news is they are getting a new satellite and are very excited about it. They should be able to use it for the 2015 summer.

**Dr. Grevatt** asked for further perspective regarding the pictures shown in Western Lake Erie, "can you give a sense of scale for the satellite image? How many miles across is it?"

**Ms. Messer** replied that she was not really sure how wide it was. She apologized and said it's huge but was unsure of the miles.

**Dr. Grevatt** said he recalled in Cleveland hearing 50 miles across and that the bloom itself was something around 15 square miles. It was huge. It reached from Toledo to Cleveland.

**Ms. Messer** stated that public water systems do have HAB monitoring and so they have taken a lot of samples. The Ohio EPA collected 487 raw and finished samples and the public water systems have submitted another 455. She said they must deal with this because they had high profile blooms. Ms. Messer mentioned they only had a few finished water detections of the thresholds but we have also have seen detections in the city of Akron and city of Toledo. She stated that we would like to see precision of accuracy because we have seen finished water with mycrocystins.

She went on to mention that they have found cyanobacteria in 20 PWS source waters. When they started looking at taste and odor issues, cyanobacteria is frequently found. She explained that Carroll Township is on Lake Erie in the western Basin, and that is where the first "do not drink" advisory was. She commented that the bloom was not as bad this year and not as high as in 2011. On September 4$^{th}$, they had 1.43 ug/l detection in finished water and on September 5$^{th}$, the detection in finished water was 3.56. Carroll Township had a connection with Ottawa County and immediately switched to that source. Carroll Township flushed their system. They remained on a "do not drink" advisory until they could confirm Ottawa County water was all through the distribution system by using fluoride as an indicator. It took Carroll Township two weeks to not detect finished water toxins. She said she was unsure if they will always be able to use that interconnection as a true contingency because Ottawa had capacity in September, but if Carroll needed the connection in July, she didn't know if Ottawa would have capacity during peak

season. That was a really big wake up call for all of the systems. There is an unfounded sense of security with the treatment technologies out there.

Ms. Messer also stated that the other thing she wanted to touch on was that they were not always seeing green and blue algal blooms. In 2012, a state park that is not a public water system source was the color of ketchup. It turned into a euglena bloom, which is not a cyanotoxin and not in the same group as the green algae. In 2013, Ohio had euglena bloom on a public water system source and they took some samples. They did have detections of euglena in the finished water. This is a system that has historically been able to remove microcystin at high levels but treatment was removing approximately half the toxins. The analytical capabilities are limited and the results could only be assessed to a degree of magnitude. So what do they do? She said they talked to CDC, academia, researchers, USEPA and reached out to everyone they could. There was not sufficient health information to issue an advisory. They consulted with the public water system and health department.

She mentioned she wanted to talk about some of the things Ohio EPA was trying to do in relation to the source of this problem. In January 2011, Grand Lake Saint Mary had its source designated as distressed watershed because of the bloom in 2010; however the watershed had impacts for a long time as evidenced by Celina needing to treat for DBP. She noted the bloom highlighted what the impacts on the community really were. Ms. Messer stated the distressed watershed designation requires regulations of livestock and agricultural areas and they actually have to follow best management standards. To get that kind of impact is significant, but, she said, they have expanded and that they are using algae impairment indicators in other source areas. The algal indicator is being considered an acute concern. If the source water has two or more detections above the threshold, at least they are thirty days apart, it will be declared impaired. Using 2009 through 2011, nine public water systems in seven different assessment units were impaired. She said it included the entire western basin of Lake Erie and seven other public water systems. She noted that it doesn't include 2013 data, but if they did include it, they would have even more impairments requiring a TMDL. The primary driver for the TMDL for the Maumee River was already triggered by nitrates. Ohio EPA is going to survey all their PWS this winter and potentially develop additional criteria based on feedback.

Ms. Messer noted that carbon treatment is very expensive. The amount of money PWSs have to spend on treatment in the state of Ohio is significant. She said the survey will ask about cost information. She noted that ozone treatment has been effective and that membranes are tricky—she noted that you have to be careful when back washing them. She mentioned that all of these things are really expensive treatments and that you can do some source water treatment, such as copper sulfate, but once a bloom reaches a certain point, you can't treat it and that makes it worse by lysing the cells. She said U.S. EPA in Cincinnati is doing research on Lake Erie by taking samples through the treatment train during 2013. Through the whole treatment train, they took sample results and looked at eight water systems. They are noticing that once you have scums, it's too late. You probably need to do drinking water intake before. You may not get a scum, but the threat is more in the water column. It does not show up as scum all the time which makes the monitoring a lot more difficult, but the satellite really helps with that. She noted that the sensors can really help. Ohio has an elaborate monitoring network. Ohio does a lot of sampling and timing them is really important, but it's expensive and it's hard to determine when

precisely to sample. They must determine when the highest threat to the intake is. She said the NOAA imagery they use is a really big help.

Ms. Messer then went into talking about collaboration. She said they worked really well with Lake Erie user groups. On the slide she displayed, she noted that the picture at the bottom was of an island where OSU has a lab. The lab has two day workshops every year and more and more public water systems have attended. She feels really good that awareness is expanding even though it's not a mandatory program. She mentioned the survey that they are going to do and how they will share its results. She also noted that they had had a call last month with U.S. EPA and health organizations where it they expressed the need for euglena to be further explored with Texas A&M in the spring. She stated that later this month, the state of Oregon is orchestrating a call with all the states that have cyanotoxin issues. She said that even though they have a lot of momentum, they have a long way to go.

**Dr. Grevatt** asked what the state of Ohio had been able to do to help understand why the factors are increasing and her thoughts about why the factors are causing these blooms.

**Ms. Messer** replied that it is all speculation and that the ecology is changing all the time. There was a whole different issue with Lake Erie and now they are really talking about nutrients. She noted that they think that there may be a connection with a climate change. The state of Ohio spent millions treating Grand Lake Saint Marys with alum, but with limited success. She also stated that another thing they have started to think about is the phosphorus, nitrate and pH ratio and how toxic they are. The research on the ecology on the organism is emerging and there are all sorts of issues. She stated, "If you push phosphorus down, what do you get in return? It appears to be a high pH."

**Dr. Grevatt** noted that the Council had been joined by Nancy Stoner. He asked Nancy if she would like to say anything.

**Ms. Stoner** stated that she mostly just wanted to thank everyone for their service on NDWAC and the great work that everyone was doing together. She said it was nice to see everyone and that she appreciates them. She also noted that she wanted to join them not just to see everyone but to learn about this topic.

**Ms. Morales** thanked Nancy for joining the Council at this time and noted that this was a very concerning topic. Ms. Morales opened the floor for questions.

**Ms. Massey** asked if there was anything Ohio EPA noticed that changed or any factor that had been added.

**Ms. Messer** replied that what she presented were the best answers they have gotten so far. She noted that it's such a delicate balance. Another thing they are concerned about is all the unknowns. She explained that they don't know when the new bloom will be. The big scum producing blooms got a lot of notoriety and they didn't even look for toxin producing bacteria until 2009. Ms. Messer commented that they haven't been able to figure out what has been going on and that they would like to know more.

**Ms. Massey** asked if there were higher temperatures noted for that season.

**Ms. Messer** replied with yes, it was a very hot summer. 2010 and 2011 were particularly hot summers. In 2011, they had a drier season as well.

**Mr. Vincent** noted that it was a great presentation and he was curious about the community response for the two days of the "do not drink" advisory. He noted that they had high priority water users like hospitals, etc. and wondered what sort of effort Ohio EPA had to make.

**Ms. Messer** replied that unfortunately they are dealing with something that they don't want to deal with but they have been really lucky in a lot of ways. The communities have at least become aware of what cyanotoxins are and their risk. She mentioned the specifics of this "do not drink" was in a rural community so there were no hospitals and not a lot of big users. There was a large water system on Lake Erie that said they didn't believe they could be placed under a "do not drink" advisory. Ohio EPA's position is that the water systems should have had a contingency plan for what they would do if they couldn't drink the water. They were told that they need to make sure they reach out to the Emergency Management Agency and should always prepared. After the Carroll Township a "do not drink" advisory occurred, there were six probable cases of illness relating to that incident. The "do not drink" was a wakeup call but this illness association is also a wakeup call.

**Mr. Vincent** asked about the six illnesses and if those people were immune compromised or normally healthy.

**Ms. Messer** replied that based on the information they got, it was a bell curve with various age groups. The thing they would like to find out about those illnesses is the general proximity to water treatment plant in each case, as well as research on the distribution. She wondered if these were closer to the water treatment plant. Were they far way? She noted if they could get zones that would be great.

**Ms. Morales** asked if Jill had a question.

**Ms. Jonas** mentioned that Peter brought up the common sense of security of finished water. She said to Beth that she mentioned that research is being done in Cincinnati. It concerns the need for more method development. Have they considered the role NDWAC could play or what they could come up with regarding those issues?

**Ms. Messer** replied that she wasn't really sure. She asked if NDWAC could direct research development efforts and if they could, she noted that she has a list of method accuracy and precision that the Council could direct some research too. She noted that the big requirement was the need for more toxins to be harvested, but it's expensive. So if there would be the ability to look into other emerging toxins out there, being able to get the toxin to the researchers would be great. She mentioned that NOAA has struggled to keep people on staff but if nothing else was possible, they would just emphasis the need so organizations can do stuff.

**Dr. Jones** said it sounded like some of the toxins had barriers and asked if there were any efforts to correlate or harvest toxins as they do research on toxicity? She asked why they wouldn't work for treatment barriers or different types of treatments.

**Ms. Messer** replied that she thinks the work that U.S. EPA is doing is the best of what the treatment train can do. She said they are willing to share that with whoever we can and much more in depth research needs to be done. Not only do they need to do that for the treatment train but also with carbon it depends—carbon works very well but depending on toxin you might want to use different types of carbon. That kind of research needs to be done as well.

**Mr. Neukrug** noted that all together, it was a great presentation. He was interested in how come Ms. Messer only touched on TDML and source water protection and not source control of nutrients.

**Ms. Messer** replied that she meant the way algal toxins are a good contaminant because until it was a stinky smelly mess, they didn't get to the table for TDML.

**Ms. Morales** noted that it was a great presentation whose has a lot of good potential. She then stated that Elizabeth from EPA Office of Water would be presenting next.

**Dr. Zarate-Bermudez** stated that on the slide for thresholds there were different signs of cyanotoxins and special levels mentioned. He then asked if when she mentioned this, she was looking for a specific cyanotoxins.

**Ms. Messer** replied that what they had done is to look for predominant algae when they had a bloom. They then do an algal identifiable and based on what that algae is, they will analyze for that toxin. Historically up until they had the euglena bloom, they had been microcystin.

**Ms. Morales** thanked Max, and had Elizabeth start her presentation.

<u>OW Office of Science and Technology Efforts on HABs</u>

**Ms. Behl** started by saying she was happy to be there and to meet everyone (see presentation on NDWAC website). She noted that she is the Director of the Health and Ecological Criteria Division. She stated that it is another Division in the Office of Water. She said they work on health advisories, MCLs, and also do a lot of work on the Clean Water Act. She also introduced Lesley D'Anglada, who has worked a lot on this topic. She noted that states are really out in front of EPA on this. She explained that what they would see is a lot of links to other state websites. She noted that she was going to talk about three initiatives and what they have taken on in the area of HABs. The purpose of this was to make the information available. She then noted that she had a little information on the HAB webinar series, and would provide an update on the health advisories for toxins that are in process. She mentioned the website was posted in 2012 and at the bottom of the screen there are eight tabs. The first tab *Cyanotoxins*—provides brief explanation of the cyanotoxins most commonly found in U.S. The next tab is *Detection* and she noted that the tab describes considerations in sampling for monitoring and lists different

detection methods and test kits, as well as other methods used to analyze. There are also links to EPA and USGS. The next tab, *Health and Ecological effects*—concerns major routs of human exposure and effects on aquatic systems. Moving on, she explained the *Research* tab describes current activities in the U.S. by EPA and USGS. The next tab is the link to *States*, which is organized by state. She then noted that there is a *More Information* tab with lots of good information on international websites and other activities with the water resource foundation.

**Ms. Behl** then went into the HAB formation and noted that there is widespread agreement within the scientific community that the incidence of HABs is increasing.

- Some physical factors that promote HABs formation include the availability of light, meteorological conditions, alteration of water flow, vertical mixing, and temperature. Chemical factors include pH changes, nutrient loading and trace metals.
- The causal factors related to bloom formation are high nutrient input, low water flow and mixing, as well as an increase in temperature.
- EPA is currently analyzing the National Lakes assessment data to evaluate stressor-response relationships between the nutrients nitrogen and phosphorus and harmful algal bloom occurrence.
- The most effective preventative measures are those that control the anthropogenic influences that promote blooms such as the leaching and runoff of excess nutrients.

Ms. Behl stated that the National Lakes Assessment was statistically designed and was conducted by EPA, state, and tribal partners to analyze microcystins in many samples. She noted that they are currently working with the Office of Wetlands, Oceans and Watersheds to try and associate HAB blooms, harmful algae, and effective prevention measures such as nutrients.

She mentioned that there are a couple of other links to fact sheets that she wanted to highlight, one of which is a three page fact sheet about the impacts of climate change on the occurrence of HABs. She said these summarize the potential impacts, climate change, carbon dioxide concentrations, changes in rain fall patterns, coastal welling, and sea level rise. All of these may contribute to growth of HABs.

She stated that there was another fact sheet that she wanted to talk about that they produced in 2012—it's a nine page fact sheet targeted toward drinking water system operators and provides background information on CCLs, factors promoting bloom information, and effectiveness of treatment technologies.

She noted that there are also webinars and discussion groups sponsored by EPA regarding HAB research health risks, control, and treatment. She added that they will have a webinar in January regarding the topic of new research on cyanotoxins. In conclusion, Mrs. Behl noted that there are a variety of standards that are being employed for different cyanotoxins and that two years ago they started working with Health Canada to develop drinking water health advisories with them. She emphasized that they are not regulatory in nature, rather based on the acceptable levels in drinking water based on health effects information.

In regards to where they are now, she noted that they had completed the draft of the HA summarizing all toxicity information. She agreed that there is a need to drive the research and one of the key questions is do they have enough data to drive some values.

**Mr. Grevatt** asked in regard to publishing the final draft, what steps are required for it to become final.

**Ms. Behl** replied that they will put it out for comment first and hopefully that will be a quick process. She noted that they have a 60 day comment period.

**Mr. Vincent** asked if they thought that the concentration levels for the '06 health advisory will be similar to the upcoming final version.

**Ms. Behl** replied that she did know that there was new toxicity data that indicates that the concentrations are a little lower, but they are peer reviewing the document so she can't yet say for certain if it will be the same or lower.

**Ms. Messer** said this year they were going to try and do more outreach, but wondered if there are any health effects or any other thoughts they should consider.

**Ms. Behl** said she was going to let Lesley answer it.

**Dr. D'Anglada** replied that it depends on the type of exposures. She explained that the CDC used to have a Cooperative Agreement with some states in which they were collecting health information on exposure to cyanotoxins. She stated that they currently are not collecting more health information, but the health effects range from gastro intestinal illnesses to allergic reactions. The effect depends on exposure and the problem is that people often do not report when they are exposed to it. Unfortunately that Cooperative Agreement with CDC and some states is no longer in effect so people are not providing that information to the CDC. She concluded by saying they hoped to soon do webinars to get information to the states.

**Ms. Behl** noted that she wanted to state that this is for ingestion. Other types of exposure are dermal contact and recreational contact. She added that there is a human health criterion and that they might be able to find some existing data.

**Ms. Mandelbaum** said she hadn't seen under bloom management source control measures and asked if they were still being piloted and whether they had recommendations or source control methods yet.

**Ms. Behl** asked for clarification on source control.

**Ms. Mandelbaum** replied that they had addressed factors that they considering, but not how they are trying to stop the nutrient loads that could impact it.

**Ms. Behl** said there is an awful lot of work across the Agency looking at nutrients on aquatic life with efforts to work with states to find ways to reduce nutrient contamination over different

agencies under non-regulatory methods of source control. They are also investing in helping them build a methodology to develop nutrient bacteria. She added that they are going to analyze the data from the National Lakes Assessment, but that it is a mathematical analysis that evaluates causal factors for pH and ratios.

**Dr. D'Anglada** said that they tend not to include source protection in the health advisory, but they have seen other countries doing it and that they will discuss including information on source protection.

**Ms. Mandelbaum** asked if they had a timeline.

**Ms. Behl** replied that they are working on it this fiscal year.

**Ms. Massey** said she was wondering if the requirement to stop winter spreading of manure in the watershed was a requirement of the TDML.

**Ms. Messer** said it will be included in the TDML and that it was actually the outcome of it. She noted that they went ahead and still enacted the requirements.

**Ms. Morales** noted that there had been a great discussion and dismissed everyone for a short break.

Regulatory Evaluation under the SDWA

**Mr. Burneson** said that he will briefly discuss EPAs regulatory evaluation under the Safe Drinking Water Act (see presentation on NDWAC website). The following is a summary of his key points:

1. EPA listed three algal toxins on the third Contaminant Candidate List (CCL) in 2009.
   - Anatoxin-a,
   - Microcystin-LR, and
   - Cylindrospermopsin.

2. EPA is evaluating algal toxins for regulatory determinations, and must be able to determine if any of them:
   - have adverse effect on the health of persons;
   - will occur in public water systems with a frequency and at levels of public health concern; and
   - presents a meaningful opportunity for health risk reduction for persons served by public water systems.

3. EPA is evaluating algal toxins for inclusion in future Unregulated Contaminant Monitoring Rules:

- EPA will need to develop analytical methods with sufficient sensitivity and precision; and
- Evaluate sampling protocols that will capture the episodic occurrence.

**Ms. Messer** asked what Mr. Burneson thought about using ELISA test methods to evaluate algal toxins in Ohio.

**Mr. Burneson** replied that the ELISA method was suitable for making their evaluations in Oihio about whether it is appropriate to advise the treatment of water.

**Ms. Messer** replied that she appreciated that and that although they are not yet there, they are working on obtaining the backgrounds so that they will have a much more solid foundation prior to taking public health action.

Source Water Protection Efforts

**Ms. Green** began her presentation by introducing herself, noting she manages the Source Water Protection Program (see attached presentation). Before she started she wanted to acknowledge that control of nutrient loads is a big piece of the issue. She also pointed out that she was going to talk about protection of drinking water sources and that is only a small piece. EPA is undertaking significant efforts working with states and other partners to reduce nutrients to surface waters generally. She explained that they recognize the need to reach out to new audiences and be a bit more creative and strategic so they have created the source water collaborative to try and integrate source water protection into land use decisions.

She noted that there are various activities and tools that the source water collaborative has produced. The agricultural source water collaboration toolkit was launched last fall and is an online resource that is a mutual education tool for agricultural communities and drinking water professionals. The tool helps facilitate partnerships on the ground between agriculture and the source water community. She said the NRCS does the on-the-ground work and the state conservationists make the decisions in regards to where the money goes. It's a win-win for everyone. She added that they developed the tool with significant input from NRCS and have promoted it through a ASDWA-hosted webinar as well as by individual source water collaborative members. Additionally, the Source Water Program is also sponsoring three collaborative pilot projects to reduce nutrients and pathogens in drinking water:

1. **Lancaster County, Pennsylvania**
   Led by the Lancaster County Planning Commission
   Goal: Increase collaboration between water suppliers and key partners to implement best source water protection practices and outreach to stakeholders, focusing on reducing nitrates in ground water.

2. **State of Wisconsin (with Rock and Sauk Counties)**
   Led by WI Department of Natural Resources' Bureau of Drinking Water and Groundwater

Goal: Develop a transferrable, collaborative response, with participation of partners and key stakeholders, to reduce the number of sub-watersheds with drinking water sources approaching unsafe levels of nitrate.

3. **Sheridan, Wyoming (Big Goose Creek Watershed)**
   Led by the City of Sheridan & Sheridan Area Water Supply
   Goal: Develop a watershed control plan to address Cryptosporidium, E. coli and sediment pollution, and design action plans that can be implemented to protect drinking water sources from future contamination.

She further explained that they have also done a lot with education and outreach including a piece they developed with Future Farmers of America highlighting conservationist practices for protecting drinking water sources:

- Nutrient management.
- Conservation tillage and crop rotation.
- Fencing and alternative water supply for livestock.
- Integrated pest management.
- Drainage water management.
- Efficient irrigation.
- Smart septic tanks.
- Ground water contamination awareness.

She noted that they also developed "Source Water Protection Lessons" that high school agriculture science teachers can use and that it's tied to the National Science Education Standards for grades 9 – 12. A separate effort that she mentioned was a non-regulatory approach relying on partnerships over the course of the past year. She noted that there is a strong desire to make some headway and work with the states so a state-EPA workgroup is in the process of developing a support document on how one might use existing Clean Water Act tools to protect drinking water. She explained that the document includes examples of where these tools have been applied successfully to demonstrate how other states can do something similar. She also mentioned that they are heavily engaged in the activities going on within the Office of Water and are working with many states individually on nutrient management plans.

**Ms. Morales** said it is very good to see that EPA is reaching out to other partners to address this problem when it comes to small systems. Small systems cannot do it alone. Ms. Morales stated that she could check that box now and it makes her very happy to hear, she thanked Ms. Green.

**Ms. Mandelbaum** asked when and if they will be able to publish some of those materials.

**Mr. Vincent** asked if they planned to publish the BMPs (best management practices).

**Ms. Green** noted that they have various education and outreach materials that draw from the BMPs that are published by USDA. She noted that they have hundreds of standards and descriptions of what they are.

**Mr. Vincent** asked if they had yet had an opportunity to model them like they do the TMDLs (total maximum daily loads) to see if they reduce nutrients well.

**Ms. Green** noted that they have various education and outreach materials that draw from the BMPs that are published by USDA. She noted that USDA has standards with descriptions of what they are.

**Ms. Green** also answered that the USDA is trying to do better at that and they have two things that she is aware of. They have the Conservation Effects Assessment Project and are trying to look at effectiveness. She explained that the USDA put a percentage of their Environmental Quality Incentives Program funds towards establishing one watershed in every state across the country where they target conservation practices for water quality improvement. She noted that this past year drinking water was included as a consideration for application of these funds.

**Ms. Morales** thanked Holly for the great topic.

ALGAL TOXINS AND DRINKING WATER

**Note:** Telephone line was not available in the afternoon, thus Dr. Zarate-Bermudez could not participate in the afternoon session.

**Dr. Grevatt** thanked everyone for their participation in the morning session. He noted that he wanted to start by reflecting on the importance of what everyone talked about. He mentioned that when talking about algal blooms in particular—whether they are in drinking water supplies in small systems or private wells that they are talking about contaminants that may have very serious health effects in children and very serious potential implications between different sectors and ages. He then posed the following questions to the group :

1. Given what we know, is the information on EPA's website useful to states and water systems?

2. What should EPA do to ensure that states and water systems have this information?

3. What actions might best help states and water systems address algal toxins?

**Ms. Messer** noted that they pulled a lot of stuff off the website. She mentioned that the user groups that they worked with are aware of that information. She added that they are looking at it so she thinks it is a very useful tool and they have links to other useful resources as well.

**Dr. Grevatt** asked what everyone else thought, noting they may not have had the opportunity to review the website.

**Dr. Jones** asked if there is a place on the website where people could provide an evaluation or a place for feedback. If so, she asked what the feedback thus far had been.

**Dr. D'Anglada** said when they published the website in 2012 it was announced through one of the webinars and she asked for feedback from everyone. She noted she received good comments and that when you go into the more information tab there is her name and a link to where individuals can provide feedback. She concluded by stating she has the inland HABs group has around 300 members thus far.

**Mr. Vincent** inquired about the information on algal blooms and explained that he thought state drinking water administrators would be the most interested in this and that it might be useful for everyone. He noted he had been on the site and thought it was good. He added that they also have healthy beaches webpages and the Great Lakes with mapping and links to each of the state websites, which is great.

**Ms. Godreau** noted that she wasn't sure where the satellite data came from and if and what is available for other states. She noted she was interested in how to access the information in North Carolina and whether or not there were links on how others can use/get satellite data.

**Dr. D'Anglada** replied that they work with ORD and the information is provided by the state. They use remote sensing satellites to create the maps with the blooms and they are currently developing a fresh water algorithm. She mentioned that they are working on processing the data and will soon create an app for phones so that anyone can download it and see the maps—tentative 2014 release.

**Ms. Godreau** asked if she understood correctly that satellite system is in real time and needs to have the data plugged into it.

**Dr. D'Anglada** replied that yes that is correct and it will be available for the states.

**Ms. Messer** said that if you live in Ohio, it's very cloudy and you might not be able to get a new image.

**Dr. D'Anglada** noted that the good thing is that bloom season is during summer when it is usually more clear skies.

**Ms. Jonas** found the website useful and enjoyed that it provided a quick reference guide. She added that another area EPA can consider is reaching out to health professionals. Whether its nitrate impacts, microcystin, etc., she said she thinks there is a need for better connecting with/providing information to health professionals. She explained that at times people think about phosphorus alone, but it's critical to think about nitrates and phosphates together when considering nutrient impacts to surface water and ground water. She noted she appreciates what EPA has done in protecting surface waters. It is also important to look at how efforts to protect surface water alone, can have a negative impact groundwater. She mentioned that they all want to be able to travel anywhere and get healthy drinking water.

**Mr. Vincent** said he is unsure if they had a link to the CDC on the website. He noted that they have a physician reference so maybe they should be hyperlinked together.

**Ms. Morales** asked if there were any plans to integrate any other agencies on EPA website.

**Dr. D'Anglada** replied that other agencies are included on the more information tab (USGS, NOAA, and NASA).

**Ms. Morales** replied that is great and part of the big discussion when looking into climate. She added that water utilities need to approach the issue from a watershed level. They can't control climate change and temperature changes so they need to have flexibility to protect the resources.

**Ms. Messer** said she agrees with what Ms. Jonas said in regard to physicians and she would add that the state programs really have to push for it the collection of the data.

**Mr. Vincent** also mentioned public heath veterinarians as a good source of feedback.

**Dr. D'Anglada** replied that CDC has been working with them.

**Dr. Grevatt** asked Ms. Messer if she could say more about state of Oregon.

**Ms. Messer** said she believed it's scheduled for the 19th or 21st of this month. The state of Oregon facilitated and at this point they just want to get an idea of where everyone else is. She doesn't think they have decided on what the next steps are and doesn't think there is any problem if EPA wants to be invited to the discussion.

**Dr. Grevatt** noted that Ms. Stoner had to go and he let her say a few words.

**Ms. Stoner** said that this has been a great discussion and she learned a lot of wonderful things. She stated she was grateful to everyone for sharing.

**Dr. Jones** said her question had to do with climate change and what factors if any came into play with algal toxins.

**Dr. D'Anglada** said that they just published a fact sheet to highlight some factors. She noted that she knows that climate change strategies were included Agency wide. She explained that temperature is a big factor; however, there are other factors as well.

**Dr. Grevatt** said that EPA is actively involved in climate change particularly as it pertains to an all hazards approach and resiliency. He noted he was struck by Ms. Messer's comment regarding the work that the state of Ohio has done to reach out to public water systems. He explained that contingency plans need to be developed and address things like the loss of power that might occur. He commented that he was however unsure of whether they had yet thought about the plans in regards to when a city has to cut off a water supply due to toxins.

**Ms. Messer** said she agrees with that and believes it applies to any sort of unknown contaminant. She asked what the guidelines for a water system in those situations are.

**Dr. Grevatt** said the example that Ms. Green offered in Lancaster was a very striking idea in that 400 farmers came together to talk about nitrate in the drinking water and wondered if people had thoughts on how they could duplicate this type of involvement on a National level. He added that the things that Ms. Behl has been doing locally are extremely important and that he believes they need to do both.

**Ms. Jonas** noted that to her it's about targeting and making sure drinking water and source waters overlap in areas even though it may not always be that a drinking water source is protected. She added they don't have enough money to come up with a treatment for every contaminant out there so finding commonalities and targeting on a national level is crucial.

**Ms. St. Martin** asked everyone to think back to the 1960s when the evening news reported the lakes were on fire and how there was a national cry from the citizens of the U.S. She added that as they talk about the algal boom it appears to be the same level of crisis, but that citizens no longer have the same understanding regarding the severity of the situation. She concluded that they will not be able to achieve what they need to on a national level until the citizens of this nation become activist in wanting to understand the issues.

**Mr. Vincent** said he thought what Ms. Green did in Lancaster was excellent. He noted that they have had some success in Florida but they don't have a lot of surface water issues. He explained that they have more ground water issues with nitrate in the spring water. He noted that they created initiatives with DEP money and got signs on the highway regarding the issue.

**Ms. Mandelbaum** noted that in California they have had quite a number of challenges between the state EPA and farmers and that it was only recently that they were able to require a baseline. She explained that this was when California water quality legislation came into effect and passed. She commented that they had a second court case this year that said the regional water quality control boards have to work to get the groundwater basins closer to the newly established baseline level. She added that Federal leadership would make a big difference as they are getting a lot of push back especially from agricultural lobbyist who are not happy with the price and costs of implementing those best management practices. She noted that the loss of drinking water is a much bigger cost than reductions of discharges.

**Ms. Massey** said she would just like to quickly comment about something that they may not have thought of that could be a potential source of nitrates. She explained that when they think about nitrates, agricultural sources, and septic tanks typically come to mind. In the last 10 -15 years, EPA has done a great job promoting decentralized waste water treatment; however, she thinks they have to be careful when working with these sources in sensitive areas. She noted that they need to make sure those systems are monitored properly because they can be very potent sources of nitrate due to their increased volume compared to septic tanks. It is very important to require effluent and ground water monitoring for nitrate for these systems. Permitting of these systems as Class V wells is a way to accomplish this.

**Ms. Jonas** said that they have to figure out how to change the way the culture is both nationally and locally. They have established a course of action for utilities that addresses what treatment should be employed when nitrates are starting to elevate. She noted the following would need to be answered: Do they have to replace the well? Do they have to employ a treatment? How do they change the local attitude to ensure a vibrant economy and safe drinking water together simultaneously?

**Ms. Morales** said one of the things she has been seeing in small communities is the need for entities to come together, work together, and collaborate together. She said while there might not be a solution for everyone it frees the communities from having to deal with it independently but it does require the vision to know where they are headed as a join entity. She noted that one of the challenges is the state agencies so if EPA and USDA and other Federal agencies could help with the messages and get it out to the states the state agencies it would really make it a lot easier. She explained that they have a lot of requirements so there is the opportunity to bridge that gap and allow for the opportunity. She noted that small systems want to move forward and to want the responsibility and one of the things they can do is think about what else is coming and how they might be able to position themselves to further assist systems. She stated that she really recommends thinking outside of the box.

**Dr. Grevatt** noted that the Council would now take a quick break.

PRESENTATIONS FOR TERMS OF SERVICE AND POSSIBLE FUTURE ISSUES FOR COUNCIL'S NEXT MEETING
*Peter Grevatt, OD/OGWDW*

**Dr. Grevatt** said it is his duty and pleasure to thank and give well wishes to those who are ending their terms: Sonya Massey, Marcia St. Martin, Jessica Godreau, Craig Woolard, and Olga Morales. Mr. Grevatt then went into the discussion and Council deliberations on agenda topics for next year and asked if there were any further points of discussion about the day's topics.

**Mr. Vincent** asked if they (EPA) are looking at nitrosamines and how it might be a result of the nitrification.

**Dr. Grevatt** noted that was something they could also give some thought to.

**Ms. Morales** mentioned if there was an issue that anyone wanted to discuss regarding what the EPA has been working on then they can put in a request for it. Based on what she has seen over the last few years it's an opportunity to see where things are at.

**Dr. Grevatt** said that in addition to that he is glad to have time to see if there are any additional thoughts on the lead and copper issues based on the previous day's conversation.

**Ms. Mandelbaum** mentioned as far as thinking outside the box she is not exactly sure how it could be done but thinking there could there be separate funds set up for grants, etc. for that

working group. Something to consider through grants to the state or through HUD, and asked if we could investigate that funding is a big issue.

**Dr. Grevatt** asked if everyone was aware of the environmental funds.

**Ms. Christian** stated that supplemental environmental funds are when companies get fined for doing wrong or polluting the environment. She has had the pleasure of running the ozone monitoring program. When a company gets fined, they can pay the fine or put the funds toward separate account to do project work. Projects are earmarked for ozone monitoring or storm water. She was able to get some money from companies like BP or Exxon paying for the project because they had polluted. SEP may be a source of help with the community by replacing the lead service lines.

**Dr. Grevatt** said in some cases in settlement agreements there are a number of cases where steps have been used to fund a project.

**Mr. Neukrug** said it has been fascinating how EPA, on the wet weather side, has progressed to integration of the regulations. For the SDWA, there has been the start of integrated planning for safe drinking water and how they managed everything within source water protection. Whatever monies are available for public health protection need to be prioritized towards programs with the biggest public health /environmental health benefits.

**Ms. Wu** mentioned the first water collaborative efforts and wondered whether this can help EPA look even more upstream. Is it something we or other agencies can do? How far upstream can we go to prevent this problem with the water? How can that been done?

**Dr. Grevatt** noted that for HABs, it included a very broad set of issues. He asked what does EPA want to do and what do they want NDWAC to consider? Any immediate feedback over the next weeks/months would determine what would be a helpful step on these issues. There needs to be balance between global actions and national leadership. How far upstream do we want to go not only figuratively, but also life-cycle management?

**Mr. Neukrug** said it is the wastewater side of the business that needs to be held most responsible for control of effluent contaminants, not the drinking water utilities. If not, things are outrageous on the drinking water side.

**Ms. St. Martin** stated that this goes back to Lead and Copper Rule. They worked with the local water community but there is consideration that they may want to work with local EPA offices to help educate a utility in order to take advantage.

**Dr. Grevatt** said he appreciated her raising that issue and hopefully, we don't need communities to go through disasters to make issues. He then asked, on another level, are there opportunities when buildings are demolished? Why don't we take that out and build a new foundation? There are a lot of different ways of taking advantage of infrastructure changes to get some of these things done. Large and small things happen when people are thinking of ripping up the road and then trying to retrofit it. That is a message we have been talking about.

**Mr. Vincent** mentioned that for future subjects, you constantly have other funded research on security issues or an update on important research that has to be done. At the next meeting, we can discuss emerging contaminants.

**Dr. Grevatt** replied definitely, that is something we can talk about.

**Ms. Morales** stated something that came up earlier when Ms. Messer mentioned contingency plans. Most of the contingency plans are emergency plans. She said she knows that the emergency response plans were developed because of terrorists activities. It's time for the Agency to develop plans that are more climate induced for all hazardous situations.

**Dr. Grevatt** said he wanted to be clear about what he was communicating this morning. Our water security program was established in regards to 9/11. It was a program that prepared and helped utilities address terrorist threats over time—he added that they have embraced all hazards including natural disasters. He went on to address that this is a very different kind of issue that concerns things he hasn't thought about before. He noted that there are tools that exist and it's striking to see the concentrations of contaminants after the treatment systems.

**Mr. Simon** said in the 1986 amendments that assessment programs for wells had to have a contingency plan for every ground water system. He added that every system has to have locally approved wellhead protection plans. He then asked Ms. Jonas if in Wisconsin she had to approve local wellhead programs. He asked, "Didn't you have to approve the wellhead protection programs relative to all contaminants? Did you not require every system to have an emergency contingency plan?"

**Ms. Jonas** replied that the requirement was based on new wells and mandated that new wells have the emergency response plan as part of the five step program, but it didn't include the entire system.

**Mayor Hampton** asked for clarification regarding the algal blooms and monitoring them. He asked what was going on in Ohio. He stated that Michigan is in the fresh water basin asked Ms. Messer what efforts Canada and Michigan are doing.

**Ms. Messer** said it was very little to none and it almost looked like they were going at it alone. She added that the difference between advisory and regulatory measures is that they have to be made enforceable in order for communities and states to communicate it. She asked if Mayor Hampton understood that the health effects are never clear. She asked why there wasn't a regulatory solution as opposed to an advisory program.

**Mayor Hampton** stated that from his perspective as an elected official, it is not that he is against unfunded mandates, but they cause the biggest push back. He then asked, "What moves a health issue from an advisory to a regulatory action?"

**Dr. Grevatt** replied that it is a very different process than developing a health advisory because those can be developed rather quickly. He stated that it could be the case that down the road EPA

comes to an agreement that they need a regulatory determination for that particular contaminant. However, this requires a number of steps. He said there is a reason to move forward with the National Primary Drinking Regulation; however, the UCMR process, sampling, contaminant candidate list all must first take place before a regulation can be put into place.

**Mr. Vincent** asked if NDWAC has a place in this process. He asked if EPA has a promotion plan for more federal dollars or an interagency plan to provide money if at all possible.

**Dr. Grevatt** replied that EPA doesn't have a plan as far as Congress is concerned, but given that they choose to provide appropriations, you may be aware that there have been conversations regarding infrastructure funding. He added that the DWSRF doesn't make up the lions share but it is very important part. He went on to mention that the drinking water SRF set asides State programs and the Drinking Water SRF has an important focus on under privileged communities that have a hard time getting infrastructure funding and is a very significant part of our budget.

**Ms. Morales** mentioned one thing she would like to propose to the Council. A lot of funds are aimed at developing and extending the life of the utility assets. Over the last six years she has been with the Council, Asset Management has been discussed and noted there are bridges and highways systems over 60 years and 70 years old and the same is true of water systems, it is a great opportunity for utilities to manage the assets.

**Dr. Grevatt** asked if there were any other thoughts.

**Mayor Hampton** asked a question on the State revolving funds. He asked, "We use SRFs distinctively so we couldn't have done things without those funds?"

**Ms. Mandelbaum** noted that to the best of her knowledge, nitrates and nitrites are already on the CCL list. She suspects that there are other areas of implementation in both contaminants' controls. She asked if NDWAC could further explore the issue.

**Dr. Grevatt** replied that they do have National Drinking Water Regulations for nitrates which is 10/mg per liter; however, he agreed that having an MCL does not solve the problem. If there are high levels of nitrate in source water they certainly can create a problem.

**Ms. Godreau** mentioned that Ms. Morales referenced asset management. She brought up the CREATE planning tool for utilities that EPA has a number of tools developed for different purposes. Her understanding is that most of them started with the creation of a system inventory but that the tools were all started from different ones. She commented that if EPA were to standardize the system inventory piece all of the tools could work off of one inventory.

**Ms. Morales** replied that they had a discussion about that. While it sounds right it's not as easy. She agrees that it would be wonderful if they could do it.

**Dr. Grevatt** replied that that they are requesting the development of various tools and for EPA the target audience may vary which makes connecting them more difficult.

**Ms. Godreau** said that all these tools start with an understanding of the facilities and assets of a water system. All of these are supposed to take into account the same system of assets.

**Dr. Grevatt** noted that he'll have to take that back and think about it.

**Ms. Morales** mentioned that she also brought this issue to their attention during the last meeting.

**Ms. Godreau** stated that in regards to how they would do it—they would have to look at contaminants that are poised for regulations and look to see where those contaminants might be coming from. She noted that Eric was telling them the preliminary 3 is set to be out in 2014. She thought it would be appropriate for what EPA to able to figure out how other parts of the Agency might be able to take this list and come to some conclusions. She said it is important to figure out where these contaminants are coming from as well as what regulatory programs they are under. She noted she would enjoy hearing a presentation that talks about the ways EPA (such as the Office of Water and other departments) are working on this issue.

**Dr. Grevatt** noted that he has heard from a number of folks who heard about just the treatment plan and asked how they keep it out of the source water.

**Mr. Burneson** asked to clarify terms when making permissions for contaminants. He added there are three options: no decision, decision to regulate, decision not to regulate.

**Ms. Godreau** replied that the picture she has is for contaminants that will be regulated. She said it's good to have an understanding of where the contaminant is coming from during the time of preliminary regulations.

**Ms. Morales** stated that they have had contaminants that have been assessed for regulation and so she thinks they can prevent them.

**Ms. Jonas** said there are situations where they are already regulated in drinking water, such as nitrate, but they have an overlapping issue with clean water. She noted that there is additional progress that has been made working with other programs in order to deal with the issue of what they are doing in one program area. She then asked what else they could do to keep nitrates out of the system. She mentioned that she would like to hear what the next steps are.

**Dr. Grevatt** replied that sounds good and thanked Ms. Jonas.

**Ms. Morales** mentioned that this is not the only opportunity they have to share what they would like to hear about from EPA. She mentioned to the Council to think about the next steps. She explained that once they begin to prepare for the next meeting, they should take that as an opportunity to send them to Roy as a wish list.

**Mr. Simon** noted to the Council that they may want to write their ideas down in a note.

**Dr. Grevatt** then mentioned a couple of important action items.

ACTION ITEMS:

- Received your unique consent on the Lead and Copper Rule. Those who have not participated, please let us know if that is something you are able and interested in doing. We are going to move forward with outreach. We want people who have an interest to volunteer for the working group and are going to start to establish the schedule. We floated a draft and had some talk about timing, but we need to try to come to more clarity.
- In addition to that, a follow up discussion on harmful algal blooms is necessary. Think more about what some of the topics you would like as follow-up issues, not just in regards to this issue, but broader issues as well. We need some for source water protection in order to think about how we limit the presence of contaminants in source water.
- At our next discussion, I will talk to Roy about if we will have a spring meeting. Once this has been decided we will inform the Council and begin making any necessary arrangements.
- The last thing is to reiterate that we do have a Federal Register Notice out requesting new NDWAC members. If you have people in mind that you think would be good to serve, we would be interested in hearing those names. We want to have the strongest group of individuals possible.

**Dr. Grevatt** thanked everyone again, especially Olga for her leadership.

**Ms. Morales** thanked everyone for the last six years. She said that there are great individuals on the Council and she looks forward to continue working with all of them and adjourned the meeting.

Respectfully Submitted:
/Signed/

Roy Simon 4/8/14
Roy Simon
DFO

Respectfully Submitted:
/Signed/

Jill D. Jonas 4/9/14
Jill D. Jonas
Chair

## Appendix I: Agenda

| DAY 1: Wednesday – December 11, 2013 | | |
|---|---|---|
| **8:00-8:30 AM** | **Registration and Coffee for Members** | |
| **8:30 - 9:00** | **Welcome and Review Agenda** | Olga Morales, NDWAC Chair<br><br>Peter Grevatt, OD, EPA Office of Ground Water and Drinking Water (OGWDW) |
| **9:00 - 10:00** | **National Drinking Water Program Update**<br>*Purpose: Provide an overview of the National Drinking Water Program Priorities for the year ahead and discussion.* | Peter Grevatt |
| **10:00 - 11:00** | **Drinking Water Regulatory Development Activities**<br>*Purpose: Update on drinking water regulatory-related activities and discussion.* | Eric Burneson, Acting Director, Standards and Risk Management Division, OGWDW |
| **11:00 -- 11:15** | **Break** | |
| **11:15 – Noon** | **Lead and Copper**<br><br>*Purpose: Presentation of the Issues for the NDWAC Work Group* | Eric Burneson |
| **12:00-1:00** | **Lunch on your own** | |
| **1:00 – 2:00** | **Open Public Comments** | Olga Morales and<br>Roy Simon, DFO as co-facilitators |

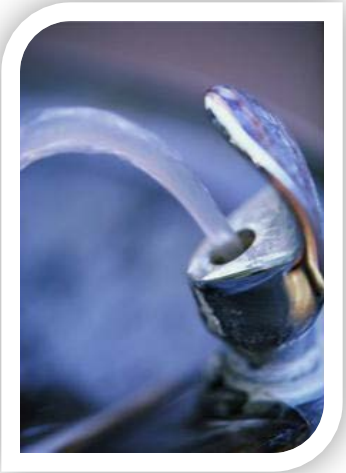
| | | |
|---|---|---|
| **2:00 - 3:30** | **Title: Council Discussion on Lead and Copper**<br><br>*<u>Purpose:</u> Discuss Sample Site Selection, Sampling Protocol, and Optimized Corrosion Control* | Facilitator<br><br>Lisa Christ<br>Acting Chief, Targeting and Analysis Branch, OGWDW<br><br>Peter Grevatt |
| **3:30 – 4:00** | **Break** | |
| **4:00 – 5:30** | **Title: Council Discussion on Lead and Copper (continued)**<br>*<u>Purpose</u>: Discuss Copper Public Education and Lead Service Line Replacement white papers* | Facilitator<br><br>Lisa Christ<br><br>Peter Grevatt |
| **5:30 – 6:30** | **Walk to Restaurant for Dinner** | |
| **6:30 PM – 8:00 PM** | **Group Dinner at:**<br><br>**The Hamilton – 14th and F Streets , NW**<br>**And then Taxi Back to Crystal City Courtyard Marriott** | Roy Simon, Facilitator |

| DAY 2: Thursday – December 12, 2013 | | |
|---|---|---|
| **8:00-8:30 A.M.** | **Coffee for Members** | |
| **8:30-10:00** | **Title: Algal Toxins and Drinking Water**<br><br><u>Purpose:</u> *Describe and Discuss Activities on Algal Toxins.*<br><br>o *Introduction*<br><br>o *Ohio's experience with algal toxins*<br><br>o *OW Office of Science and Technology Efforts on HABs*<br><br>o *Regulatory Evaluation under the SDWA*<br><br>o *Source Water Protection Efforts*<br><br>• *Clarifying Questions from NDWAC Members* | Olga Morales, Facilitator<br><br>Peter Grevatt<br><br>Beth Messer, Assistant Chief, Drinking Water, Division of Drinking and Ground Waters, Ohio EPA<br><br>Elizabeth Behl, Director of Health and Ecological Criteria Division<br>Office of Science and Technology (OST), OW<br><br>Lesley D'Anglada, Ph.D. Microbiologist, OST/OW<br><br>Eric Burneson<br><br>Holly Green, Chief, Prevention Branch, Drinking Water Protection Division |
| **10:00 – 10:30** | **Break** | |

| | | |
|---|---|---|
| | | |
| **10:30 -- 11:30** | **Title: Algal Toxins and Drinking Water**<br><br><u>Purpose:</u> *Continued NDWAC discussion to focus on these questions:*<br><br>*1. Given what we know, is the information on EPA's website useful to states and water systems?*<br>*2. What should EPA do to ensure that states and water systems have this information?*<br>*3. What actions might best help states and water systems address algal toxins?* | Facilitators:<br><br>Olga Morales and<br>Peter Grevatt |
| ***11:30 – Noon*** | ***Title: Pres*entations for Terms of Service and Possible Future Issues for Council's next meeting** | Peter Grevatt, OD/OGWDW |
| **12:00-1:00 P.M.** | **Lunch on your own** | |
| **1:00-2:00** | **Council Deliberations and Agenda Topics for Next Meeting** | Olga Morales and Peter Grevatt as co-facilitators |
| **2:00-2:30** | **Closing Remarks and Adjourn** | Olga Morales<br><br>Peter Grevatt<br><br>Roy Simon |

# Regulatory Analysis and Rule Development

## National Drinking Water Advisory Council

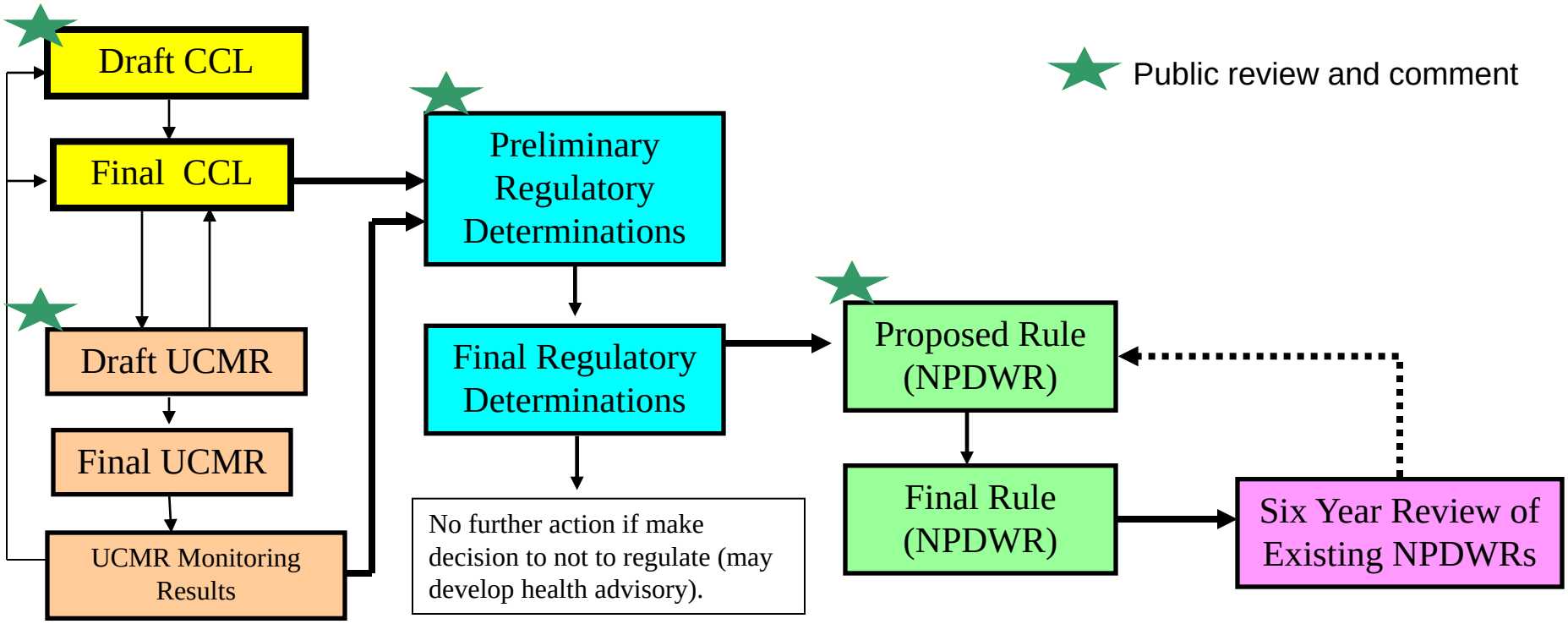


December 11, 2013

Office of Ground Water and Drinking Water

U.S. EPA

# General Flow of SDWA Regulatory Processes




At each stage, need increased specificity and confidence in the type of supporting data used (e.g. health, occurrence, treatment).

# Presentation Overview

- Contaminant Candidate List
- Unregulated Contaminant Monitoring
- Regulatory Determinations
- Rules under Development/Revision
- Six Year Review of Regulations
- Regulatory Revisions
- Reduction of Lead in Drinking Water Act

# Contaminant Candidate List (CCL)

- Published Third Contaminant Candidate List (CCL 3) in Oct 2009, which listed 116 contaminants:
  - 12 microbes (e.g., viruses, bacteria)
  - 104 chemicals (pesticides, industrial chemicals, pharmaceuticals, inorganics)
- Spring 2012 - Published FR notice requesting nominations of contaminants to be considered for inclusion on CCL 4
  - 59 unique contaminants were nominated by 10 organizations and individuals
    - 5 microbes and 54 chemicals
    - 8 contaminants were nominated more than once
  - The nomination letters and web site submittals can be found in the CCL 4 docket (EPA-HQ-OW-2012-0217) at www.regulations.gov
- Expect Draft CCL 4 publication in 2014

# Unregulated Contaminant Monitoring Rule ("UCMR 3")

- Final rule published May 2, 2012
- *http://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/ucmr3/index.cfm*
- Monitoring taking place Jan 2013 – Dec 2015; reporting through ~mid-2016
- 28 chemicals and 2 viruses
- Chemical contaminants include hormones, perfluorinated compounds (e.g., PFOS/PFOA), VOCs, metals (including Cr-6 and total Cr), 1,4-dioxane, chlorate

# UCMR 3 Preliminary Results

- Posted the first set of results 11/5/13
  - http://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/data.cfm
  - Data set represents first-quarter 2013 results as well as partial second- and third-quarter results
- Results to be updated ~quarterly hereafter
- UCMR 3 minimum reporting levels (MRLs) are based on analytical method quantitation limits
  - comparably lower than UCMR 1 and UCMR 2 MRLs;
  - more frequent detection of UCMR 3 contaminants expected

# UCMR 3 Preliminary Results

- UCMR 3 "reference concentrations"
  - based on published health-effects information, where available, from
    - CCL3 Contaminant Information Sheets
    - EPA Health Advisory Table
    - Human Health Benchmarks for Pesticides
  - Purpose is to aid in the interpretation of the UCMR 3 results (i.e., so that detections may be judged relative to health-based concentrations rather than method-based reporting limits)
  - Reference concentrations currently available for 20 of 28 UCMR 3 chemicals

# UCMR 3 Preliminary Results

- ~1400 sample results from ~200 PWSs for hormones
- ~6700 sample results from ~1000 PWSs for metals, chlorate
- ~4000 sample results from ~1000 PWSs for other chemicals
- <15% of data that will ultimately be collected

# Summary Points re Preliminary Data

- Metals
  - Many PWSs had detections of metals (i.e., above the MRL)
  - Between 0-3.5% had measurements above the Ref Conc
  - V above the Ref Conc at 3.5% of PWSs; Sr above the Ref Conc at 1.1%; other metals measured above the Ref Conc by less than 0.5% of PWSs
- Chlorate
  - Many of the PWSs (680 of ~1000) had detections of chlorate
  - 31% of the PWSs had chlorate measurements above the Ref Conc

# Summary Points re Preliminary Data

- 1,4-dioxane
  - 190 of ~1000 PWSs had detections of 1,4-dioxane
  - 6% above the $10^{-6}$ Ref Conc of 0.35 ug/L; none above the $10^{-4}$ Ref Conc of 35 ug/L
- VOCs
  - One or more VOCs were detected by ~50 of the 1000 PWSs that reported data
  - Few VOC measurements above the Ref Conc
  - 1,2,3 trichloropropane measured by ~1.6% of PWSs above the $10^{-4}$ Ref Conc; detected above MRL by ~1.9% (MRL > $10^{-6}$ Ref Conc)

# Summary Points re Preliminary Data

- Perfluorinated Compounds (PFCs)
  - 15 of the ~1000 PWSs detected one or more PFCs
  - 1 PWS measured PFOS above the Ref Conc
  - Ref Conc was only available for PFOA and PFOS
- Hormones
  - 8 of the ~200 PWSs detected one or more hormones
  - Ref Conc available for the 5 estrogenic hormones, not the 2 androgenic hormones
  - None of the PWSs had (estrogenic) hormone measurements above the Ref Conc

# UCMR 4

- May 2013 stakeholder meeting focused on methods for unregulated contaminants
- Initiating workgroup process for UCMR 4
- Anticipated timeline:
  - Early 2014 UCMR 4 stakeholder meeting (*details TBA*)
  - Mid-2015 proposed rule
  - Late-2016 final rule
  - January 2018 monitoring start

# Regulatory Determinations

SDWA requires EPA to make regulatory determinations for ≥5 CCL contaminants every 5 years. EPA must regulate if:

*1) The contaminant may have an adverse effect on the health of persons;*

*2) The contaminant is known to occur or there is substantial likelihood that the contaminant will occur in public water systems with a frequency and at levels of public health concern; and*

*3) In the sole judgment of the Administrator, regulation of such contaminant presents a meaningful opportunity for health risk reduction for persons served by public water systems*

***SDWA Section 1412(b)(1)**

# Potential Outcome of Regulatory Determinations

- **No Regulatory Determination**
  - Insufficient data to assess contaminant against the 3 criteria
- **Positive Determination**
  - Answer “yes” for “all three” criteria
  - Begin process to develop a drinking water regulation where additional, more detailed analyses are performed
- **Negative Determination**
  - Answer “no” for “any one” of the three criteria
  - Do not develop a drinking water regulation
  - Developing a Health Advisory is a non-regulatory option
  - Negative determination is a final decision; judicially reviewable

| # | Outcome |
|---|---|
| 1 | ✓ |
| 2 | ✓ |
| 3 | ✓ |

| # | Outcome |
|---|---|
| 1 | ✓ |
| 2 | X |
| 3 | X |

# Status and Next Steps for Regulatory Determinations 3 (RD 3)

- Evaluating the health and occurrence information to identify which CCL 3 contaminants have sufficient information to make to the preliminary regulatory determinations.
- Expect to publish preliminary RD 3 for public comment in 2014.
- After evaluating and considering public comments, expect to publish final RD3 early 2015.

# Perchlorate

- EPA is developing a proposed perchlorate standard :
  - Continue to evaluate available data on perchlorate occurrence
  - Evaluating the feasibility of treatment technologies to remove perchlorate and examine the costs and benefits of potential standards
- Public stakeholder meeting held in September 2012
- Consulted with the National Drinking Water Advisory Council in October, 2012
- Science Advisory Board  Recommendations for methodologies to derive a Maximum Contaminant Level Goal (MCLG) May 29, 2013
  - Develop a perchlorate MCLG using Physiologically Based Pharmacokinetic (or "PBPK") modeling rather than the traditional approach of using the reference dose and exposure factors.
- EPA is working with FDA to evaluate options for PBPK modeling to derive a perchlorate MCLG

# Carcinogenic VOCs Group

- EPA is developing a proposed group cVOC standard
  - Considering regulated (TCE, PCE and others) and unregulated carcinogenic VOCs (cVOCs)
  - Assess potential cVOCs for the group based upon similar health effect endpoints; common analytical method(s); common treatment or control processes; and occurrence/co-occurrence in drinking water
  - Evaluate options for setting a cVOC MCL(s) and examine the feasibility of analytical methods & treatment technologies, and costs/benefits for the group
  - Any revision for currently regulated cVOCs will improve or maintain health protection
  - Hold consultations in early 2014
- Expects to propose a regulation in late 2014

# Six Year Review Background

- 1996 SDWA Amendments require EPA to review and, if appropriate, revise existing National Primary Drinking Water Regulations (NPDWRs) every six years
  - In 2003, EPA completed the 1st Six Year Review of 69 NPDWRs; made decision to revise TCR
  - In 2010, EPA completed the 2nd Six Year Review of 71 NPDWRs and made decisions to revise tetrachloroethylene (PCE), trichloroethylene (TCE), acrylamide and epichlorohydrin
- Occurrence analysis is a key component in the Six Year Review process

# Six Year Review 3

- We had overwhelming support from states for the Six Year Review 3 compliance monitoring data request
  - 46 states and 8 primacy agencies have supplied EPA with their compliance monitoring data
  - We are beginning the initial review of data sets and we'll work directly with the states and primacy agencies to resolve any data questions
- Expect to complete Six Year Review by 2016

# Review of Long Term 2 Enhanced Surface Water Treatment (LT2) Rule

- Aug 2011 - EPA announced plans to initiate the review of LT2 in response to executive Order 13563 (Improving Regulation and Regulatory Review); this review is part of SY3.
- Like SY3, the LT2 review involves assessment and analysis of data/information on occurrence, treatment, analytical methods, health effects, and public health risks.
- Have held three stakeholder meetings to solicit/gather information on the Round 1 monitoring results/bin placement, analytical methods improvements, uncovered finished reservoirs, and microbial toolbox options.
- Expect to complete review on same schedule as SY3 (if not sooner).

# Overview of the 1989 TCR

- Federal drinking water rule first established in 1989
- Only microbial drinking water rule that applies to all (~155,000) public water systems (PWSs) in the U.S. (serving >300 million Americans)
- Requirements pertain to both community and non-community systems
- Primary objectives of the rule:
  - Ensure integrity of the distribution system
  - Indicate whether treatment is effective
  - Indicate possible fecal contamination

# History of 2013 RTCR

- **Six Year Review** - SDWA requires EPA to review and revise, as appropriate, each NPDWR no less often than every six years; In 2003, EPA reviewed and decided to revise the Total Coliform Rule (TCR).
- **Advisory Committee** - In July 2007, EPA convened the Total Coliform Rule Distribution System Federal Advisory Committee (TCRDSAC), consisting of 15 organizations.
- **Agreement in Principle** - In Sept 2008, TCRDSAC deliberations concluded with a signed Agreement in Principle (AIP) that included recommendations on how to revise the TCR.
- **Proposed Rule** - In July 2010, EPA proposed and solicited public comment on the RTCR, which had the same substance and effect as the TCRDSAC recommendations.
- **Final Rule** - In Feb 2013, and after considering 134 public comment letters, EPA promulgated the final RTCR.

# Key Provisions of RTCR (1 of 3)

## Monitoring

- Maintains the routine sampling structure of TCR
- Allows systems to transition on their existing TCR monitoring frequency; re-evaluated at sanitary surveys
- Reduces the required number of follow-up samples (repeat and additional routine) for systems serving ≤1,000
- Like TCR, small systems (GW serving ≤1,000) are eligible for reduced monitoring
- Provides more stringent criteria that systems must meet to qualify and stay on reduced monitoring
- Requires small systems with problems to monitor more frequently

# Key Provisions of RTCR (2 of 3)

## Assessment and Corrective Action (Find and Fix)

- RTCR requires PWSs to investigate the system and correct any sanitary defects found when monitoring results show the system may be vulnerable to contamination
- Systems must conduct a basic self assessment (Level 1) or a more detailed assessment by a qualified party (Level 2) depending on the severity and frequency of contamination
- Failure to assess and correct is a Treatment Technique (TT) violation

# Key Provisions of RTCR (3 of 3)

## Seasonal Systems

- Defines "seasonal systems" and requires them to have start-up procedures and sampling during high vulnerability periods

## Public Notification (PN)

- Notify public within 24 hours if system confirms fecal contamination (*E. coli*)
- Notify public within 30 days if system does not investigate and fix the identified problem (replaces the PN for total coliform detections, reducing system costs and consumer confusion)
- Notify public yearly if system does not monitor or report monitoring results (for CWSs, via the Consumer Confidence Report (CCR))

# Guidance and Implementation

- PWSs are expected to comply three years after publication (by April 1, 2016). Some States have indicated that they may pursue early implementation.
- EPA HQ held first webinar on the rule requirements in April 2013; hosted and planning to host additional, more specific training to Regions and States for implementation through Spring 2014.
- Expect to release Guidance Manuals in the next 1-2 years:
  - Assessments and Corrective Actions Guidance ~ Early 2014
  - Small Systems Guidance (Systems ≤ 1,000) ~ Spring/Summer 2014
  - Quick Reference Guide ~ Completed and on the RTCR web page at http://water.epa.gov/lawsregs/rulesregs/sdwa/tcr/regulation_revisions.cfm#implem
  - State Implementation Guide, primacy guidance/templates, crosswalks ~ Dec. 2013
  - Fact sheets, laboratory quick reference guide, other implementation tools in 2014

# Reduction of Lead in Drinking Water Act

- Amends SDWA Section 1417 – Prohibition on Use and Introduction into Commerce of Lead Pipes, Solder and Flux
  - Modifies the applicability of the prohibitions by creating exemptions
  - Changes the definition of “lead-free” by reducing lead content from 8% to a weighted average of not more than 0.25% in the wetted surface material (primarily affects brass/bronze)
  - Eliminated provision that required certain products to comply with “voluntary” standards for lead leaching
  - Establishes statutory requirement for calculating lead content
  - Effective 3January 4, 2014
- Frequently Asked Questions
  - Developed based on Stakeholder input
  - Reassessing fire hydrants
- Will develop proposed revisions to 40 CFR 141.43

# Lead and Copper Rule Long-term Revisions: Background and Introduction of Key Issues for NDWAC Consideration

**Presenter:** Eric Burneson, Acting Director

U.S. EPA, Office of Ground Water and Drinking Water, Standards and Risk Management Division

# Purpose & Overview

**Purpose**:

To provide the NDWAC with background on the Lead and Copper Rule Long-term Revisions in general, and

To highlight for the Committee five areas where EPA is currently considering a range of regulatory revisions and is seeking detailed stakeholder input

**Overview**:

Background on the Lead and Copper Rule

Key areas for rule revisions that would benefit from in depth Stakeholder input

EPA's proposed stakeholder Working Group structure and timeline

# Background: Lead and Copper Rule (LCR)

EPA under the Safe Drinking Water Act (SDWA) sets public health goals and enforceable standards for drinking water quality

Lead and Copper: National Primary Drinking Water Regulation (NPDWR) initially promulgated June 7, 1991

The goal of the LCR is to:

> Protect public health by minimizing lead and copper levels in drinking water, primarily by reducing water corrosivity

The rule applies to all community water systems (CWSs) and non-transient non-community water systems (NTNCWSs)

The LCR addresses corrosion and leaching of lead and copper from service lines and household plumbing in to drinking water

# Background: LCR Continued

The LCR requires compliance with a treatment technique (optimized corrosion control) rather than a Maximum Contaminant Level (MCL)

Maximum Contaminant Level Goals (MCLG)

Lead – 0 µg/L
Copper – 1.3 mg/L

Tap sampling results are compared to an action level (AL)

Lead - 15 µg/L
Copper - 1.3 mg/L

Action level for lead is a screen for optimal corrosion control as part of the treatment technique. It is based on treatment feasibility; NOT on a health threshold.

Action level for copper is a screen which triggers optimal corrosion control treatment, and is set at the health based MCLG.

# Public Health Benefits of the LCR

Reduction in risk of exposure to lead that can cause damage to brain, red blood cells, and kidneys, especially for young children and pregnant women

Reduction in risk of exposure to Copper that can cause stomach and intestinal distress, liver or kidney damage, and complications of Wilson's disease in genetically predisposed people

# Major Monitoring Provisions of the LCR

Standard Lead and Copper Tap Monitoring:

All community water systems (CWSs) and non-transient non-community water systems (NTNCWSs) are subject to monitoring requirements

Systems must collect first-draw samples at taps in homes/buildings that are at high risk of lead and copper contamination

The number of required samples varies by the size of the population served by the system, from 100 samples for large systems serving over 100K people down to 5 samples for systems serving 100 or fewer people

Systems must conduct monitoring every 6 months unless they qualify for reduced monitoring

The number of required samples and sampling frequency may be reduced if systems meet certain requirements

# Monitoring Requirements Continued

Standard Water Quality Parameter Monitoring:

Large systems serving >50,000 people, and small and medium systems serving ≤ 50,000 individuals during monitoring periods in which either AL is exceeded must monitor for water quality parameters (WQPs)

Sampling frequency:

- WQP samples at household/building taps are collected every 6 months
- WQP samples at entry points to the distribution system are collected every 6 months prior to CCT installation, then every 2 weeks

The number of required tap samples varies by the size of the population served by the system, from 25 samples for large systems serving over 100K people down to 1 sample for systems serving 500 or fewer people

The number of required tap samples and sampling frequency may be reduced if systems meet certain requirements

# Consumer Notice and Confidence Reports

Within 30 days of learning the results, all systems must provide individual Lead tap results to people who receive water from sites that were sampled, *regardless of whether the results exceed the lead Action Level*

All systems, irrespective of their lead levels, must provide an educational statement about lead in drinking water in their Consumer Confidence Report

# Current LCR Actions Triggered Under Action Level Exceedance

For systems serving < 50,000 people, if the 90$^{th}$ percentile of a system's lead sampling results exceed the action level, a system must:

Conduct public education

Implement source water monitoring and if needed treatment

Install or optimize corrosion control treatment

Implement Lead Service Line Replacement (LSLR), if corrosion control does not reduce lead and copper levels below the ALs

# LCR Requirements if the Action Level is Exceeded: Public Education

Systems that exceed the lead AL (*not required if only the copper AL is exceeded)*

CWSs:

deliver materials to bill-paying customers and post lead information on water bills

work in concert with local health agencies to reach at-risk populations (e.g. children, pregnant woman)

provide press releases and conduct new outreach activities

post to Website (CWSs serving > 100,000 only)

NTNCWSs:

posting and distribution to all consumers (can be electronic with State permission)

Can apply to CWSs such as hospitals and prisons where population cannot make improvements

# LCR Requirements if the Action Level is Exceeded: Public Education

Delivery of the education materials must be within 60 days after end of the monitoring period in which lead AL was exceeded

- Notices must be repeated annually; water bill inserts quarterly; press releases twice a year; and Web posting continuously

Public education can be discontinued whenever lead samples fall below the AL

# LCR Requirements if the Action Level is Exceeded: Source Water Monitoring and Treatment

Applies to systems that exceed lead or copper AL

Monitoring is needed to determine the contribution of source water to total tap water lead and copper levels and the need for source water treatment (SOWT)

Once the AL is exceeded one set of samples at each entry point is due within 6 months

The State sets maximum permissible levels (MPLs) for lead and copper in source water based on initial and follow-up source water monitoring

# LCR Requirements if the Action Level is Exceeded: Source Water Monitoring and Treatment

The System has 24 months to install any required SOWT

Continuing source water monitoring requirements:

Standard: ground water systems to monitor once during 3-year compliance periods; surface water systems monitor annually

Reduced: systems monitor every 9 years if MPLs are not exceeded during 3 consecutive compliance periods for ground water systems or 3 consecutive years for surface water systems

## LCR Requirements if the Action Level is Exceeded: Corrosion Control Treatment

The current LCR requires small and medium systems that exceed the action level and large non-(b)(3) systems (i.e. those systems above 5 µg/L) to:

If the State requires, systems must conduct a corrosion control study within 18 months

The system makes optimal corrosion control recommendations to the State for approval (State approves or designates alternative)

The system implements CCT within 24 months and conducts follow-up monitoring for 2 consecutive 6-month periods on taps every 6 months and at entry points every 2 weeks (monitoring for lead, copper, and other WQPs)

State reviews data and designates optimal water quality parameters (OWQP) (i.e., min/max pH, alkalinity, inhibitor concentration, etc.)

# LCR Requirements if the Action Level is Exceeded: Corrosion Control Treatment

System's compliance with the treatment technique is based on OWQP (not Pb/Cu levels) and on whether they perform the required actions when the action level is exceeded

Systems may stop CCT if both lead and copper samples are below the ALs for 2 consecutive 6-month periods but CCT must recommence if subsequently either AL is exceeded

Reduced tap monitoring requirements:

- if system meets OWQPs for 2 consecutive 6-month periods the number of sampling site can be reduced
- Meeting OWQPs for 6 consecutive 6-month monitoring periods can result in a reduction in sampling sites and annual monitoring
- Meeting OWQPs for 3 consecutive years of annual monitoring can monitor triennially

# LCR Requirements if the Action Level is Exceeded: Lead Service Line Replacement

Systems that exceed the lead action level, in two consecutive 6-month monitoring periods, after installing CCT and/or SOWT, must replace at least 7% of LSLs annually

- Systems can do full or partial LSLRs, or "test out" a LSL if all samples from the line are at or below the lead AL
- Systems must replace the portion of the LSL they own
- Systems must offer to replace the private property owner's portion at his or her expense the system is not required to replace the privately-owned portion
- Systems conducting partial LSLRs must:
  - Notify customers at least 45 days prior to replacement about the potential for increased lead levels
  - Collect samples within 72 hours of replacement and provide results within 3 days of receipt

Systems can discontinue LSLR whenever lead tap samples are at or below the AL for 2 consecutive 6-month monitoring periods; the system must recommence if samples subsequently exceed the AL

# Background: Long-term Revisions

EPA conducted a national review of LCR implementation issues in 2004

- collected and analyzed lead concentration data
- carried out a review of implementation and monitoring at the state level
- held four expert workshops to discuss elements of the regulations

EPA released the ***Drinking Water Lead Reduction Plan (DWLRP)*** in March 2005

- The plan outlined both short and long term goals for improving LCR implementation

# Background: Long-term Revisions

In 2007 EPA promulgated the Short-term Revisions to the LCR

- The rule enhanced monitoring, treatment, lead service line replacement, public education, and customer awareness

EPA is currently working on the Long-term Revisions to the LCR

- The areas of the rule requiring revision were identified in the DWLRP and the 2007 Rule

# EPA's Goal for the Long-term Revisions:

Improve the effectiveness of corrosion control treatment in reducing exposure to lead and copper and to trigger additional actions that equitably reduce the public's exposure to lead and copper when corrosion control treatment alone is not effective.

# Why is EPA Forming a Working Group?

In 2011, EPA consulted with the NDWAC on key areas of LCR rule revisions

Since 2011, EPA has further analyzed those key areas and is seeking greater, in depth, stakeholder input

To facilitate this input, EPA is forming a Working Group to provide NDWAC with input and recommendations on five key areas for revision to the LCR outlined in this presentation.

# Key Issues for Input

Sample site selection criteria for lead and copper

Lead sampling protocol

Public education for copper

Measures to ensure optimal corrosion control treatment

Lead Service Line Replacement (LSLR)

# NDWAC Working Group Structure

The Working Group will explore the five specific technical issues and will:

provide suggestions on how to implement the goals for LCR revisions

provide information

share perspectives on advantages and disadvantages of options under consideration by EPA, and

suggest additional options

The Working Group will provide group advice where consensus is reached and alternatives where consensus is not reached

## NDWAC Working Group Structure Continued

The Working Group will make its report to the NDWAC, which in turn will provide advice on these issues to EPA

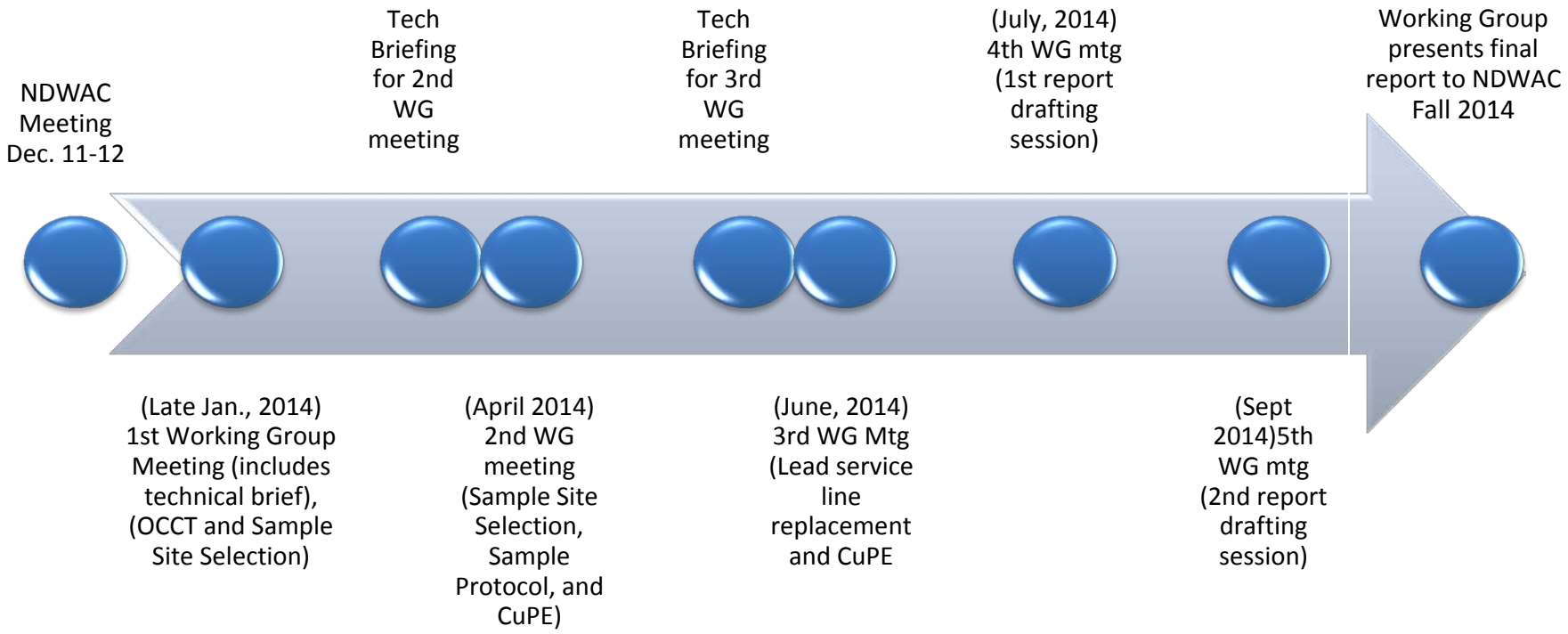
Working Group members will be selected based on the experience needed to provide balanced advice on the five issues related to Long-term revisions to the LCR

Members of the NDWAC will be selected for workgroup participation in order to facilitate the flow of information between the work group and NDWAC

# EPA's Proposed Timeline

The Working Group would receive three technical briefings and meet 5-6 times to discuss the issues and write a draft report for the Fall 2014 NDWAC meeting

The NDWAC will review the report and submit to EPA their final recommendations



# Comments and Feedback

NYC Environmental Protection

*Carter H. Strickland, Jr.*
*Commissioner*

**Paul V. Rush, P.E.**
Deputy Commissioner
Bureau of Water Supply
prush@dep.nyc.gov

71 Smith Avenue
Kingston, NY 12401
T: (845) 340-7800
F: (845) 334-7175

October 29, 2013

Mr. Roy Simon
U.S. Environmental Protection Agency
Office of Ground Water and Drinking Water (MC 4601M)
1200 Pennsylvania Avenue NW
Washington, DC 20460

RE: NYC DEP Comments on LCR Rule Revisions for NDWAC Consideration

Dear Mr. Simon:

The New York City Department of Environmental Protection (DEP) is pleased to offer these written comments on revisions to the Lead and Copper Rule (LCR), for consideration by the National Drinking Water Advisory Council (NDWAC) Members. DEP, which operates the country's largest unfiltered water supply and provides clean drinking water to more than 8 million city residents, strongly supports LCR revisions that promote meaningful health protection benefits for our citizenry, and which correct some of the problems with the existing rule construct. However, with a system that has almost 7,000 miles of water mains, and over 1 million service connections, there are substantial challenges in implementing the LCR, so the rule revisions need to remain flexible to account for differences in the size and characteristics of different water supply systems. The following are some of the issues that DEP is concerned with and should be considered when evaluating recommendations for revisions to the LCR.

Sincerely,

Steven C. Schindler
Director of Water Quality

Enclosure
c: P. Rush, P.E., Deputy Commissioner NYC DEP
D. Lipsky, PhD, Chief, NYC DEP
C. Glaser, Section Chief, NYC DEP
file

**NYC DEP Comments on LCR Rule Revision**
**For NDWAC meeting December 11-12, 2013**

**Clarify the objectives of the LCR:**

DEP believes that the United States Environmental Protection Agency (EPA) should clarify the objective of the 90$^{th}$ percentile Action Level (AL) - as being a measure of corrosion control effectiveness. There is a dichotomy between the objective to monitor a specific and relatively constant pool of residences at "high-risk" for lead for the purpose of tracking corrosion control performance, and the objective of using these same data as an indicator of public health significance. This dichotomy occurs because the method by which samples are collected under the LCR, while adequate as a treatment technique for the purposes of optimizing corrosion control, are not adequate as an indicator of public health risk. The samples are not representative samples of exposure; rather they represent a potentially worst-case sample that is not representative of the water delivered throughout the day to the customer.

Additionally, the metric used to determine exceedance or non-exceedance of the AL, namely the 90$^{th}$ percentile, that triggers public education activities and lead service line replacement activities by the utility, is not a good metric for determining health risk. For example, in a pool of 100 samples, the 90$^{th}$ percentile value will be the same whether the highest 10 samples are in the range of 15-20 µg/L, or whether the highest ten values are in the range of 15-200 µg/L. Yet the potential health risks are clearly different. In the absence of guidance on acceptable levels of lead in at-the-tap water samples, the public, state, and local regulatory agencies, and the water utilities, continue to use the performance based action level established as a treatment technique, as a quasi-health standard, which makes the public education component confusing and potentially misdirected. An example of the confusion is obvious with respect to selecting a compliance pool. If the action level represents a public health guidance value, then DEP believes it is contradictory to continue to sample from the same sites with lead service lines year after year. Instead, DEP believes EPA should encourage utilities to advise the residents at these properties that they can and should take some type of remedial action to remove the lead from their at-the-tap water. However, any remediation would potentially lead to their exclusion from the sampling pool, which seems to go against the current directive of the LCR.

DEP believes EPA should consider these contradictions when making revisions to the LCR, and change the rule to encourage homeowners with lead service lines to replace the service lines in their entirety. DEP recognizes, however, that encouraging people to replace their lead service lines will potentially increase the difficulty of locating and maintaining sites for a compliance pool, which currently is meant to monitor corrosion control performance. In New York City finding sites to sample under the LCR has been an ongoing challenge. As it is, in order to build up a larger pool of lead service line sites, DEP has had to resort to offering a financial incentive for homeowners to participate in compliance sampling. When revising sampling requirements under the LCR, DEP believes that EPA should carefully reconsider the objectives of the rule in order to best protect public health while ensuring adequate corrosion control.

**Address Service Lines that are Privately Owned:**

In New York City, service lines are the responsibility of the property owner. In a city of over 8 million people, the majority of properties are privately owned. If buildings are served by privately owned services lines, the owners of those lines should be responsible for any remedial action if there is a LSL, not the water utility.

Furthermore, some of the potential exposure to lead in drinking water is a result of lead solder or lead fixtures, over which the water utility has no control. To make the utility responsible for the lead content of the water, after corrosion control has been implemented and adjusted to maximize benefit, when the utility has no ability to mitigate the sources of lead is not a reasonable strategy. DEP believes that other innovative strategies should be considered. To protect against exposure to lead from internal plumbing, the entire building may need to be re-plumbed (a costly enterprise), or alternatively, a resident can install at-the-tap filters. DEP believes that because these changes need to occur inside the residence, the choice and the responsibility for how to mitigate the exposure to lead through tap water should be the owner's, not the utility's, which did not design or install the internal plumbing. Furthermore, utilities such as DEP have no legal authority to mandate remediation efforts. Often, and certainly in NYC, the local health department is the authority that can require some type of sanitary inspection and remediation if there are residents in a building who have children with elevated blood lead levels. One possible strategy, therefore, is to recommend improved communication with the local health department whenever elevated levels of lead are found in drinking water, and to assist local health departments in determining the service line composition.

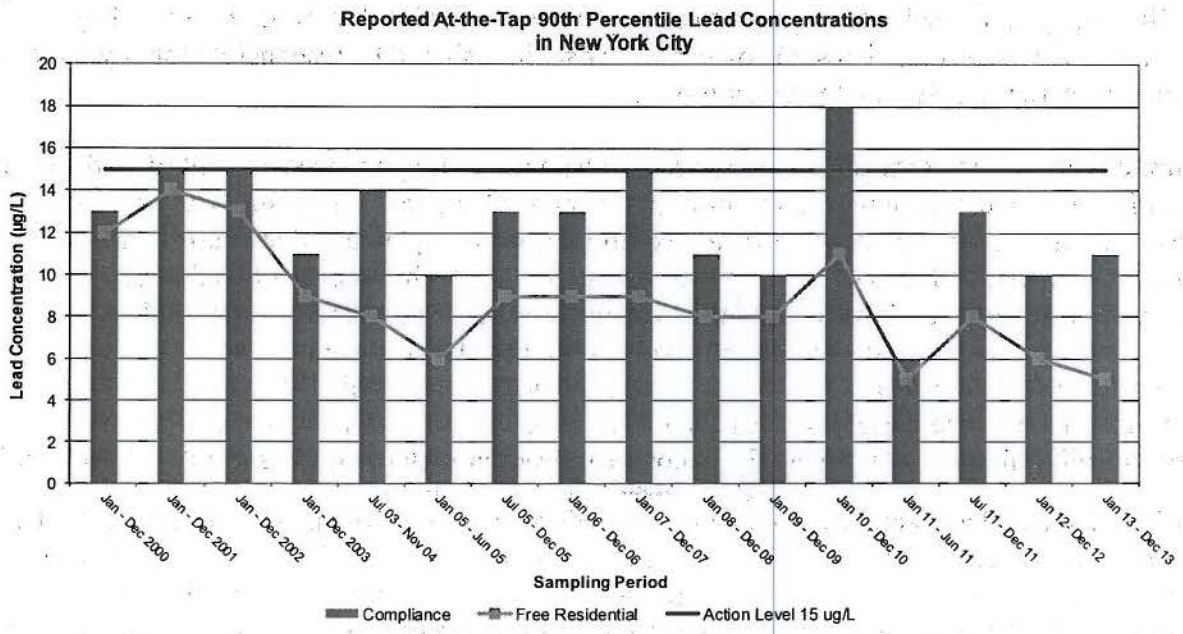
**Copper Sampling:**

DEP does not think that the current guidelines for copper sampling should be changed. In a city such as New York, with a very old housing stock, it would be a very difficult task to identify homes where new copper plumbing has been installed. Although records are kept for service line replacement, they are not kept for plumbing work that occurs inside of a building. In addition, through our free residential sampling program DEP has copper results for an extended period of time, from points all over the City; and it is rare for any site to have copper levels that exceed the current Action Level (AL) of 1.3 mg/L. For the years of 1997-2013, to date, with over 10,000 sites sampled, New York City has found only 139 first draw samples, and only 46 one-to-two minute flush samples whose copper levels exceeded the AL. Therefore, DEP believes a better approach would be to provide public education materials to homeowners, realtors, and plumbers to help them better understand any risks associated with exposure to copper plumbing, and as part of full disclosure and a responsible due diligence practice.

**Criteria for Site Selection:**

Since 1992, DEP has offered free residential testing to New Yorkers and to date DEP has sent out over 58,000 sample kits. When a comparison is made between the 90$^{th}$ percentile for compliance sites (those with lead service lines or copper pipe joined by lead solder) and the data collected through the free residential program, fluctuations in free residential and compliance data follow similar trends (see graph below).

**Figure 1**




DEP believes that these data show that with a sufficient number of samples, this type of sampling provides a good measure of corrosion control. DEP believes that random sampling throughout the City, and throughout the year, provides a larger dataset that accurately reflects the overall success of the corrosion control program. DEP thinks that a program such as our free residential testing is a better metric to use in terms of community wide risk assessment, as well as a better method for finding residences where the second and third flushes may have higher lead concentrations than the first draw samples collected from a relatively constant and limited compliance pool. The data from this type of program can then be used to identify locations for health departments to inspect, and for perhaps more targeted sampling and investigation. EPA should consider not changing the AL for compliance under the LCR, but rather allow utilities to utilize data such as these for targeted response actions.

**When to Collect Samples:**

Under the LCR DEP conducts compliance sampling at residences that are at high risk for lead and copper contamination. Detailed inspection records are kept for compliance sites so it can be determined if the residence has either a lead service lines (LSL) or copper pipes with lead solder (CLS) (installed between 1983-1986). In most cases these sites are only sampled with a first draw samples. However, DEP has data from a limited group of sites where in addition to the first draw sample, a one to two minute flush sample was collected, and some where an additional five minute flush was collected. These data demonstrate that the first flush sample often does not capture the highest concentration of lead.

Additionally, in 2011, DEP conducted a profiling study of two homes with lead service lines. Results show that the immediate flush sample may not quantify the worst case at-the-tap lead level following a stagnant period, nor does it give a predictable level of the peak value. DEP believes that lead concentrations in first flush samples are often not indicative of the worst

concentrations in a residence's tap water. For consistency and as a measurement of corrosion control DEP believes that the first flush sample is adequate. This conclusion is also supported by data from DEP's free residential program, which indicate that the trends in lead concentration in first flush samples correlate with the results from compliance sampling. Based on these and other profiling studies, DEP suggests that EPA consider bifurcating the LCR sampling into two objectives – one for corrosion control and one for health risk assessment. To meet the corrosion control objective, DEP believes that the current methodology for collecting samples from a compliance pool is appropriate, along with the requirement that the utility complete public notification and optimization of corrosion control practices whenever the 90$^{th}$ percentile lead level exceeds the action level of 15 µg/L. To meet risk assessment objectives, utilities should work closely with local health departments to determine if a targeted program to profile the levels of lead in the home is warranted. This could provide a better indicator of health risk on a case by case basis. Local health departments, who, unlike a water utility, typically have the power to intervene in homes where there is exposure to lead or other sources of environmental risk. That is the current practice in New York City, where DEP communicates all lead results, and locations, particularly lead values over 15 µg/L to New York City's highly effective Lead Poisoning Prevention Unit.

**Where to Collect Samples:**

DEP recognizes that EPA is considering a change in sampling protocol, and we believe that if the protocol becomes more complex this will make it more difficult to find residents to participate in the LCR sampling program. DEP believes it would be an inconvenience to homeowners to have them collect samples directly from lead service lines rather than from at-the-tap locations. Many residents, particularly those in multi-family residences, or those who are elderly, may not have access and/or would have difficulty collecting samples from the service line. It is already hard to identify sites that meet the requirements laid out in the LCR, and whose residents are willing to participate in the sampling program. If residents are asked to collect water samples directly from the service line, DEP believes the number of sites available for sampling would be further limited. DEP has already resorted to offering customers a $25 rebate on their water bill to encourage them to participate in the LCR sampling program. Any complexities that are added to the sampling requirements will create an additional burden on utilities that already have difficulty maintaining a pool of sampling sites.

**Local Health Department:**

DEP believes that it is important for water utilities to work closely with local and state health departments and notify them of any exceedances of the action level, as another way of ensuring that the proper authorities investigate residences where there may be children at risk. EPA should consider adding a provision to the LCR that would encourage the development of innovative lead risk reduction programs, for example, a provision that would allow the Primacy Agency the flexibility to foster greater coordination between the utility and local health agencies, in promoting multi-media lead exposure reduction programs, in lieu of generally static, expensive, and narrowly focused utility driven public education programs that address only lead in drinking water. This would be particularly effective in places like New York City, where the health

department operates a robust and highly effective lead poisoning prevention program that has comprehensive, clear, and measurable goals and priorities for reducing total lead exposures.

EPA should recommend that utilities work with their local health departments to distribute the public education materials to vulnerable populations. Working with the health departments should constitute "a good faith effort", rather than the current wording which reads *Make a good faith effort to contact all customers who are most at risk...* The revisions should be worded to state that the utility shall give the public education materials to the local health department, or shall, under the direction of the local health department, provide the materials to other organizations, so long as the local health department provides current contact information for said organizations.

**Partial Lead Service Line Replacement:**

DEP believes that utilities would have a difficult time identifying all the homes where service line modifications occur. In New York City there are almost 7,000 miles of water mains, and the long term water main replacement activities are handled by another city agency. Because the repairs are done by another City agency, DEP would have to work with that agency to notify customers of repairs in New York City. With an estimated 55,000 lead service lines in the city (about 5% of the total number of connections), notifying customers of water main repairs would be a monumental task. Additionally, it would be difficult for DEP as a water utility to sample each and every customer with a lead service. More importantly, about 40 percent of the housing stock in New York City consists of multifamily houses and apartment buildings; therefore there are many non-bill paying customers who might be affected by water main replacement work. Identifying and notifying customers who do not receive a water bill would be especially difficult. DEP believes it would be more practical to create a targeted education program or inform the private contractors about the issue.

**Letter to the**
**National Drinking Water Advisory Council**
**LCR Long-Term Revisions Meeting**
**EPA East Building – Room 1117 A**
**December 11 and 12, 2013**

Dear Chair Morales,

We are presenting this paper to the National Drinking Water Advisory Committee (NDWAC) for your consideration, as you deliberate potential long-term revisions to the EPA federal Lead and Copper Rule (LCR) of 1991. All our statements of fact are based on cited primary materials and peer-reviewed scientific studies that were published since the LCR's promulgation. Attention to these primary materials and studies is important, for they sometimes diverge from, or even contradict, widespread assumptions about the LCR and authoritative statements of public officials with presumed regulatory expertise.

In light of the fact that NDWAC is charged with providing EPA with recommendations likely to have broad and serious public health implications, we would like to ensure that your advice is premised on documented and verifiable facts, accurate understandings, and sound science. In the name of public health, which is EPA's goal for the long-term revisions,[1] we believe that the first step toward constructive deliberation must be acknowledgment of the following critical fact to which the science points clearly and indisputably:

***Lead service lines (LSLs), whether intact or partially replaced, can pose a serious public health risk, especially to the populations most vulnerable to lead (i.e., developing fetuses, infants, and young children), even when public water systems meet the LCR Lead Action Level (LAL) of 15 ppb.***

Once this fact is accepted, NDWAC, EPA officials, public water systems, the public health community, and the public at large can have a productive dialogue about best ways to revise the LCR in order to mitigate or eliminate LSLs as a health risk. The advantage we have today as compared to two decades ago is that sound science is readily available and real solutions are within reach. Our central challenge is to steer clear of legally, historically, and scientifically unsubstantiated understandings of the issue that serve narrow interests and hardened positions other than the public's health.

The information we are providing herein highlights that:

- Twenty-two years after the LCR's promulgation, lead-contaminated drinking water is a) far more prevalent than often assumed, and b) a significantly greater contributor to children's total blood lead levels than usually acknowledged (and possibly the primary source of lead for many fetuses, infants, and young children across the US).

[1] US EPA. 2012. Lead and Copper Rule Long-term Revisions SBREFA Background Document (8/29), http://www.ruralwater.org/lcr4.pdf.

- Acute exposure to lead particles with concentrations like those detected in Washington, DC (multiple samples >700 ppb, with the highest measurement at 20,000 ppb in 2007;[2] 200 ppb in 2011[3]) and "City B" (580 ppb in 2011[4]) during periods of compliance with the LAL, can expose pregnant women to a daily lead dose exceeding that in 1900's abortion pills.

- Sampling under the LCR does not reflect "worst case" conditions as stipulated by the Rule. In public water systems where samples of water sitting in LSLs have been collected (a practice that goes above and beyond current LCR monitoring requirements), lead levels tend to be significantly higher than those reported by public water systems to the EPA's federal compliance database, the Safe Drinking Water Information System (SDWIS). As a result, LCR-mandated monitoring can mislead water utilities, their customers, and state and federal officials into believing that lead corrosion is successfully minimized, when in fact taps in consumer homes dispense significant concentrations of lead and place communities, especially vulnerable people, at high risk of exposure.

- Although developing fetuses, infants, and young children may be exposed to lead in drinking water on a daily basis, the monitoring practices in place for the detection of a) lead in water and b) lead in blood are not well-designed to capture links between the two. In fact, it can be argued that these practices are designed to miss such links.

- The LCR currently does not address a major potential cause of elevated lead levels in drinking water. Evidence increasingly suggests that physical disturbances to LSLs, which occur on a daily basis in public water systems throughout the US, can cause significant increases in drinking water lead levels for undetermined periods of time.

- NDWAC's LCR recommendations of 2011 include advice that, if adopted, would prolong the public's exposure to lead in drinking water.

In the attached paper, we expand on the above statements and provide the literature that substantiates them. We ask that NDWAC give proper consideration to this information. We also ask that information provided to NDWAC by others be subject to the same evidentiary criteria, so that the recommendations made by NDWAC are informed by actual historical evidence, accurate interpretations of regulatory language, and sound science, rather than wishful thinking, unsubstantiated statements or conjecture.

Should you have any questions, please don't hesitate to contact us.

---

[2] Lambrinidou, Y. Documents obtained from DC Public Schools (available upon request).
[3] DC Water, LCR compliance monitoring results, 2011 (semester 2), http://www.dcwater.com/lead/lcr_pdf/LCR%202011_Semester%202.pdf
[4] Del Toral, M. A., et al. 2013. Detection and Evaluation of Elevated Lead Release from Service Lines: A Field Study. *Environmental Science & Technology* 47(16):9300-9307.

Respectfully,

Yanna Lambrinidou, PhD
Parents for Nontoxic Alternatives
Washington, DC
202.997.1834

Paul Schwartz, BA
Water Alliance
Washington, DC
202.279.0438

## BACKGROUND

### 1. The LCR is a *public health* law.

The LCR was promulgated to protect the public from lead and copper in drinking water. ***The LCR is, by definition, a public health law***. It was enacted as a regulatory program under the Safe Drinking Water Act (SDWA) of 1974, which required regulation of drinking water contaminants *deemed harmful to human health*. As the US Environmental Protection Agency (EPA) explains in the final Rule:

> The Safe Drinking Water Act (42 U.S.C. 300f et seq.) (SDWA or the Act) requires EPA to establish maximum contaminant level goals (MCLGs) and national primary drinking water regulations (NPDWRs) *for contaminants that, in the judgment of the Administrator, may have any adverse effect on the health of persons and that are known or anticipated to occur in public water systems*.[1] (emphasis added)

### 2. Lead in drinking water poses a well-documented and serious public health risk, especially to fetuses, infants, and young children.

- Recent investigations in the US have shown that lead in water used for drinking or cooking can be the primary source of lead for children with elevated blood lead levels.[2]

- Research on the Washington, DC 2001-2004 lead-in-water crisis found that hundreds (and probably thousands) of children 2.5 years of age and younger developed elevated blood lead levels from concentrations of lead in water that may very well be present (but untested and/or undetected) in tap water across the country, and the most severe consequences occurred when the city's lead-in-water levels still met LCR requirements.[3]

- Recent research in Washington, DC found that children in homes with a partially replaced lead service line were twice as likely to have elevated blood lead levels as compared to children in homes with an intact lead service line, and four times as likely to have elevated blood lead levels as compared to children in homes with no lead service line.[4] This association stood even when the city's drinking water met LCR requirements. Today, thousands of US homes receive their water through a partially replaced LSL. Although tens of thousands of these replacements were mandated by the LCR, a far greater number was carried out during water main and other repair and maintenance work.[5]

- Prenatal exposure to lead and lead in drinking water has been linked to spontaneous abortion, stillbirth, and infant mortality at concentrations commonly detected at US taps (i.e., in lead particles, which are pieces of

lead solder or rust that tend to leach into water on a periodic but unpredictable basis).[6,7,8] Acute exposure to lead particles with concentrations like those detected in Washington, DC (multiple samples >700 ppb, with the highest measurement at 20,000 ppb in 2007;[*] 200 ppb in 2011[†]) and "City B" (580 ppb in 2011[‡]) during periods of compliance with the LAL, can expose pregnant women to a daily lead dose exceeding that in 1900's abortion pills. In infants and young children lead exposure can result in physical and mental delays.

3. **The LCR's Maximum Contaminant Level Goal (MCLG) for lead *is* health-based and is set at zero.**

   The SDWA required EPA to set an MCLG for every drinking water contaminant it regulated. An MCLG is "the maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety."[9] MCLGs are based *solely* on public health considerations. The LCR's "health-based"[10] MCLG for lead was set at zero "based on the best available science which shows there is no safe level of exposure to lead."[11]

4. **The LCR's Lead Action Level (LAL) is *not* health-based, is set at 15 ppb, and should *never* be presented (or implicated) as a "threshold" below which lead-in-water levels are "safe" to drink.**

   The LCR's LAL was set at 15 ppb as a result of technological and financial considerations. According to EPA: "The action level for lead has been set at 15 parts per billion (ppb) because EPA believes, given present technology and resources, this is the lowest level to which water systems can reasonably be required to control this contaminant should it occur in drinking water at their customers [*sic*] home taps."[12] Yet public water systems issue claims of safety merely on the basis of a LAL non-exceedance,[§] EPA has publicly stated that

---

[*] Lambrinidou, Y. Documents obtained from DC Public Schools (available upon request).
[†] DC Water, LCR compliance monitoring results, 2011 (semester 2), http://www.dcwater.com/lead/lcr_pdf/LCR%202011_Semester%202.pdf
[‡] Del Toral, M. A., et al. 2013. Detection and Evaluation of Elevated Lead Release from Service Lines: A Field Study. *Environmental Science & Technology* 47(16):9300-9307.

[§] **Chicago 2013:** In the 6/1/12-9/30/12 lead-in-water monitoring period, the 90th percentile measurement for lead was 6.6 ppb and 1 of 50 samples tested >15 ppb. *Letter from Chicago Department of Water Management (CDWM) Commissioner to City Council members*: **"*Chicago drinking water is safe and meets or exceeds all standards*** set by the USEPA and IEPA" (emphasis added). Sources: http://www.cityofchicago.org/content/dam/city/depts/water/ConsumerConfidenceReports/2012_WaterQualityReport.pdf; http://aldermanmoreno.tumblr.com/post/63001379365/just-received-this-letter-from-water-dept-commissioner.

**Chicago 2012:** In the 6/1/09-9/30/09 lead-in-water monitoring period, the 90th percentile measurement for lead was 6.07 ppb and 1 of 50 samples tested >15 ppb. *Chicago Tribune*: "A representative from the Chicago Department of Water Management, which tests tap water under current procedures, said it was aware of and analyzing the results of the research, and is serving as an active partner with the EPA in its review. *'**Chicago water is safe and meets or exceeds all standards**'* set by the agency, the statement said" (emphasis added). Sources: http://www.cityofchicago.org/content/dam/city/depts/water/ConsumerConfidenceReports/2010WaterQualityReport.pdf

systems complying with the LCR are providing water that is "safe to drink,"[**] and the Centers for Disease Control and Prevention (CDC) in its guidelines for environmental risk assessments at the homes of children with elevated blood lead levels advises against investigating water as a potential source of lead, if the child resides in a jurisdiction that meets the LAL (see discussion below, page 8).[13] Perversely, even as hundreds of Washington, DC children were being lead poisoned from elevated lead in water, EPA Region 3 claimed that much higher levels of lead in water were necessary to be a health concern, and EPA stood silent and assisted public health officials in asserting the 15 ppb standard had a high safety factor.

5. **All evidence suggests that 22 years after the LCR's promulgation, lead-contaminated drinking water is a) far more prevalent than often assumed, and b) a significantly greater contributor to children's total blood lead levels than usually acknowledged (and possibly the primary source of lead for many fetuses, infants, and young children across the US).**

   There is no doubt that lead-in-water levels in the US have dropped markedly since the early 1990s as a result of the LCR requirement for corrosion control treatment. However, to date there is *no evidence* to support the widespread claim that in general drinking water poses a far lesser health risk than paint, dust, and soil as a source of lead for US children. Here is why:

   - **Lead-bearing plumbing materials, the main source of lead in water, exist in the vast majority of US homes.**

     Lead leaches into water from lead service lines (intact or partially replaced), lead solder, leaded brass fixtures, and galvanized iron pipes that have come into contact with lead-contaminated water (e.g., in homes with

---

; http://articles.chicagotribune.com/2012-01-31/health/ct-met-epa-lead-tests-20120131_1_lead-levels-high-levels-round-of-water-testing.

It is worth noting that some water utilities have made claims of "safety" even while *in exceedance* of the LAL [e.g., Washington, DC 2003 (see Holder, E. H., Jr. 2004. "Summary of Investigation Reported to the Board of Directors of the District of Columbia Water and Sewer Authority," Covington & Burling, 7/16); Providence, RI 2010 (http://www.provwater.com/news/faq/lsr_faq.htm)].

[**] **Burneson, E. (EPA Headquarters)**, "Lead and Copper Rule" meeting, Oct. 14-15, 2008, Washington, DC (Stated that: EPA's position is that water systems in compliance with the LCR are providing water that is safe to drink); **Jon M. Capacasa (EPA Region 3)**, April 15, 2008, Congressional hearing (Stated under oath that: "EPA can report that the drinking water serving the District of Columbia meets all federal health based standards and the system is in compliance with all National Primary Drinking Water Regulations," http://www.epa.gov/ocir/hearings/testimony/110_2007_2008/2008_0415_jmc.pdf; **Voltaggio, T. C. (EPA Region 3)**, Washington DC City Council Hearing, April 1, 2004, Washington DC (Stated that: The 15 ppb LAL is not necessarily based upon a risk assessment indicating that consumers drinking above this level would have a "particular health level"; 15 ppb is a "low" level of lead in drinking water; If EPA were to find that people were drinking water with 15 ppb lead, it would not take action, and that's appropriate because 15 ppb lead is not necessarily a number you shouldn't exceed to prevent health harm; A 90$^{th}$ percentile lead-in-water level that exceeds 15 ppb is merely a "bell" ringing that tells you to reduce corrosion, and not necessarily an indication that someone is being hurt from lead in water); **Rogers, R. (EPA Region 3)**, Washington DC City Council Hearing, April 1, 2004, Washington DC (Stated that: 15 ppb is a level that is both attainable and health-protective).

an intact, fully replaced, or partially replaced lead service line). Most homes across the country have at least one of these plumbing materials, while many have a combination of two or more.

- **Today, the main method for detecting lead-in-water contamination in jurisdictions across the country is the LCR-mandated monitoring program that water utilities are required to implement as often as twice a year to once every nine years in order to capture worse-case lead levels at the tap.[14] Studies by EPA and others have shown that this program is not reliable for identifying the true extent of lead-in-water contamination, even when implemented appropriately.[††] As a result, LCR-mandated monitoring can mislead both water utilities and their customers into believing that lead corrosion is successfully minimized, when in fact taps in customer homes dispense significant concentrations of lead and place consumers at high risk of exposure.**

  Many questions have been raised about the integrity of the LCR-mandated lead-in-water monitoring program in terms of reliability, validity, and accuracy of results. In Washington, DC, for example, concerned safe drinking water and environmental health organizations have raised repeated concerns about a) the time of the year LCR-monitoring samples are taken, in light of the fact that temperature can affect lead-in-water levels, b) the chemistry of the water when LCR-monitoring samples are taken, in light of the fact that temporary annual water treatment switches (e.g., from chloramine to free chlorine) can result in dramatic but temporary drops in lead, c) the sample pool of targeted homes, in light of the fact that many of these homes may not satisfy the LCR requirement of posing "the greatest risk of lead leaching,"[15] and d) water sample invalidation practices, in light of the fact that sometimes samples are discarded prior to analysis when deemed to have stagnated too long prior to collection (despite the fact that EPA has made it clear that there is no cap on stagnation prior to sampling collection) or for other unspecified reasons.[16,17]

---

[††] The LCR-mandated monitoring program is sometimes implemented in ways known to temporarily reduce worst-case lead-in-water levels [see, the Chicago Department of Water Management LCR sampling protocol that was in use until 2009, which included a) flushing of taps prior to stagnation, b) aerator removal, and c) manual removal of particles prior to sampling. To date, Chicago has never exceeded the LCR LAL. However, a 1993 sampling round in the city of Chicago by Consumer Reports indicated a LAL exceedance, even though the taps sampled were random, and did not necessarily come from the city's highest-risk homes (Consumer Reports. 1993. Is there Lead in Your Water? 58:73-78.)]. Similarly, in Washington, DC in late 2005, non-LCR-monitoring samples collected by concerned residents in homes with a LSL indicated a LAL exceedance, even though at the time the city was officially under the LAL (Edwards, M. 2013. Personal communication). Other times, water utilities do not report lead-in-water levels accurately, even when they discover significant contamination (see, Leonnig, C. et al. 2004. Lead Levels in Water Misrepresented Across US. *Washington Post* (10/5); Holder, E. H., Jr. 2004. "Summary of Investigation Reported to the Board of Directors of the District of Columbia Water and Sewer Authority," Covington & Burling, 7/16).

Several recent studies, moreover, have shown that the LCR sampling protocol, by design, does not have the capacity to capture an accurate picture of lead corrosion in US distribution systems because:

a. It requires collection of only 1st liter samples, despite the fact that peak lead-in-water levels can appear in subsequent draws (especially when lead in particulate – versus soluble – form is involved, as particles tend to leach into water erratically and unpredictably).[18],[19] This limitation can become stark when one compares lead-in-water concentrations measured for LCR compliance (1st draw only) to lead-in-water concentrations measured for non-compliance purposes (subsequent draws) in the same jurisdiction. For example, a new EPA study reported that in "City B" lead levels were tested in water that had been sitting in lead service lines (or sometimes possibly in internal plumbing) and revealed a LAL exceedance, even though "City B" was officially under the LAL at the time based on 1st liter compliance samples. Levels above 15 ppb ranged from 16 ppb to 580 ppb, with many exceeding 50 ppb.[20] The same situation is true of the lead service line sampling done in Chicago, compared to using the 1st liter samples. In addition, if 2nd draw samples counted for LCR compliance, in 2007 the Washington, DC water utility would have exceeded the LAL.‡‡ An internationally renowned lead corrosion expert at the EPA Office of Research and Development (ORD) who conducted a review of studies in which multiple samples were taken at each targeted tap estimates that if the highest lead-in-water measurements were counted toward LCR compliance, 90th percentile lead-in-water levels would be 4-7 times higher than they are today, especially in public water systems that do not use an effective lead corrosion inhibitor such as orthophosphate.[21]

b. It allows for steps of sample preparation prior to analysis that can fail to dissolve lead particles enough to render them measurable. This can result in gross under-detection of actual lead levels at the tap and miss lead-in-water concentrations high enough to exceed the Consumer Product Safety Commission's (CPSC) "acute health threat" for lead.[7,22,23]

- **Although the populations most vulnerable to harm from lead – fetuses, infants, and young children – ingest drinking water on a daily basis,**

‡‡ In 2007, Washington, DC's official 90th percentile lead value for LCR compliance was 10 ppb during the January-June monitoring cycle and 11 ppb during the July-December monitoring cycle. In contrast, Washington, DC's 90th percentile lead value of 2nd draw samples was >15 ppb (DC WASA, Drinking Water Quality Report 2007, http://www.dcwater.com/news/publications/2007%20Water%20Quality%20Report.pdf).

**the monitoring practices in place for the detection of a) lead in water and b) lead in blood are not well-designed to capture links between the two. In fact, it can be argued that these practices are designed to miss such links.**

In the final Rule, EPA estimated that:

> The total drinking water contribution to overall lead levels may range from as little as 5 percent to more than 50 percent of children's total lead exposure. Infants dependent on formula may receive more than 85% of their lead from drinking water. As exposures decline to sources of lead other than drinking water, such as gasoline and soldered food cans, drinking water will account for a larger proportion of total intake.[24]

More recently, CDC estimated that "≥30% of current EBLs [elevated blood lead levels] do not have an immediate lead paint source" and studies suggest that "lead exposures result from multiple sources."[25] Moreover, studies in Washington, DC and Chicago, IL – two cities with a high concentration of lead service lines and partially replaced lead service lines – raise serious questions about children's current exposures to lead in water across the US. Specifically:

a. An award-winning 2009 paper about the public health impact of Washington, DC's historic lead-in-water contamination of 2001-2004 found that a) hundreds and probably thousands of children 2.5 years of age and younger developed elevated blood lead levels from concentrations of lead in water that may very well be dispensed (but untested and/or undetected) at taps across the country, and b) the most severe adverse effects occurred in the second half of 2001, when the city's lead-in-water levels rose suddenly and dramatically but the water utility had not yet officially exceeded the LCR's Lead Action Level (LAL) of 15 ppb and consumers were not aware of the contamination.[3] This suggests that, even when the LCR is implemented properly and honestly (in Washington, DC it was not), there can be a critical lag between the time of consumer exposure to high levels of lead at the tap and water utility dissemination of LCR-mandated health alerts (if a LAL exceedance is even captured and reported).

b. A 2011 paper by the CDC found that in Washington, DC, children in homes with a partially replaced lead service line were twice as likely to have elevated blood lead levels as compared to children in homes with an intact lead service line, and four times as likely to have elevated blood lead levels as

compared to children in homes with no lead service line.[26] This association stood even when the city's drinking water tested under the LCR LAL and corrected for confounders, such as lead paint risk. The potential public health implications of this finding can be grave given the fact that in the US there are tens (and possibly even hundreds) of thousands of residences with partially replaced lead service lines. The majority of these replacements have been forced on consumers by their water utilities, as part of routine or emergency water main and other work rather than the LCR.[27]

c. A 2013 EPA study in Chicago found that the most severe lead leaching often occurred in lead service lines that had been physically disturbed due to street excavation, service line repairs, water meter and shut-off valve work, days, months, or even years before the sampling.[18] Prior disturbance of a lead service line is not among the LCR criteria that deem a home at increased risk of lead in water and would render such a home especially appropriate for inclusion in a water utility's LCR compliance sampling pool. The study also indicates that lower than average water use may also potentially be a factor in high lead levels. It is, therefore, possible that the compliance monitoring currently occurring across the country in jurisdictions with lead service lines misses (partly or wholly) a universe of homes with severe lead-in-water problems.

Evidence that US children today may be routinely exposed to elevated levels of lead in drinking water that LCR-compliance monitoring can miss becomes more troubling when one considers the following:

a. **Federal blood lead screening recommendations neglect two highly vulnerable to lead populations**: Based on the assumption that lead paint, dust, and soil constitute the primary sources of lead in a child's environment, the CDC considers children between the ages of 1 and 6 at highest risk of lead exposure. This is because children at this stage of development are usually old enough to crawl or walk independently; touch floors, objects, and other surfaces such as paint chips that may be contaminated with lead; and place their hands into their mouths. The CDC recommends blood lead testing for children at 12 *and* 24 months of age. For children who have not been screened by the age of 2, CDC recommends a blood lead test between 36-72 months.[28] Two extremely high-risk populations that are highly vulnerable to lead and that can be exposed to the contaminant routinely via drinking water are, for all intents and purposes, left out of CDC's recommendations: fetuses and

infants dependent on formula. CDC does not recommend routine blood lead screening for pregnant women, unless such women are deemed at high risk for lead exposure, a subjective assessment which rarely emphasizes drinking water as a potential source (see, for example, 2010 CDC podcast).[29] Infants dependent on formula also fall through the blood lead screening "cracks," despite the 1991 EPA estimate that they "may receive more than 85% of their lead from drinking water" (*Federal Register*, Vol. 56, No. 110, June 7, 1991, p. 26470).[See also 3.] To date, there has been no systematic screening of this population group for lead in blood.

b. **Environmental risk assessment guidelines for detection of lead at the homes of children with elevated blood lead levels are not designed to find lead in drinking water, even if this constitutes a child's primary source of exposure**: CDC's case management guidelines for environmental risk assessment at the homes of children with elevated blood lead levels recommend a focus on "immediate lead hazards" and point to deteriorating paint, dust, and soil.[13] The same guidelines insinuate that federal regulations to minimize lead in drinking water and keep the public informed about lead levels at the tap (i.e., the Lead Ban of 1986, the LCR, and the SDWA amendments of 1996) offer adequate public health protection to consumers served by public water utilities:

> Exposure to lead in tap water has been reduced by measures taken during the last two decades under the requirements of the 1986 and 1996 amendments to the Safe Drinking Water Act and a subsequent EPA regulation (the Lead and Copper Rule). The latter regulation, which only applies to public water systems, requires those systems to monitor tap water for lead and to implement public education and other measures to reduce lead levels in drinking water if they exceed 15 ug/L in more than 10% of household samples. *Lead levels are reduced by treating the supplied water to make it less corrosive and, in some cases, by replacing lead water-service lines.* These regulations do not apply to the more than 40 million households supplied by private well water that can have elevated levels of lead if the water is corrosive and lead is present in the well pump or household plumbing system. In most jurisdictions, there is no monitoring for lead in the drinking water supplied by private wells (emphasis added).[13]

CDC suggests that environmental risk assessments at the homes of children with elevated blood lead levels forgo lead-in-water sampling unless:

- The 90th percentile LCR-compliance level in the child's jurisdiction exceeds the LAL, or
- No non-water source of lead can be found, or
- The child's drinking water comes from a well.

Given this guidance, and the limitations and flaws of LCR-compliance monitoring, it becomes clear that lead in water can be missed both as a primary and secondary contributor to a child's elevated blood lead levels. This weakness may be exacerbated by recent trends in lead poisoning prevention laws that presume any non-intact paint in or on pre-1978 residences to be lead-based.

In summary, although it does seem to have reduced lead-in-water levels in the US, the LCR in its current form cannot be considered adequately protective of public health. Evidence suggests that a) 90th percentile lead-in-water levels are often higher than reported and possibly in exceedance of the LAL, b) lead service line replacement – the LCR's main remedy for LAL exceedances – may place consumers at greater risk of health harm from lead, and c) generations of fetuses, infants, and young children may still be ingesting high concentrations of lead through their drinking water, but with little chance of ever finding out.

6. **The National Drinking Water Advisory Council (NDWAC) LCR recommendations of 2011 include advice that, if adopted, would prolong the public's exposure to lead in drinking water.**

NDWAC's 2011 recommendations to EPA (http://water.epa.gov/drink/ndwac/upload/ndwaclettertoepadec2011.pdf) include two actions that would be protective of public health vis-à-vis exposure to lead at the tap. These are: a) "EPA should issue immediate guidance on the possible negative health impacts related to compliance with the current lead service line replacement provision of the LCR"; b) "EPA should revise the LCR to include provisions to notify the homeowner if a lead service line is repaired or replaced for any reason, not just reasons triggered under the current LCR."

Three of NDWAC's recommendations, however, lack any public health justification. These are:

a. **"EPA should not require either partial or full lead service line replacement under the revised LCR"**

LSLs have long been established as a primary source of lead in drinking water.[30] For this reason, the LCR water-monitoring requirement mandates that water systems make it their priority to target homes with a LSL in order to increase the likelihood of finding worst-case lead-in-water levels. The LCR of 1991 states explicitly that:

> While corrosion control can be an effective treatment for preventing or slowing the dissolution of lead from lead service, [*sic*] in many cases it will not be sufficient to reduce lead levels below the action levels [*sic*]. […] [Systems] with lead service lines have substantially higher lead levels than those without. […] [Lead] levels in homes with lead service lines compared to homes without lead service lines, in the same system, had higher lead levels. EPA believes that the information presented in Tables 7 and 10 suggests that lead service lines can contribute significant amounts of lead at consumers' taps.[31]

Today there is scientific consensus that, "The most effective way to reduce the total mass of lead measured at the tap is to replace the entire lead service line."[24,32]

**b. "EPA should suspend enforcement of the lead service line replacement requirement"**

LSLs pose a significant health risk to the public as long as they are in use. Water treatment changes, physical disturbances due to street work or other events, partial lead service line replacement, and changes in water use or outside temperature can all result in accelerated lead corrosion, *even when a water utility does not exceed the LAL. The LCR's LSL replacement requirement, when it results in full LSL replacement, is the rule's only requirement that eliminates permanently the primary source of lead in drinking water*.

The LCR of 1991 required water utilities in exceedance of the LAL to conduct full LSL replacement, unless they could show that they neither owned nor "controlled" some portion of the LSL.[§§] In response to a legal challenge by the American Water Works Association (AWWA) [*AWWA v. EPA*, 40 F.3d 1266 (D.C. Cir. 1994)], EPA's definition of "control" was remanded to EPA. *The court ruled not that the definition fell outside EPA's authority under the SDWA, but that EPA had not provided adequate opportunity for the public to comment on*

[§§] The Rule did not specify how the cost of the full LSL replacement would be covered.

*the definition.* Following a public comment period, EPA proceeded to equate "control" with "ownership" "in order to eliminate potential legal confusion and delays in implementing the Rule."[33] In practice, this decision changed the LCR's LSL replacement requirement from a full LSL replacement requirement to a partial LSL replacement requirement, despite the fact that EPA made it explicit that full LSL replacement was always preferable to partial LSL replacement for the protection of public health.[33]

Although disadvantages of partial LSL replacement are well documented, the absence of a LSL replacement requirement all together would turn the LCR into a law that stops short of eliminating the main source of lead in drinking water, even in jurisdictions with widespread and severe contamination. Under such a Rule, the responsibility to protect the public from lead at the tap would be left *almost entirely* to consumers, most likely through recommendations for routine water-use precautions. In light of the fact that such precautions can be costly, complex, and time-consuming, such a regulatory development would give rise to serious public health, legal, moral, and environmental justice concerns.

**c. "EPA should not require homeowner sampling after the lead service line replacement"**

According to the LCR minor revisions of 2000, within 72 hours after a partial LSL replacement water systems are required to collect one water sample that is representative of water sitting in the service line (prior to 2000, this requirement mandated sample collection within 14 days after partial LSL replacement) (http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/upload/2000_4_25_lcrmr_guidance_lcmr_lead_line_requirements.pdf). The LCR of 1991 specifies that, "[The] purpose of collecting the follow-up sample is to inform residents of precautions that may be needed temporarily such as flushing water at taps to avoid potential increases in lead levels."[34] In other words, *the purpose of the follow-up sample is purely health-protective*. If the LCR is going to continue to allow partial LSL replacement (a practice we strongly oppose), a one-time sample 72 hours after the replacement indeed has little meaning. Whether high or low, the result of this sample offers no information about lead-in-water levels in the short-term or long-term after the replacement. If EPA removes homeowner sampling after partial LSL replacement, then it must ensure that residents in

homes with such a replacement are fully protected from lead-in-water spikes in the short- and long-term. *Full protection, however, must not depend on measures that place undue burden – in terms of cost, time, and complexity – on residents, because such measures are not likely to be followed properly, if at all.*

## RECOMMENDATIONS

### GENERAL

- *All proposed revisions to the LCR should have a health-protective rationale and should be based on current scientific understandings about lead in drinking water.*

- The LCR's approach to lead in drinking water should constitute what is called "Science-Based Adaptive Management." This is an approach that allows timely updating of regulatory strategies to accommodate new insights, knowledge, and technologies that better address lead in drinking water.

### DEFINITIONS

- In light of the clear and permanent public-health protective effect of full LSL replacement, the LCR's definition of "control" should be changed back to the 1991 definition. Only a return to the original definition will ensure that a) LAL exceedances in jurisdictions with LSLs trigger a full LSL replacement requirement, and b) the LCR's mandatory LSL replacement requirement is in fact the *remedial* measure it was intended to be.

### INVENTORY REQUIREMENTS

- All public water systems should complete an inventory of intact LSLs and partially replaced LSLs in their jurisdictions, and submit this inventory to the State. The State should then report to EPA the number of intact LSLs and partially replaced LSLs for every public water system it oversees. *The State should also enter these numbers in a publicly accessible and easily searchable database.* For public water systems with LSLs, the number of reported intact LSLs and partially replaced LSLs should be updated annually to reflect any changes (due to new full and partial LSL replacements, regardless of whether these replacements occurred for LCR-compliance purposes or routine infrastructure work, *but the distinction should be indicated clearly*).

### LCR-COMPLIANCE LEAD-IN-WATER MONITORING SCHEDULE

- Public water systems with intact LSLs and/or partially replaced LSLs should not be allowed to reduce monitoring to every three years unless those systems have $90^{th}$ percentile lead <5 ppb.
- All reduced monitoring should require State approval.

### LCR-COMPLIANCE LEAD-IN-WATER SAMPLING

- To capture worst-case lead-in-water levels:

- All samples should be taken during the three warmest months of the year *by all public water systems*, regardless of their monitoring schedule.
- No samples should be taken during temporary water treatment switches that are known to minimize lead corrosion and lead-in-water levels (e.g., annual month-long switches from chloramine to free chlorine).
- Site selection in jurisdictions with LSLs should consist 100% of single-family homes with intact LSLs and partially replaced LSLs. The pool of target homes must be listed on a publicly accessible database, and the type of service line these homes are believed to have should be clearly indicated. Changes to this pool from one monitoring cycle to the next, should be indicated and explained in the same database.
- No pre-stagnation flushing should be allowed (this practice is well-known as a remedial measure that reduces lead-in-water levels temporarily; in a 9/12/08 letter to Washington, DC residents, EPA made it clear that pre-stagnation flushing "goes against the intent of the monitoring protocol," letter available upon request).
- No aerator removal should be allowed (such removal would go against existing EPA guidance, http://www.epa.gov/safewater/lcrmr/pdfs/memo_tapsamples-aerators_10202006.pdf).
- No ceiling on stagnation time should be allowed (EPA's LCR guidance states explicitly that there is no cap on stagnation prior to sampling collection, http://web.archive.org/web/20080326160910/http://www.epa.gov/OGWDW/lcrmr/memo_nov23-2004.html).
- Sequential samples should be taken at each sampling site and the highest result should be used for the LCR-compliance 90$^{th}$ percentile calculation.
- *All* LCR-compliance samples collected should be analyzed and used in the 90$^{th}$ percentile calculation, unless they meet the invalidation criteria in the rule.
- *Every public water system's LCR-monitoring sampling protocol should be available online and easily accessible for public view.*

- Public education:
  - Public water systems should provide homeowners in the LCR sampling pool with:
    - All lead-in-water measurements corresponding to their property.

- ♦ A clear explanation about the meaning of these measurements in relation to public health (with an emphasis on the LCR's health-based MCLG of zero).
- ♦ A complete list of possible remedial measures available to residents, with a clear discussion about the pros and cons of each.

- o Public water systems should make publicly available on their websites:

  - ♦ All LCR-monitoring lead-in-water measurements.
  - ♦ A clear explanation about the meaning for a jurisdiction as a whole of lead-in-water values >15 ppb in a) <10% of target homes and b) >10% of target homes.
  - ♦ A clear explanation about the meaning of these measurements in relation to public health (with an emphasis on the LCR's health-based MCLG of zero).
  - ♦ A clear explanation about all the sources of lead in drinking water.
  - ♦ A clear explanation of the fact that the LCR a) allows up to 10% of target taps to dispense any concentration of lead in drinking water, and b) requires public water system intervention when over 10% of taps test >15 ppb.
  - ♦ A clear explanation about the difference between soluble and particulate lead, and the health risks posed by the latter, even when lead-in-water measurements at a specific time and in a specific home are low.
  - ♦ A clear explanation about short- and long-term lead-in-water risks posed by LSLs (intact and partially replaced).
  - ♦ A clear explanation about lead-in-water risks posed by physically disturbed LSLs (intact or partially replaced).
  - ♦ A complete list of possible remedial measures available to residents, with a clear discussion about the pros and cons of each.

## NON LCR-COMPLIANCE LEAD-IN-WATER SAMPLING

- On an annual basis, public water systems should post online any and all lead-in-water sampling results from homes sampled for non-LCR compliance purposes (e.g., "voluntary" samples sent by residents to the public water system for testing).

## LSL REPLACEMENT REQUIREMENT

- The LSL replacement requirement should be triggered when the LAL is exceeded following corrosion control "optimization."

- When the LAL is exceeded, public water systems should be required to replace fully a certain percent of LSLs in their jurisdiction (e.g., 7%).
- "Testing-out" of LSLs should be prohibited.
- Homeowners should be given clear, complete, and scientifically accurate information about a) the health benefits of full LSL replacement, b) the health risks (short- and long-term) of intact LSLs and partially replaced LSLs; c) the health risks and erratic release of lead particles following partial LSL replacement; and d) financing options for full LSL replacement (*full LSL replacement should be financially accessible to all homeowners regardless of income and race*).[35]
- During LSL replacement, LSLs should be fully removed.
- All residents who have a full LSL replacement should be given clear and complete information about steps they can take to protect themselves from any lead-in-water spikes following replacement.
- In cases of scheduled infrastructure work, LSLs should be fully removed. In cases of emergency infrastructure work involving partial LSL replacement, when possible, residents should be given the option to have the private side of their LSL replaced (with the same menu of financing options as the one offered in cases of a LAL exceedance), and if they decline, they should be given a flow-through pitcher with a 6-month filter supply.

## PUBLIC EDUCATION

### ANNUAL CONSUMER CONFIDENCE REPORTS

- Public water systems should explain briefly and accessibly:
    - The LCR's treatment-technique requirement and 90$^{th}$ percentile trigger.
    - The number of homes last sampled.
    - For public water systems with LSLs, how many target homes had an intact LSL and how many had a partially replaced LSL.
    - The 90$^{th}$ percentile value.
    - How many samples exceeded the LAL.
    - The values of all samples >15 ppb.
    - A clear explanation about the meaning for a jurisdiction as a whole of lead-in-water values >15 ppb in a) <10% of target homes and b) >10% of target homes.
    - A clear explanation about the meaning of these measurements in relation to public health (with an emphasis on the LCR's health-based MCLG of zero).
    - A clear explanation about all the sources of lead in drinking water.
    - A clear explanation of the fact that the LCR a) allows up to 10% of target taps to dispense any concentration of lead in

drinking water, and b) requires public water system intervention when over 10% of taps test >15 ppb.

- A clear explanation about the difference between soluble and particulate lead, and the health risks posed by the latter, even when lead-in-water measurements at a specific time and in a specific home are low.
- A clear explanation about short- and long-term lead-in-water risks posed by LSLs (intact and partially replaced).
- A clear explanation about lead-in-water risks posed by physically disturbed LSLs (intact or partially replaced).
- A complete list of possible remedial measures available to residents, with a clear discussion about the pros and cons of each.

**ADDITIONAL REQUIREMENT**

- Public water systems should be required to:

  - Provide mandatory notification to residents in homes with an intact or partially replaced LSL that their service line is likely to be physically disturbed (or was recently disturbed) due to a clear routine (or emergency) infrastructure work. This notification should include explanation of what such a disturbance might mean in terms of lead-in-water spikes, and what remedial measures residents can take, including flushing out the loosened scale and sediment.

  - Provide mandatory notification to residents in homes with a known partially replaced LSL about short- and long-term spikes associated with such replacements and a complete list of possible remedial measures residents can take (including private-side replacement, accompanied by financing options), with a clear discussion about the pros and cons of each.

*All public education materials must be accessible at all times through the public water system's website*

## ACKNOWLEDGMENTS

Yanna Lambrinidou was supported by the Robert Wood Johnson Foundation (RWJF) under the Public Health Law Research (PHLR) program grant ID#68391 and DC Water.

## REFERENCES

[1] *Federal Register*, Vol. 56, No. 110, June 7, 1991, p. 26462.
[2] Triantafyllidou, S. and M. Edwards. 2012. Lead (Pb) in Tap Water and in Blood: Implications for Lead Exposure in the United States. *Critical Reviews in Environmental Science and Technology* 42:1297-1352.
[3] Edwards, M., et al. 2009. Elevated Blood Lead in Young Children Due to Lead-contaminated Drinking Water: Washington, DC, 2001−2004. *Environmental Science and Technology* 43(5):1618−1623.
[4] Brown, M.J. et al. 2011. Association Between Children's Blood Lead Levels, Lead Service Lines, and Water Disinfection, Washington, DC, 1998-2006. *Environmental Research* 111(1):67–74.
[5] Renner, R. 2010. Reaction to the Solution: Lead Exposure Following Partial Service Line Replacement. *Environmental Health Perspectives* 118(5):A202-A208.
[6] Troesken, W. 2006. *The Great Lead Water Pipe Disaster*. Cambridge, MA: MIT Press.
[7] Triantafyllidou, S., et al. 2007. Particulate Lead in Drinking Water. *Journal AWWA* 99(6):107-117.
[8] Edwards, M. A. 2013. Fetal Death and Reduced Birth Rates Associated with Exposure to Lead-Contaminated Drinking Water. *Environmental Science & Technology*, http://pubs.acs.org/doi/abs/10.1021/es4034952.
[9] US EPA. 2013. Regulating Public Water Systems and Contaminants Under the Safe Drinking Water Act, http://water.epa.gov/lawsregs/rulesregs/regulatingcontaminants/basicinformation.cfm (last updated: 9/11/13; last accessed: 11/16/13).
[10] *Federal Register*, Vol. 56, No. 110, June 7, 1991, p. 26469.
[11] US EPA. 2012. Basic Information About Lead in Drinking Water, http://water.epa.gov/drink/contaminants/basicinformation/lead.cfm (last updated: 3/6/12; last accessed: 11/16/13).
[12] US EPA. 2012. Consumer Factsheet on Lead in Drinking Water, http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/fs_consumer.cfm (last updated: 3/6/12; last accessed: 11/16/13).
[13] US CDC. 2009. Chapter 2: Assessment and Remediation of Residential Lead Exposure, http://www.cdc.gov/nceh/lead/CaseManagement/chap2.pdf (last accessed: 11/17/13).
[14] US EPA. 2007. Lead and Copper Rule: A Quick Reference Guide, http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/upload/2007_12_13_lcrmr_pdfs_draft_qrg_lcrmr_quickguide2007.pdf (last accessed: 11/17/13).
[15] US EPA. 2012. Memorandum: Lead and Copper Rule - Clarification of Requirements for Collecting Samples and Calculating Compliance - November 23, 2004, http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/memo_nov23-2004.cfm (last updated: 3/6/12; last accessed: 11/17/13).
[16] US EPA. 2004. Memorandum: Lead and Copper Rule - Clarification of Requirements for Collecting Samples and Calculating Compliance - November 23, 2004, http://web.archive.org/web/20080326160910/http://www.epa.gov/OGWDW/lcrmr/memo_nov23-2004.html (last updated: 3/6/12; last accessed: 11/17/13).

[17] Lambrinidou, Y. et al. "LCR compliance monitoring in DC - Request for meeting." E-mail to William Arguto and Wendy Gray, US EPA Region 3 (6/6/12), available upon request.
[18] Del Toral, M. A., et al. 2013. Detection and Evaluation of Elevated Lead Release from Service Lines: A Field Study. *Environmental Science & Technology* 47(16):9300-9307.
[19] Edwards, M. and D. Abhijeet. 2004. Role of Chlorine and Chloramine in Corrosion of Lead-Bearing Plumbing Materials. *Journal of the American Water Works Association* 96(10):69-81.
[20] Del Toral, M. A., et al. 2013. Detection and Evaluation of Elevated Lead Release from Service Lines: A Field Study. *Environmental Science & Technology* 47(16):9300-9307 (Supporting Information http://pubs.acs.org/doi/suppl/10.1021/es4003636/suppl_file/es4003636_si_001.pdf).
[21] Personal communication with Yanna Lambrinidou, 11/20/13.
[22] Triantafyllidou, S. et al. 2013. Lead (Pb) Quantification in Potable Water Samples: Implications for Regulatory Compliance and Assessment of Human Exposure. *Environmental Monitoring and Assessment*, 185(2):1355-65.
[23] Triantafyllidou, S. and M. Edwards. 2012. Lead (Pb) in Tap Water and in Blood: Implications for Lead Exposure in the United States. *Critical Reviews in Environmental Science and Technology* 42(13):1297-1352.
[24] *Federal Register*, Vol. 56, No. 110, June 7, 1991, p. 26470.
[25] Levin, R. et al. 2008. Lead Exposures in US Children, 2008: Implications for Prevention. *Environmental Health Perspectives* 116(10):1285-1293.
[26] Brown, M.J. et al. 2011. Association Between Children's Blood Lead Levels, Lead Service Lines, and Water Disinfection, Washington, DC, 1998-2006. *Environmental Research* 111(1):67–74.
[27] Renner, R. 2010. Reaction to the Solution: Lead Exposure Following Partial Service Line Replacement. *Environmental Health Perspectives* 118(5):A202-A208.
[28] US CDC. 1997. Screening Young Children for Lead Poisoning: Guidance for State and Local Public Health Officials, http://www.cdc.gov/nceh/lead/publications/1997/pdf/chapter3.pdf (last accessed: 11/17/13).
[29] US CDC. 2010. New CDC Lead and Pregnancy Recommendation Report 2010, http://www2c.cdc.gov/podcasts/media/pdf/Lead_Pregnancy.pdf (last accessed: 11/17/13).
[30] Sandvig, A. et al. 2008. Contribution of Service Line and Plumbing Fixtures to Lead and Copper Rule Compliance Issues, http://www.waterrf.org/ExecutiveSummaryLibrary/91229_3018_profile.pdf (last accessed: 11/24/13).
[31] *Federal Register*, Vol. 56, No. 110, June 7, 1991, p. 26505.
[32] US EPA Science Advisory Board. 2011. SAB Evaluation of the Effectiveness of Partial Lead Service Line Replacements, http://yosemite.epa.gov/sab/sabproduct.nsf/36a1ca3f683ae57a85256ce9006a32d0/964CCDB94F4E6216852579190072606F/$File/EPA-SAB-11-015-unsigned.pdf (last accessed: 11/24/13).
[33] *Federal Register*, Vol. 65, No. 8, January 12, 2000, p. 1963.
[34] *Federal Register*, Vol. 56, No. 110, June 7, 1991, p. 26506.
[35] Lambrinidou, Y. and M. Edwards. 2013. Improving Public Policy Through Qualitative Research: Lessons from Homeowners about Lead Service Line Replacement Under the Federal Lead and Copper Rule. Presentation at the 141st American Public Health Association annual meeting, Boston, MA, November 2-6.

# LCR Long-Term Revisions

## Background & Recommendations

Yanna Lambrinidou, PhD
Parents for Nontoxic Alternatives

Paul Schwartz, BA
Water Alliance

# Lead Service Lines

- Estimates:
  - 10 million (EPA LCR 1991)
  - 3-5 million (other estimates)
- Associated with:
  - EBLLs (CDC 2011)
  - Fetal deaths (Edwards 2013)
  - Long-term lead spikes following physical disturbance (Del Toral, Porter, Schock 2013)
  - Short- and long-term lead spikes following partial LSL replacement (e.g., Triantafyllidou & Edwards 2011; Cartier et al. 2012)

# Lead Action Level (LAL)

| Standard | Designation | Enforceability |
|---|---|---|
| 0 ppb | Maximum Contaminant Level Goal (MCLG) | Non-enforceable |
| 15 ppb | Lead Action Level (LAL) | Enforceable |

Although NOT a violation of the law

# Prevalence of Lead in Water

- Lead-plumbing materials present in vast majority US homes
- Mandated LCR monitoring for lead is not capturing worst-case levels, as it is supposed to
- Public water systems use their own sampling protocols that often include steps known to miss lead

## LEAD AND COPPER SAMPLING FORM

### Instructions for Sampling Lead and Copper at Customer Tap

Please follow directions below to help us determine the lead and copper content of your drinking water.

1. The night before sampling, clean the aeration screen, if possible, and run cold water through the kitchen or bathroom tap (the kitchen faucet is the preferred choice). The cold-water should be run until you can feel a temperature change. This will take approximately 1 to 3 minutes. **Allow the water sit in the plumbing for a period of 6 to 8 hours. Use this faucet to obtain your water sample.**

2. On the morning of the sampling, do not run the water before sampling. The very first water to be used in the house should be the water to be collected in the 1-liter plastic bottle.

3. Slowly open the cold-water faucet and fill the 1-liter bottle to the top and put the lid on tight. There is no need to refrigerate the sample.

4. Please answer the questions below and fill out the bottom of the sheet and sign your name. Please put the filled sample bottle, along with the paper work in the plastic bag provided.

Independent monitoring in US city with highest concentration of LSLs => consistently >LAL

# Prevalence of Lead in Blood

Recent studies documenting large scale harm:

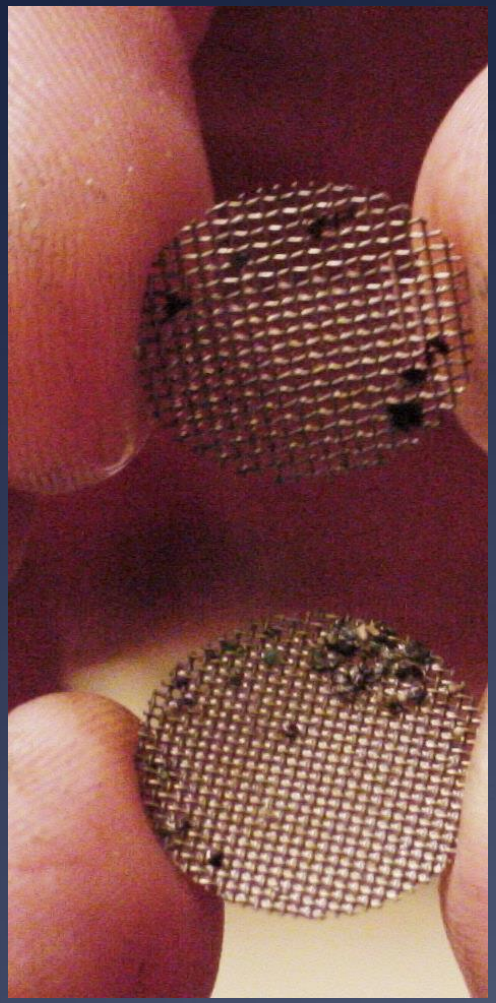
* Edwards 2013
* CDC 2011
* Edwards, Triantafyllidou, Best 2009

Routinely overlooked on a national scale:

* Fetuses (pregnant women)
* Infants dependent on formula
* Lead in water in EBL children's homes

# Challenge of Lead Particles

- Pieces of lead solder or rust
- Unpredictable and erratic release (Russian Roulette phenomenon) => NOT EASY TO CAPTURE AND DETECT
- Can pose acute health threat



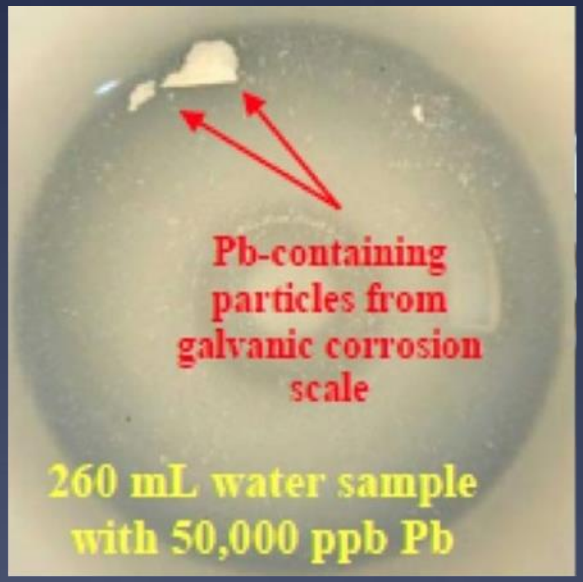
# Actual Lead Particles from Building with Child Lead Poisoning



Slide from Dr. Simoni Triantaffylidou, Post Doctoral Fellow, US EPA

2011: Triantafyllidou, S. and M. Edwards. Galvanic Corrosion after Simulated Small-Scale Partial Lead Service Line Replacements. *JAWWA*103:9, pp. 85-99.


Lead pipe area adjacent to copper junction after 1+ year of experimentation




Lead dose in one glass of water exceeding the CPSC "acute health threat" for lead 71 times

# Recommendations

- ‘First, do no harm.’
- Remember, above all, both the Safe Drinking Water Act (SDWA) and the Lead and Copper Rule (LCR) are about protecting public health.
- Every step of the way the LCR must protect, not harm, public health.

# Get the Lead Out

- Full lead service line removal under LCR
- Stop "voluntary" partial lead service line removal (e.g. when infrastructure work is being done)

# LCR Monitoring Must be Health Protective

- Develop a mandated monitoring schedule and sampling protocol that are designed to capture worst-case lead levels, *as is intended by the LCR*
- Close loop-holes that allow sampling protocols that both miss lead and mislead

# Follow Sound Science

Look for lead particles,

not just soluble lead

# Right to Know

- Disclose challenges and long-term health risk of partial lead service line replacement
- Educate about the new science on physical disturbances of lead service lines
- Give people full disclosure regarding tools for self protection

# Thank You

December 12, 2013

## ADDENDUM

**NOTE TO NDWAC**:

This addendum consists of 12 points about key issues discussed in the December 11, 2013 NDWAC meeting concerning long-term revisions to the federal Lead and Copper Rule (LCR). We are submitting this addendum in conformance with the NDWAC process, which states: *"Consistent with the Federal Advisory Committee Act, the Council holds open meetings and provides opportunities for interested persons to make statements within a designated time period at the two meetings or to file statements/comments before or after such meetings."*[1] Our points add to, clarify, disagree with, or reinforce some of the statements made at the meeting.

We hope NDWAC finds this addendum informative and takes it into consideration during its deliberations.

We are available to answer any questions.

Sincerely,

Yanna Lambrinidou, PhD
Parents for Nontoxic Alternatives
pnalternatives@yahoo.com
202.997.1834

Paul Schwartz, BA
Water Alliance
paul1959421@yahoo.com
202.279.0438

## 1. The LCR is a public health law, *not* a corrosion control law

The LCR was enacted as a regulatory program under the Safe Drinking Water Act (SDWA) of 1974, which required regulation of drinking water contaminants *deemed harmful to human health*. Regulatory programs under the SDWA are required to specify:

- A Maximum Contaminant Level (MCL) for the contaminant(s) they target, "if it is economically and technologically feasible to ascertain the level of such contaminant in public water systems"[2]

or

- If it is not "economically and technologically feasible to ascertain the level of such contaminant in public water systems," a "treatment technique," "which leads to a reduction in the level of such contaminant sufficient to satisfy the requirements of section 1412."[1] Section 1412 specifies that regulatory programs under the SDWA *"shall protect health to the extent feasible, using technology, treatment techniques, and other means, which the Administrator determines are generally available (taking costs into consideration)…"*[3] (emphasis added).

For a variety of reasons, the LCR of 1991 regulated lead in drinking water through a "treatment technique." It is critically important to keep in mind two of the most central aspects of this approach:

**a. The treatment technique mandated by the LCR is *NOT* the LCR's end goal, as was stated by EPA during the NDWAC meeting. The LCR's treatment technique is simply a regulatory "mediator" aimed at leading to the LCR's end goal: *the protection of public health*. The LCR of 1991 states clearly that, "A treatment technique must 'prevent known or anticipated adverse effects on the health of persons to the extent feasible.'"[4] <u>No discussion about the LCR's treatment technique should ever be divorced from the rule's clear, indisputable, and ultimate purpose: public health protection</u>.**

**b. The LCR's "treatment technique" comprises a multi-pronged approach to the protection of the public from lead in drinking water. *Corrosion control is only one of four components of the LCR's treatment technique*. The other three components are:**

- **Source water treatment (when lead is detected in source water);**

- **Lead service line replacement (when a jurisdiction has lead service lines); and**
- **Public education.**

**Along with proper site selection at the highest risk sites and sampling procedures that capture worst-case lead levels, all of these regulatory components serve as synergistic "vehicles" for preventing consumer exposures to lead at the tap. The LCR of 1991 spells out clearly EPA's intent for the rule's treatment technique: "The Agency believes that the treatment technique approach contained in the final rule will achieve the public health goals of the SDWA…"[5] No discussion about the LCR's treatment technique should ever focus so narrowly on one component of this technique, that the health-protective intent of the rule's multi-pronged approach gets lost. By extension, any characterization of the LCR as a "corrosion control" rule is inaccurate and misleading.**

2. **To date, there is no scientific basis for the frequently-made argument that drinking water constitutes a "secondary" source of exposure to lead**

The statement that lead-contaminated drinking water contributes, ***on average***, 10%-20% to a child's total lead intake is made frequently by experts in the field of public health. However, the use of an ***average*** total lead intake does not make sense for risk characterization. There are children that live in homes with lead service lines that will have a much higher lead-in-water intake, and there are children that live in homes without lead service lines that will have a lower lead-in-water intake, comparatively. By combining these two groups and presenting the lead intake from drinking water as an ***average*** intake, those who live in homes with lead service lines are given a false sense of security regarding the safety of their water. Even EPA's estimate that *"Infants who consume mostly formula mixed with lead-containing water can receive 40 to 60 percent of their exposure to lead from drinking water"*[6] does not make logical sense. For example, where would the other 60 to 40 percent of the assumed lead intake come from for infants that range in age from 0 to 6 months and a) are not consuming solid foods, and b) are not yet mobile enough to be in contact with lead-containing paint, dust, or dirt? It stands to reason that many infants from 0 to 6 months doing little more than drinking and sleeping would have a total lead exposure closer to 100 percent from the drinking water.

It is time for these estimates – as well as the data and analysis behind them – to be closely scrutinized and reassessed. Since the promulgation of the LCR, numerous technical presentations have been made at international conferences, and papers have been published suggesting that older estimates are largely based on inappropriate sampling protocols that would likely

underestimate actual lead levels and exposure potential.[7] Furthermore, as we discussed in the paper we submitted to NDWAC at the December 11, 2013 meeting, a) national blood lead screening requirements, and b) environmental risk assessment protocols for identifying sources of lead in homes of children with elevated blood lead levels, *are not designed to detect drinking water as a source of lead among the most vulnerable populations, even when drinking water may be the primary source of exposure*. Specifically, pregnant women (and, therefore, developing fetuses) and infants dependent on formula are rarely screened for lead in blood. Moreover, when young children (most often over the age of 1) are diagnosed with elevated blood lead levels, environmental risk assessments in their homes rarely sample drinking water. When they do, the sampling is almost always inadequate for capturing potential contamination, (e.g., due to inadequate stagnation prior to sampling, lack of sequential samples for the detection of lead particles). Coupling these facts with the latest science on lead in drinking water (e.g., concerning partially replaced lead service lines, acute health risks posed by ingestion of particulate lead, long-term lead spiking following physical disturbances to lead service lines outlined in our paper), suggests very significant exposures that have systematically gone undetected. **Consequently, it would be a mistake for anyone considering revisions to the LCR to presume that lead in drinking water poses a relatively minor threat to public health, and there is little or no modern data supporting that assertion.**

3. **Lead service lines were legally mandated in many US cities and homeowners had no choice but to accept them**

Municipal codes requiring the use of lead service lines were commonplace, starting in the mid-1800s.[8] Chicago, for example, the city with the largest known concentration of lead service lines, mandated the installation of lead pipes until 1986 (i.e., the year of the SDWA amendments that banned lead plumbing materials). In jurisdictions with plumbing codes requiring the use of lead pipe, homeowners could not request alternative materials, even if they were aware and concerned about lead's toxicity.[5,9] In *The Great Lead Water Pipe Disaster* (2008), professor of economics Werner Troesken explains that erroneous understandings about the safety of lead service lines were widespread not only among plumbers, but also among several groups of professionals, including public officials and medical experts. These erroneous understandings were often used to "educate" consumers and even dispel public fears about lead in plumbing. **This history raises serious moral and social justice questions about perpetuating a federal lead-in-drinking water law that places partial (or full) responsibility on the public for preventing exposures to lead at the tap, especially given that many of these exposures are rooted in legal mandates for which consumers had no recourse but to comply with the law.**

4. **A trend may have started among public water systems to "gift" lead service lines entirely to homeowners**

Recently and without a public announcement, the Washington, DC water utility began to claim that it owns no portion of any of the District's service lines. This occurred after many years of official agency statements (and a massive partial lead service line replacement program that cost over $100 million in ratepayer money) confirming the utility's partial ownership of service lines. Washington, DC does not seem to be an isolated case in this regard. In a 2011 survey of public water systems by the American Water Works Association (AWWA), 69% of the 805 water utilities that responded claimed that *they own no part of a service line in their jurisdiction* (AWWA presented these results at the 2011 AWWA Water Quality Technology Conference but did not post them in the conference proceedings and, to our knowledge, has not yet made them public).[10] This percentage dramatically exceeds the results from an earlier survey, as discussed in a 2007 paper,[11] which revealed that only 20% of water utilities claimed to own no part of a service line. A 2012 investigation about lead in US drinking water quotes an environmental engineer from Massachusetts, saying:

> We have had that occur in Massachusetts. [Some communities around the nation] have passed bylaws saying this city or town is no longer responsible for the pipe. It's now the responsibility of the homeowner.

However, the basis upon which public water systems are making determinations about ownership is not always clear. The LCR of 1991 stated that,

> A water system is presumed to control the entire lead service line (up to the building inlet) unless the system demonstrates to the satisfaction of the State, […] that it does not have any of the following forms of control over the entire line (*as defined by state statutes, municipal ordinances, public service contracts or other applicable legal authority*): authority to set standards for construction, repair, or maintenance of the line, authority to replace, repair, or maintain the service line, or ownership of the service line[12] (emphasis added).

**Just as water utilities were initially required to support through legal documentation claims that they lacked "control" of service lines, water utilities claiming lack of ownership of such lines should also be required to support this claim through legal documentation that they present to the States and post online for public viewing.**

5. **Public water systems frequently interpret the meaning of service line "ownership" and "control" inconsistently and in a way that jeopardizes the public's health**

Public water systems frequently claim that they do not own the privately-owned portion of a lead service line and, as a result, have no authority to replace it. At the same time, however, when engaged in routine infrastructure work (e.g., replacing or repairing water mains), public water systems replace the portion of a lead service line that starts at the main and ends at the property line, *even when they claim to own no part of a service line*. Such partial lead service line replacements occur on a daily basis, and far outnumber the partial lead service line replacements that occur during LAL exceedances. This practice reveals a serious inconsistency in the meaning that public water systems assign to the terms "ownership" and "control" of service lines. If public water systems must *own* the portion of the service line that they replace, then public water systems that do not own *any* part of a service line should not be able to conduct *any* lead service line replacement during routine infrastructure work. On the other hand, if public water systems that do not own any part of a lead service line have the authority to conduct partial lead service line replacement during routine infrastructure work because they "control" service lines, then the same systems should have the authority to replace lead service lines fully during both infrastructure work and LAL exceedances (given that in most cases they have "control" of both the public and private portion of a service line). **In light of the serious public health risk posed by partial lead service line replacement, we urge NDWAC to look closely into this issue and consider recommending consistent and public-health protective interpretations by public water systems of the terms "ownership" and "control" vis-à-vis service lines.**

6. **The Centers for Disease Control and Prevention (CDC) recommends a) mandated full lead service line replacement and b) the creation of a "threshold concentration" that, when exceeded, would render a water utility out of compliance with the LCR**

In January 2011, the Centers for Disease Control and Prevention (CDC) sent to the EPA Office of Ground Water and Drinking Water a set of recommendations for revisions to the LCR (letter attached). The CDC letter said:

> CDC believes that leaving any part of the lead service line in place during remediation results in an unavoidable risk and we suggest you explore ways to facilitate full lead service line replacement.

In the same letter, the CDC also recommended that the LCR's 90$^{th}$ percentile trigger point be coupled with an enforceable "threshold concentration," to protect residents living in homes with high concentrations of lead in water, but in jurisdictions that meet the LAL:

> CDC believes that a 90th percentile action level should be combined with a threshold concentration above which the utility would be out of compliance. If the water sample from any high-risk home has a lead concentration that exceeds the threshold, the system would be considered out of compliance.

During the NDWAC meeting, EPA stated that the purpose of the LCR was to control corrosion, which is a clear misinterpretation and direct contradiction of the rule (see point #1 above). Even if that were the case, however, a review of the optimal water quality control parameter (OWQCP) treatment technique violations and LAL exceedances in EPA's Safe Drinking Water Information System compliance database highlights the futility of using the current OWQCP methodology for controlling lead levels. Since the promulgation of the LCR, there have been 6,375 LAL exceedances in community water systems (the total number of LAL exceedances in EPA's compliance database is actually much higher if non-transient non-community water system LAL exceedances are included). Yet over that same 20+ year period there have been only 157 OWQCP treatment technique violations across all community public water systems.* The concomitant small number of treatment technique violations suggests that the current LCR structure is grossly ineffective at ensuring effective corrosion control. **As a result, we urge NDWAC to take into serious consideration the need to a) strengthen all four components of the LCR's treatment technique and b) examine closely, and consider promoting, CDC's recommendations.**

7. **Lead corrosion experts assert that Madison, WI demonstrates the public-health benefit of full lead service line replacement**

Following the December 11, 2013 statement by EPA that Madison, WI exceeded the LAL after fully replacing the majority of the city's lead service lines, we contacted lead corrosion experts familiar with the case to learn more about it. We learned the following:

Madison, WI:

- Exceeded the LAL in 1992
- Exceeded the LAL again in 1997
- Undertook a city-wide full lead service line replacement program in 2001-2010
- In 2003, a researcher's non-LCR monitoring at 60 homes revealed a 90th percentile value >LAL (22 ppb)

* These numbers include LAL exceedances and treatment technique violations that occurred more than once in a single community public water system over the 20+ year period.

Additional research detected erratic release of lead particles, in some homes for over four years after full lead service line replacement. It also revealed that prior to lead service line removal, due to the presence of high levels of iron and manganese in the water, lead from the service lines attached to the iron and manganese and deposited internally in home plumbing. This created a reservoir of lead deposits. Subsequent to the complete removal of the lead service lines, these lead deposits leached into the water on an erratic basis, even though the principal lead source (the lead service line) had been fully removed. The experts explained that full lead service line replacement in plumbing systems that contain high levels of iron and/or manganese can be followed by lead spikes, until the lead that is attached to the manganese or iron releases fully. This process can be lengthy. However, they also cited the Madison, WI 2011 LCR-monitoring results as clear support for full lead service line replacement for two reasons:

- The 90$^{th}$ percentile value in two consecutive 2011 LCR-monitoring rounds was 2.6 ppb and 3.6 ppb respectively, and the average lead level for the 202 compliance samples collected was 1.75 ppb.
- Three years after the completion of the city's full lead service line replacement program, most Madison, WI homes are permanently free both of the principal lead source (the lead service line) and of lead residual in internal plumbing.

**In a forthcoming paper, the authors assert that the Madison, WI case supports the EPA SAB's 2011 call for full lead service line replacement,[13] and that the long-term health benefits of such replacement must not be underestimated.[14]**

8. **Qualitative research in Washington, DC and Providence, RI suggests that the LCR's lead service line replacement provision today raises serious environmental justice concerns**

Research conducted under a grant by the Robert Wood Johnson Foundation's (RWJF) Public Health Law Research (PHLR) program and DC Water revealed the following trends: a) cost is the primary obstacle preventing homeowners from agreeing to replace the private portion of their lead service line, b) full lead service line replacement is more prevalent among higher income and Caucasian homeowners, and c) 80% of homeowners who had a partial lead service line replacement would agree to full replacement if the cost were covered by the water utility (see attached slides)[15].

9. **Qualitative research in Washington, DC and Providence, RI suggests that the LCR's required notification requirement concerning planned lead service line replacement lacks basic, relevant-to-public-health information**

**that would encourage homeowners to opt for full lead service line replacement**

The aforementioned research revealed that 50% of homeowners who declined full lead service line replacement would be more inclined to pay for full replacement (or, at least, consider it more seriously) if the short- and long-term health risks associated with partial lead service line replacement had been made known to them.[10]

**10. To date, lead in water in US schools and day care centers remains unregulated**

Despite increasing efforts on a national scale to promote the consumption of tap water in US schools and day care centers, lead in water in the vast majority of US schools/day care centers is not regulated. Schools and day care centers test, analyze, report, and remediate lead-in-water problems on an entirely voluntary basis. Case study after case study show that, overall, US children are inadequately protected from lead in water available in the educational institutions they attend, *even in jurisdictions that meet the LCR LAL*.[1617] Yet the LCR is designed to address lead-in-water in single-family homes, which differ markedly from schools in relation to plumbing configurations and water use patterns. **We, therefore, recommend that NDWAC consider recommendations to EPA on the development of a separate federal lead-in-water regulation that covers specifically schools and day care centers.**

**11. EPA has experts in lead corrosion, epidemiology, the LCR, and policy implementation, as well as an LCR workgroup, all of whom could play a critical role in supporting NDWAC to develop sound recommendations**

At EPA, internationally renowned researchers in lead corrosion and epidemiology can bring NDWAC up to date on the latest scientific understandings about lead in drinking water. Similarly, experts on the LCR and on policy implementation issues can offer NDWAC both clarifying information and practical insights that can support the Council in its deliberations.

As part of the LCR long-term revisions process, EPA convened a workgroup of agency experts to develop recommendations for a proposed regulation. At the December 11, 2013 meeting, a member of NDWAC asked if the Council could obtain the workgroup's recommendations. In light of the fact that the EPA workgroup has been discussing proposed revisions for over two years, it seems to us of critical importance that workgroup members should be made available to NDWAC for consultation.

The LCR is a complex rule with strengths but also serious weaknesses and loopholes. As we explain in our paper, these weaknesses and loopholes have failed and are failing the public's health. Consideration of insights by agency experts seems like a potentially important step toward the creation of sound recommendations by NDWAC. Lines of communication between NDWAC and EPA's scientific and policy experts must be open and active throughout NDWAC's deliberation process. **To ensure the development of sound and public health protective recommendations by NDWAC, we strongly encourage NDWAC to request frequent and uncensored exchange of information with EPA's experts.**

12. **We strongly recommend that NDWAC consider including in its LCR-revisions workgroup a member of a grassroots, community-based organization that has been actively involved in protecting the public from lead in drinking water**

    On December 11, 2013, EPA invited NDWAC to suggest additional constituencies for inclusion in the Council's deliberations about the LCR. Although NDWAC includes members of NGO's with expertise on lead in drinking water, we believe that it lacks voices of community advocates with extensive experience working with communities to protect the public from lead at the tap. We encourage NDWAC to consider including such voices to the deliberating table.

## ACKNOWLEDGMENTS

Yanna Lambrinidou was supported by the Robert Wood Johnson Foundation (RWJF) under the Public Health Law Research (PHLR) program grant ID#68391 and by DC Water.

## REFERENCES

[1] US EPA. 2013. Basic Information on National Drinking Water Advisory Council http://water.epa.gov/drink/ndwac/fact.cfm.
[2] Safe Drinking Water Act of 1974 (P.L. 93-523), 1661. http://water.epa.gov/drink/ndwac/fact.cfm.
[2] Safe Drinking Water Act of 1974 (P.L. 93-523), 1661.
[3] Safe Drinking Water Act of 1974 (P.L. 93-523), 1662.
[4] Lead and Copper Rule of 1991, *Federal Register*, Vol. 56, No. 110, June 7, 1991, p. 26463.
[5] Lead and Copper Rule of 1991, *Federal Register*, Vol. 56, No. 110, June 7, 1991, p. 26477.
[6] US EPA. 2007. Lead and Copper Rule: Public Education & Other Public Information Requirements for Community Water Systems, http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/upload/2007_12_11_lcrmr_pdfs_draft_guidance_lcmr_publiceducation_cws_factsheet.pdf.
[7] Schock, M. R. and F. G. Lemieux, F.G. 2010. Challenges in Addressing Variability of Lead in Domestic Plumbing. *Water Science & Technology: Water Supply* 10(5):792-798.
[8] Toesken, W. 2008. *The Great Lead Water Pipe Disaster*. Cambridge, MA: MIT Press.
[9] Rabin, R. 2008. The Lead Industry and Lead Water Pipes: "A Modest Campaign." *American Journal of Public Health* 98(9):1584-1592.
[10] Kaplan, S. and C. Hiar. 2012. Toxic Taps: Lead is Still the Problem, http://investigativereportingworkshop.org/investigations/toxic-taps/story/toxic-taps-lead-is-still-the-problem/.
[11] Sandvig, A. and P. Kwan. 2007. Minimizing Lead Spikes. *Opflow* 33(9):16-19
[12] Lead and Copper Rule of 1991, *Federal Register*, Vol. 56, No. 110, June 7, 1991, p. 26553.
[13] US EPA Science Advisory Board. 2011. SAB Evaluation of the Effectiveness of Partial Lead Service Line Replacements, http://yosemite.epa.gov/sab/sabproduct.nsf/36a1ca3f683ae57a85256ce9006a32d0/964CCDB94F4E6216852579190072606F/$File/EPA-SAB-11-015-unsigned.pdf (last accessed: 11/24/13).
[14] Schock, M. R. et al. Importance of Pipe Deposits to Lead and Copper Rule Compliance. *Journal of the American Water Works Association* (in press).
[15] Lambrinidou, Y. and M. Edwards. 2013. Improving Public Policy Through Qualitative Research: Lessons from Homeowners about Lead Service Line Replacement Under the Federal Lead and Copper Rule. Presentation at the 141st *American Public Health Association* annual meeting, Boston, MA, November 2-6.
[16] Lambrinidou, Y., S. Triantafyllidou, and M. Edwards. 2010. Failing Our Children: Lead in US School Drinking Water. *New Solutions: A Journal of Environmental and Occupational Health Policy* 20(1):25-47.
[17] Triantafyllidou, S., T. Le, D. Gallagher, and M. Edwards. 2014. Reduced Risk Estimations After Remediation of Lead (Pb) in Drinking Water at Two US School Districts. *Science of the Total Environment* 466-467:1011-1021.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
and Prevention (CDC)
Atlanta, GA 30341-3724

January 19. 2011

Mr. Eric Burneson
Acting Deputy Director
Office of Ground Water and Drinking water
United States Environmental Protection Agency
USEPA Headquarters
Ariel Rios Building
1200 Pennsylvania Avenue, N. W.
***Mail Code:*** 4607M
Washington, DC 20460

Dear Mr. Burneson:

One of our goals at the National Center for Environmental Health (NCEH) of the Centers for Disease Control and Prevention (CDC) is the elimination of childhood lead poisoning in the United States. CDC and its funded programs conduct surveillance of the occurrence of childhood lead poisoning, establish guidelines for case-management of children with elevated blood lead levels, and make recommendations for the prevention of lead exposures from all possible sources. Our understanding of the current scientific literature on the effects of lead in children, and on the role of lead in water distribution systems -- including conclusions in a recently published study by CDC -- suggest changes are needed in the current "Lead and Copper Rule" (LCR). This letter provides CDC's recommendations for revisions to the LCR.

As you are well aware, CDC, EPA and our other Federal and state partners have spearheaded significant reductions in both the occurrence of lead poisoning and exposures to lead. EPA has promulgated effective regulations that have reduced lead emissions in air, water, and solid waste. During the past three decades, the percent of American children having blood lead levels above 10 micrograms per deciliter have been reduced from 88% to less than 1 percent. The EPA's LCR has had a significant impact on reducing lead poisoning via plumbing in the United States. The opportunity exists to further strengthen the rule and perhaps to simplify it.

We understand that EPA currently is reviewing its "Lead and Copper Rule" (LCR). This rule has formed the foundation of the national strategy to prevent drinking water exposures to lead.[1] We have supported the goals of this rule over the years.

[1] Lead and Cooper Rule: A quick Reference Guide. ISEPA Office of Water. EPA 816-F- 04-009. www.epa.gov/safewater

We believe that the LCR can and should be strengthened to further reduce exposures to lead through drinking water. The discussion below addresses three components of the LCR that CDC believes should be modified:

1. The EPA action level.
2. Lead service line (LSL) replacements.
3. Public information.

The EPA action level:

EPA currently sets the LCR action level as a 90$^{th}$ percentile sample (among high-risk homes) of 15 ppb lead or higher. The action level allows children and pregnant and breast-feeding women living in as much as ten percent of the high-risk homes to be exposed to levels of lead in drinking water in excess of 15 ppb. Under the current LCR, a utility is compliant if no more than one out of ten connections in the high-risk community exceeds 15 ppb or higher. Because the action level is based on a percentile rather than a tolerable limit, the LCR considers equally compliant two utilities having a 95$^{th}$ percentile level of 20 ppb or 2000 ppb - as long as the 90$^{th}$ percentile is below 15 ppb. CDC believes that a 90$^{th}$ percentile action level should be combined with a threshold concentration above which the utility would be out of compliance. If the water sample from any high-risk home has a lead concentration that exceeds the threshold, the system would be considered out of compliance. Under a combination of a 90$^{th}$ percentile action level and a threshold value, a system would be out of compliance if the 90$^{th}$ percentile exceeded the action level or any test exceeded the threshold value. Under these conditions, EPA would consider requiring the utility to notify the community, provide an alternative drinking water source or filtration, identify and mitigate lead sources, and/or conduct additional sampling.

CDC also believes that the 90$^{th}$ percentile threshold should be based on the concentration of lead in drinking water that results in an increase in blood lead levels of children and pregnant or breast-feeding women. However, EPA should not use the CDC blood level of concern for children (i.e.,10ug/dL) to establish its 90$^{th}$ percentile action level. We are currently reviewing this level at this time and are likely to make changes to it in the next few months. The size of the increase in the distribution of blood lead levels associated with a 90$^{th}$ percentile action level should be as small as possible and my staff and I are available to provide you with guidance on choosing an appropriate level.

Lead service line replacement

CDC has shared with EPA our analyses concerning partial lead pipe replacement since the fall of 2009. In December 2010, our analyses were published in the journal *Environmental Research*. We believe there is sufficient evidence to recommend that EPA halt partial lead

service line replacement until it has further assessed the efficacy of this remediation technique. CDC believes that leaving any part of the lead service line in place during remediation results in an avoidable risk and we suggest you explore ways to facilitate full lead service line replacement. Finally, if any section of a lead service line is replaced, CDC recommends that an alternative source of drinking water or filtration be provided until sampling documents that lead concentrations fall below the EPA action level.

Public information

We suggest EPA take steps to ensure that utilities inform customers about the location of lead service lines and the options for replacement. This information could be provided to customers with their billing statements or notices of water quality. Disclosing information about lead service lines would improve the public's understanding of the hazards of lead in water. Providing information to the public has proven a successful strategy in reducing exposures to hazardous substances. For example, section 1018 of the Residential Lead-Based Paint Hazard Reduction Act of 1992 directed HUD and EPA to require the disclosure of known information on lead-based paint and lead-based paint hazards before the sale or lease of housing built before 1978. These disclosures have led property owners to identify and mitigate existing lead hazards.

Finally, NCEH would like to offer two additional suggestions regarding lead exposures. First, as EPA considers modifications to the LCR, we ask that you carefully review the sampling strategies for home drinking water to ensure that the samples are collected uniformly and are directly pertinent to how people use water in the home. In addition, we ask that EPA coordinate across the various offices dealing with lead in water, soil, dust and paint so that every office uses the same risk assessment and relative source contribution information when they develop policies that prevent exposures to lead. NCEH is available to assist EPA as it deliberates the changes needed in the LCR. Should EPA wish to contact us further on this issue, our point of contact is Dr. Mary Jean Brown, Chief, Healthy Homes and Lead Poisoning Prevention Branch (phone (770) 488-7492; email: MJB5@cdc.gov).

Sincerely yours;

Christopher J. Portier, Ph.D.
Director, National Center for
Environmental Health, and
Agency for Toxic Substances and
Disease Registry

# Empirical and Legal Evaluation of Public Health Protection Under the Federal Lead and Copper Rule

Yanna Lambrinidou, PhD
Parents for Nontoxic Alternatives

Submitted to EPA's National Drinking Water Advisory Council (NDWAC)
December 16, 2013

# Homeowner Interviews

**Type of LSLR**

| | Washington, DC | Providence, RI | Total |
|---|---|---|---|
| Full LSLR | 18 | 1 | **19** |
| Partial LSLR | 13 | 7 | **20** |
| **Total** | **31** | **8** | **39** |

**Demographics**

| | Washington, DC | Providence, RI | Total |
|---|---|---|---|
| White/Caucasian | 17 | 6 | **23** |
| Black/African American | 10 | | **10** |
| Hispanic/Latino | 2 | 2 | **4** |
| Other | 2 | | **2** |
| **Total** | **31** | **8** | **39** |

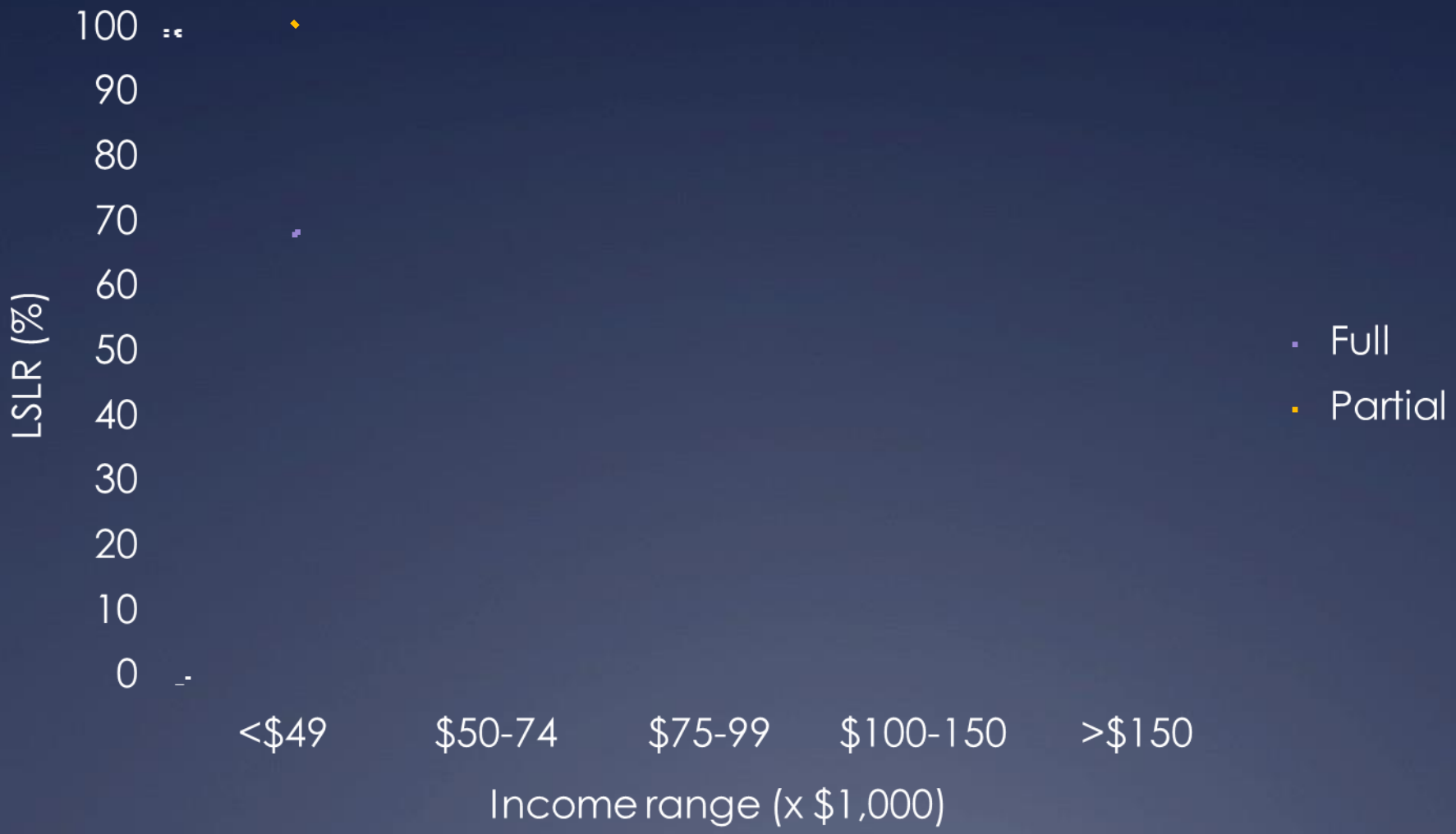
## Reasons homeowners "opted out" of private-side LSLR:

# COST

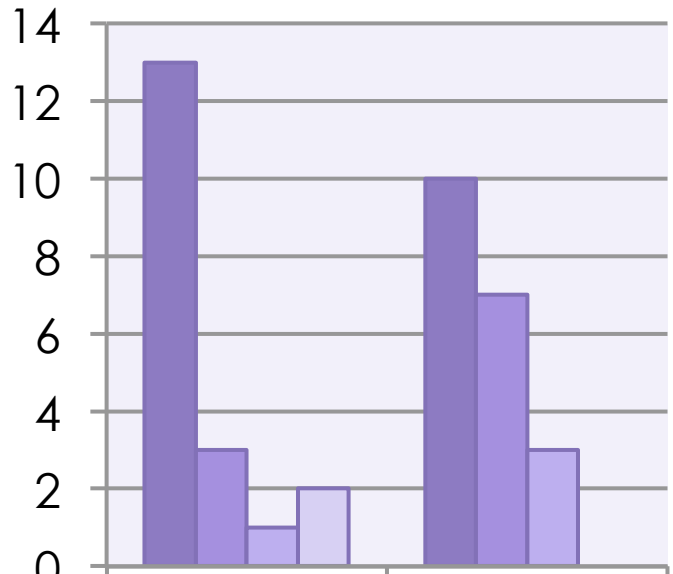
- Concern across income levels
- Recalled estimate range: $1,000-$7,000

- If cost covered by utility:
  - 80% would agree to full LSLR
  - 20% would agree to a full LSLR if it were recommended for preventing *known* (rather than speculative) health harm

# Type of LSLR by Income Level



# Type of LSLR by Race




| | Full | Partial | % Full LSLR |
|---|---|---|---|
| White/Caucasian | 13 | 10 | 56% |
| Black/African American | 3 | 7 | 30% |
| Hispanic/Latino | 1 | 3 | 25% |
| Other | 2 | | |

# Acknowledgments

Research conducted under a grant from:

* The Robert Wood Johnson Foundation's (RWJF) Public Health Law Research program, and
* DC Water

# Lead and Copper Rule Long-term Revisions: Sample Site Selection, Sampling Protocol, and Optimized Corrosion Control

**Presenter:** Lisa Christ, Brach Chief

U.S. EPA, Office of Ground Water and Drinking Water, Standards and Risk Management Division, Targeting and Analysis Branch

# Purpose & Overview

**Purpose**:

To provide the NDWAC with background on the existing LCR requirements for:

- Sample site selection criteria
- Lead sampling protocol
- Optimized corrosion control

Highlight for the Committee the types of regulatory revisions that EPA is considering

Preview the type of detailed stakeholder input EPA is seeking from the Workgroup and the NDWAC Committee

# Goals and Objectives of Rule Change: Sample Site Selection

The goal of the sample site selection criteria is to target locations with high-risk lead and copper in drinking water systems in a cost-effective manner

Selection and use of highest risk sites is important, because:

the number of samples collected is relatively small

contaminant levels can vary between systems and sites based on water quality, and distribution system and usage characteristics

Targeting these high-risk locations helps ensure that appropriate action is taken if a lead or copper problem is identified in the system

# Background: Sample Site Selection

## Current Site Selection Criterion: Lead & Copper

The LCR establishes a tiering system for prioritizing the selection of sampling sites based on the likelihood of the sites to release elevated levels of lead and copper; for lead, sites with lead service lines, lead pipes, or copper pipes with lead solder; for copper, copper pipes with lead solder.

Tier 1. Single family residences with lead pipes, **a lead service line, or with copper pipes with lead solder** installed after1982. 50/50 mix ***of both types of sites***

Tier 2. Multi-family residences with a **lead service line or with copper pipes with lead solder** installed after1982.

Tier 3. Single-family residences with **copper pipes with lead solder installed before 1983.**

# Background: Sample Site Selection

New information exists regarding lead and copper release patterns:

Lead

Full and partial LSLs represent the greatest source of lead to drinking water.

Over twenty years ago lead solder was banned, these sites now are likely to be releasing levels of lead comparable to contributions by brass plumbing components and interior pipe corrosion byproduct scales

Lead has been shown to accumulate in corrosion scales or deposits formed in premises plumbing, downstream of LSLs, and can be released sporadically, in response to treatment changes or line disturbances

# Background: Sample Site Selection

## Copper

Corrosion can occur to copper plumbing of any age

Given certain water qualities, copper levels above the AL are most likely to occur in newly constructed and recently renovated homes and buildings with copper plumbing

Corrosion of new copper pipes is not a problem for many water systems. It is limited to water systems that have water quality aggressive to copper

Water chemistry characteristics that contribute to copper release also can vary in different zones within a distribution system as well as between different systems with respect to aggressiveness to copper

# Potential Revisions: Sample Site Selection Criteria

EPA is considering two separate tiering structures, one for systems with lead service lines (LSLs) and another for systems without LSLs

Requiring public water systems to conduct copper monitoring at separate sampling sites with new copper piping, which are more likely to have elevated copper levels

Allowing systems with water qualities not considered aggressive to copper to eliminate copper monitoring through a waiver

# Example Stakeholder Input Questions for: Sample Site Selection Criteria

How should sample site selection criteria be developed to capture the highest risk sites for lead and copper in a simple and cost effective way?

At what sites should lead and/or copper samples be collected to be representative of the greatest release for each contaminant?

# Goals and Objectives of Rule Change: Lead Sampling Protocol

Establish procedures that result in a water system having a set of samples that will:

Assess the corrosivity of the water being provided and/or

Indicate if the corrosion control is effective in reducing lead and/or copper corrosion from lead service lines (LSLs) and plumbing materials

# Background: Lead Sampling Protocol

The current LCR requires a one-liter first draw sample taken after a minimum six-hour stagnation time

This applies to both lead service lines and lead-soldered copper pipes

currently residents are allowed to collect the first-draw samples

A number of studies where consecutive liters of water were taken and analyzed until the LSL was reached found that the first draw sample may underestimate the amount of lead that can be in samples in contact with the LSL

EPA's analysis of the data provided by these studies suggests that where present, LSLs (full or partial) are the greatest source of lead in the distribution system.

# Potential Revisions: Lead Sampling Protocol

EPA is considering different sampling procedure options for sites with partial or full LSLs to more accurately capture lead releases

Possible new protocols include:

Discarding a specific number of liters prior to taking a one-liter sample representative of the LSL. This sampling regime would be developed based on plumbing configurations ahead of time and be consistent across all sampling sites

Collecting a series of sequential samples at each site in the sampling pool to identify the liter containing the highest lead at the site, and using only that identified site-specific liter for subsequent monitoring and compliance purposes

# Potential Revisions: Lead Sampling Protocol

Additional possible changes to the LCR sampling protocol include:

Mandating that aerators should not be removed or cleaned before or during the collection of tap samples

Not allowing flushing of the tap for an extended period of time (5 minutes or longer) prior to the start of the minimum six-hour stagnation time

The total number of sites and the sample site selection criteria may be changed: to better represents the contribution of the LSL to lead levels; allow a reduction in the number of sample sites needed to assess the effectiveness of CCT; and to better capture the affect of different water qualities thought a system.

# Example Stakeholder Input Questions for: Lead Sampling Protocol

For systems with LSLs, what does a cost-effective lead sampling procedure look like that captures lead where concentrations are likely highest?

What is an appropriate number of samples to be collected by a water system that will indicate if the corrosion control is effective in reducing lead? In reducing copper?

# Goals and Objectives of Rule Change: Optimal Corrosion Control Treatment

Enhance the process for systems to improve the effectiveness of their corrosion control treatment

Ensure adequate incentives for optimization

Provide greater clarity about treatment optimization

# Background: Optimal Corrosion Control Treatment (OCCT)

The current LCR requires small systems that exceed the action level to:

Make optimal corrosion control recommendations to the State for approval (State approves or designates alternative)

The system implements CCT and conducts follow-up monitoring for one-year

State reviews data and designates optimal water quality parameters (OWQP) (i.e., min/max pH, alkalinity, inhibitor concentration, etc.)

Systems compliance with the treatment technique is based on OWQP (not Pb/Cu levels) and on whether they perform the required actions when the action level is exceeded

A lead action level exceedance after installation of corrosion control treatment triggers the start of lead service line replacement (LSLR)

# Background: Optimal Corrosion Control Treatment (OCCT)

Systems are faced with the challenge of continuing to maintain OCCT while adjusting treatment and system operations to comply with other NPDWRs

Research data shows different chemical behavior and optimization conditions for lead and copper release making simultaneous minimization difficult

# Potential Revisions: Optimal Corrosion Control Treatment

EPA is evaluating whether to require systems exceeding the lead action level to re-optimize CCT, if that should happen before being triggered into LSLR, and the level of rigor in the re-optimization process

<u>Re-optimization process would include:</u>

A mandatory system-wide Corrosion Control Treatment study for systems with LSLs

That evaluates the variability of water quality throughout the distribution system due to differences in source water quality within distinct hydraulic boundaries, different or variable residence times and multiple types of distribution system materials

Targets key parameters that are known to affect or limit the effectiveness of CCT (e.g. pH and alkalinity)

System would be required to study the use of orthophosphate and for systems using orthophosphate to study the use of higher dosages of orthophosphate

Systems would not be required to study calcium hardness adjustment as a potential option for OCCT

## Potential Revisions: Optimal Corrosion Control Treatment

Re-optimization process would also include:

The allowance of more time (at State discretion) to evaluate the treatment prior to setting OWQP ranges

Regular monitoring during re-optimization to provide additional information to the systems and states

Allow NTNCWSs serving fewer than 10,000 people the option of installing Point of Use (POU) treatment units in lieu of having to install CCT

# Example Stakeholder Input Questions for: Optimal Corrosion Control Treatment

What are the challenges to optimizing corrosion control treatment and what are some of the lessons learned from implementing corrosion control treatment?

How can LCR requirements be structured to encourage OCCT and retain enforceability?

# Comments and Feedback

Sample Site Selection, Sampling Protocol, and Optimized Corrosion Control

# Lead and Copper Rule Long-term Revisions: Copper Public Education and Lead Service Line Replacement

**Presenter:** Lisa Christ, Acting Chief

U.S. EPA, Office of Ground Water and Drinking Water, Standards and Risk Management Division, Targeting and Analysis Branch

# Purpose & Overview

**Purpose**:

To provide the NDWAC with background on the existing LCR requirements for public education and lead service line replacement (LSLR)

Highlight for the Committee the types of regulatory revisions that EPA is considering

Preview the type of detailed stakeholder input EPA is seeking from the Working Group and the NDWAC Committee

# Goals and Objectives of Rule Change: Copper Public Education

To improve the health of consumers by motivating consumers to take actions in reducing exposure to copper in drinking water in systems with elevated copper levels

# Background: Copper Public Education

Under the LCR, there are no public education materials or informational statements provided on the health risks of copper exposure, or steps consumers can take to reduce their risk of exposure

Health impacts of copper are nausea and vomiting (short-term), and there may be liver damage and possible immune system depression in sensitive populations (e.g. individuals with Wilson's disease)

Both the maximum contaminant level goal (MCLG) and action level (AL) for copper were established based on the prevention of acute nausea

Corrosion and leaching is limited to water systems that have water quality that is aggressive to copper

For those systems with aggressive water quality, corrosion can occur to copper plumbing of any age

# Potential Revisions: Copper Public Education

The Agency is considering requiring copper public education materials for systems exceeding the copper AL and/or a brief informational statement to consumers served by systems which have water quality aggressive to copper

These materials may be delivered to all consumers in the distribution system in a way similar to how consumers are educated about lead after a lead action level exceedance

# Potential Revisions: Copper Public Education

Topic areas for educational materials include:

What copper is, the possible sources of copper in drinking water and how copper enters drinking water

Copper health effects

Steps the consumer can take to reduce their exposure

Why there are elevated levels of copper in the system's drinking water and what is being done (if anything) to reduce the copper levels

What other plumbing materials are available for use in water qualities aggressive to copper

# Example Stakeholder Input Questions for: Copper Public Education

What does effective copper public education language look like which increases awareness of the health effects, yet is simple and cost effective?

If public education materials or informational statements are required, what information should be included?

# Goals and Objectives of Rule Change: Lead Service Line Replacement

Remove sources of lead in the distribution system

Encourage optimization of CCT to prevent lead leaching

Address environmental justice concerns associated with LSLR

Maintain and enhance enforceability of the LCR

# Background: Lead Service Line Replacement

Systems that exceed the lead action level, in two consecutive 6-month monitoring periods, after installing CCT and/or SOWT, must replace at least 7% of LSLs annually

systems can do full or partial LSLRs, or "test out" a LSL if all samples from the line are at or below the lead AL

systems must replace the portion of the LSL they own

it must offer to replace the private property owner's portion at his or her expense

the system is not required to replace the privately-owned portion

Systems conducting partial LSLRs must:

Notify customers at least 45 days prior to replacement about the potential for increased lead levels

Collect samples within 72 hours of replacement and provide results within 3 days of receipt

# Background: Lead Service Line Replacement

Systems can discontinue LSLR whenever lead tap samples are at or below the AL for 2 consecutive 6-month monitoring periods; the system must recommence if samples subsequently exceed the AL

Currently environmental justice concerns raised because only those who chose, and have the ability, to pay for replacement of the private portion of the LSL gain the benefit of total removal of the lead source

# Background: LSLR - Science Advisory Board Report

EPA asked the Science Advisory Board (SAB) to evaluate the current scientific data regarding the effectiveness of PLSLR

The SAB review centered around five issues:

- Associations between PLSLR and blood lead levels in children
- Lead tap water sampling data before and after PLSLR
- Comparisons between partial and full LSLR
- PLSLR techniques
- The impact of galvanic corrosion

## Background: LSLR - Science Advisory Board Report Continued

The 2011, final SAB Report found that:

> "the quantity and quality of the available data are inadequate to fully determine the effectiveness of PLSLR"
>
> PLSLRs have not been shown to reliably reduce drinking water lead levels in the short term
>
> PLSLR is frequently associated with short-term elevated drinking water lead levels, suggesting the potential for harm rather than benefit during that time period

# Potential Revisions: Lead Service Line Replacement

To facilitate full LSLRs, revise the definition of **control** to include that portion of the LSL not currently owned by the system, but that may be under the system's control because it has the authority to set standards for construction, repair, replacement or maintenance of the line

Delay mandatory LSLRs until after CCT re-optimization

Elimination of the PLSLR requirement when the property owner does not agree to pay for the replacement of the portion of the LSL on private property

# Potential Revisions: Lead Service Line Replacement

Full LSLR would be required if the:

system owns or controls the entire LSL, or

the property owner agrees to pay for the replacement on the private side, or

if the water system voluntarily pays the entire cost.

Elimination of the “test-out” provision

Require systems to provide impacted residents with a NSF/ANSI 53 certified pitcher-filter or other treatment unit that removes lead before LSLRs begin

# Example Stakeholder Input Questions for: Lead Service Line Replacement

When optimization does not bring lead levels under the AL how should systems reduce exposure from LSLs in a way that protects public health, is feasible and assures equitable protection among the system's users?

What are the environmental justice concerns associated with LSLRs? How can an even distribution of benefits be achieved, to avoid either disproportionate health or economic impacts?

# Comments and Feedback

Copper Public Education and Lead Service Line Replacement

# Questions/Discussion

To National Drinking Water Advisory Council, Comments by Susan Kanen, 9/26/2012

Drinking water chemist formerly with a federal agency, and an independent researcher since 2005,
808-226-3669, skanen144@yahoo.com

Compliance with the Lead and Copper Rule (LCR) does not accurately determine if the public is exposed to harmful levels of lead leaching into drinking water from lead service lines (LSL).

**a)** Research in DC on lead leaching in drinking water from LSL pipeloops is misrepresented and manipulated to falsely demonstrate results that underestimate lead leaching in an attempt to be consistent with LCR Compliance as presented by DC Water utility
**b)** DC Water is manipulating LCR Compliance using site selection, sampling protocol, seasonal sampling
**c)** Over time additional studies are documenting the failure of the LCR to be protective of public health. Included in my comments is a list of quotes from experts that lead contamination in drinking water from LSL is still an issue.

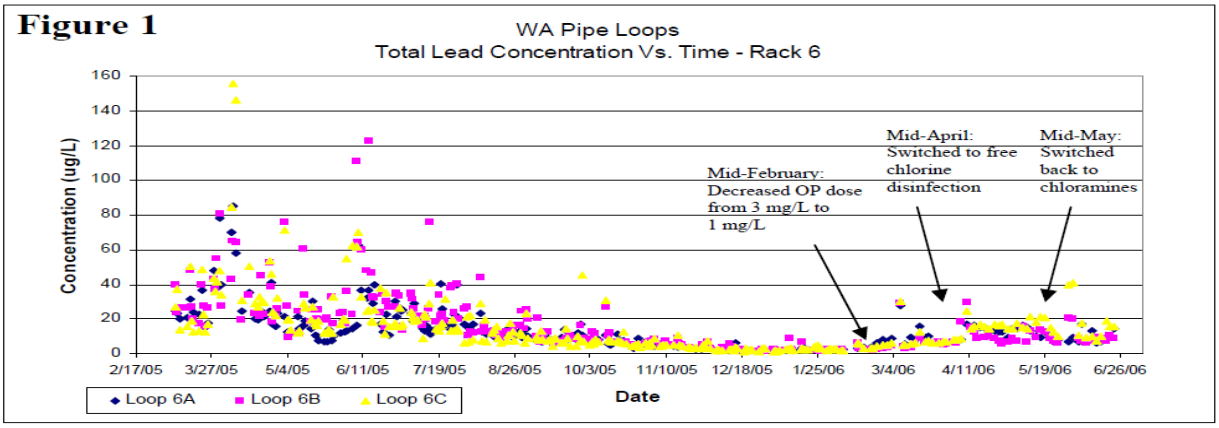
Adherence to the current LCR underestimates the exposure to the public of lead contamination of drinking water from LSL and the LCR is not protective of public health.

## DC LEAD PIPELOOP STUDIES

I observed the Dalecarlia LSL pipeloops in Washington, DC produce over 100 ppb lead at the 2005 summer temperature peak. This was one year after system-wide addition of orthophosphate corrosion inhibitor. There has been over 10,000 lead concentration data points in this experiment. The data was misrepresented online until July 2010 and manipulated data continues to be posted online to this day.

The EPA presentation of the data removed from online at the EPA website on DC Lead in July 2010:
http://www.epa.gov/dclead/WA_rack_6_Aug06.pdf

***Washington Aqueduct Pipe Loop Study – Updated August 2006***



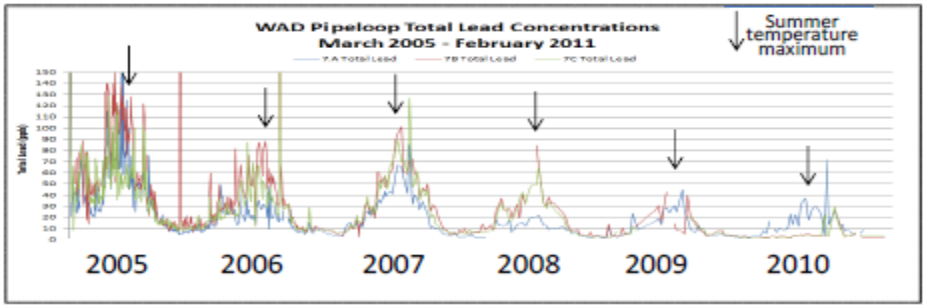

This 2006 chart above was from the data generated by the experimental conditions at Dalecarlia water treatment plant. From this chart, it looks like the lead was high and over time diminished to levels below 15 ppb and the lead leaching was solved once and for all end of 2005. The three loops of Rack 6 in this

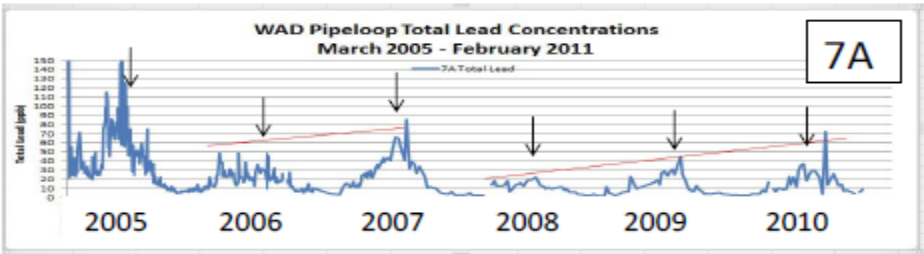
chart with additional caustic added and were not representative of water distributed to DC residents as in Rack 7 with pH control using lime. The data from unrepresentative Rack 6 was further misrepresented by cutting off the data after June 2006 thus truncating the known recorded upturn in the lead results (data points from 30 to 60 ppb in Rack 6, summer 2006) due to warmer weather. This upturn can be seen on this chart although the expanded y axis obscures the amplitude of the returning upturn in lead results for the spring of 2006. All data points were reported are too low since not all the piping in the loops was lead and the additional water from plastic pipe diluted the lead results by a factor of about two times. A large font on the data points rather than a line chart further obfuscates the results. The lead in DC drinking water crisis was claimed to be solved at the time of second semester 2005 LCR Compliance results and the WA lead pipeloops research was misrepresented in an attempt to falsely confirm this. The EPA finally removed these two pages from their website on DC Lead, Corrosion Control Research in July 2010. The replacement charts in the years since representing this study are from three triplicate loops of Rack 7 which is more representative of distribution water to DC. I have been pointing out the continued misrepresentation in the data presentations recorded in the Technical Expert Working Group (TEWG) minutes since February 2011.

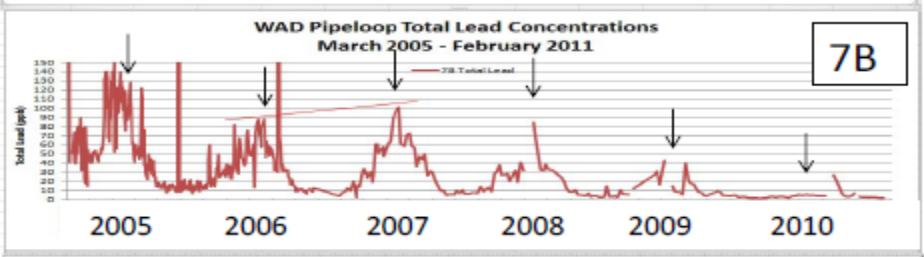
From my version of the data in the multi-colored line chart below, the three triplicate loops of Rack 7 can be clearly seen. Up to 4/2008 the triplicate values are in very good agreement and on parallel courses. Up to 4/2008 the three loops are consistently proportional to each other. The reason for this is at the time of startup, the 13 foot of LSL used for each loop was attached by the plumbers to variable amounts of nonleaded piping. The center loop 7B in red on my chart is usually more concentrated in lead since the center pipeloop was closer to the sample tap location. Loops 7A and 7C left and right were farther from the center tap and had more nonleaded piping and therefore their lines are consistently below 7B in lead concentration due to dilution of water contained in extra nonlead piping used to connect the loop to the sample taps. Before 4/2008 all three loops peaked each year at the summer's maximum temperature. Zoom in on the first chart below with all three loops. Also look at each three loop charted separately on the next page. Seasonal lead peak at the exact time of the temperature peak and the change in the proportion of the three loops to one another are patterns very well established for three years at WA loops. The repeating impression crafted by WA authored charts is that of continual improvement in lead levels, but careful observation of my version of the data shows times of increasing lead levels. Dates of unexplained missing samples are more apparent in my charts below. The same data is used by WA in the black bar graph later in this report has a much different effect. Misrepresenting the data in 2006 with the Rack 6 results continues again. In 2006, the EPA/WA chart lead levels dropped to successfully diminished levels over about 4 months, just like the LCR Compliance in DC success. This was exposed in the pipeloops chart with return of summer lead levels in rack 7 in 2006, 2007, up to 4/2008 when the appearance of the WA pipeloops data falls apart. Now the WA charts seem to be trying to show high levels at summer peaks slowly over 8 years diminish to acceptable <15 ppb. I didn't buy this story in 2005 and I don't buy it now. The WA pipeloops were/are being misrepresented and manipulated. This research is potentially of much better quality than looking at LCR Compliance data to assess effectiveness of corrosion control on lead leaching from LSL. The WA pipeloop data is from the same sites repeated in triplicate over years generating multiple lead concentration values with computer controlled sampling protocol and stable ambient conditions. In

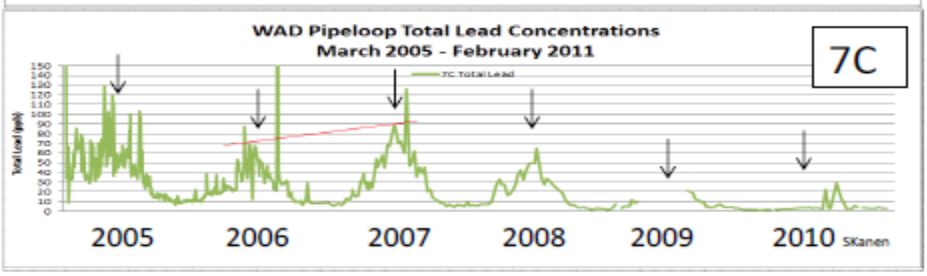
future studies, I hope scientists will more carefully control the most important variables demonstrated at WA pipeloops of temperature and pH before assessing any other contributors to lead leaching from LSL.

Chart below authored by SKanen:

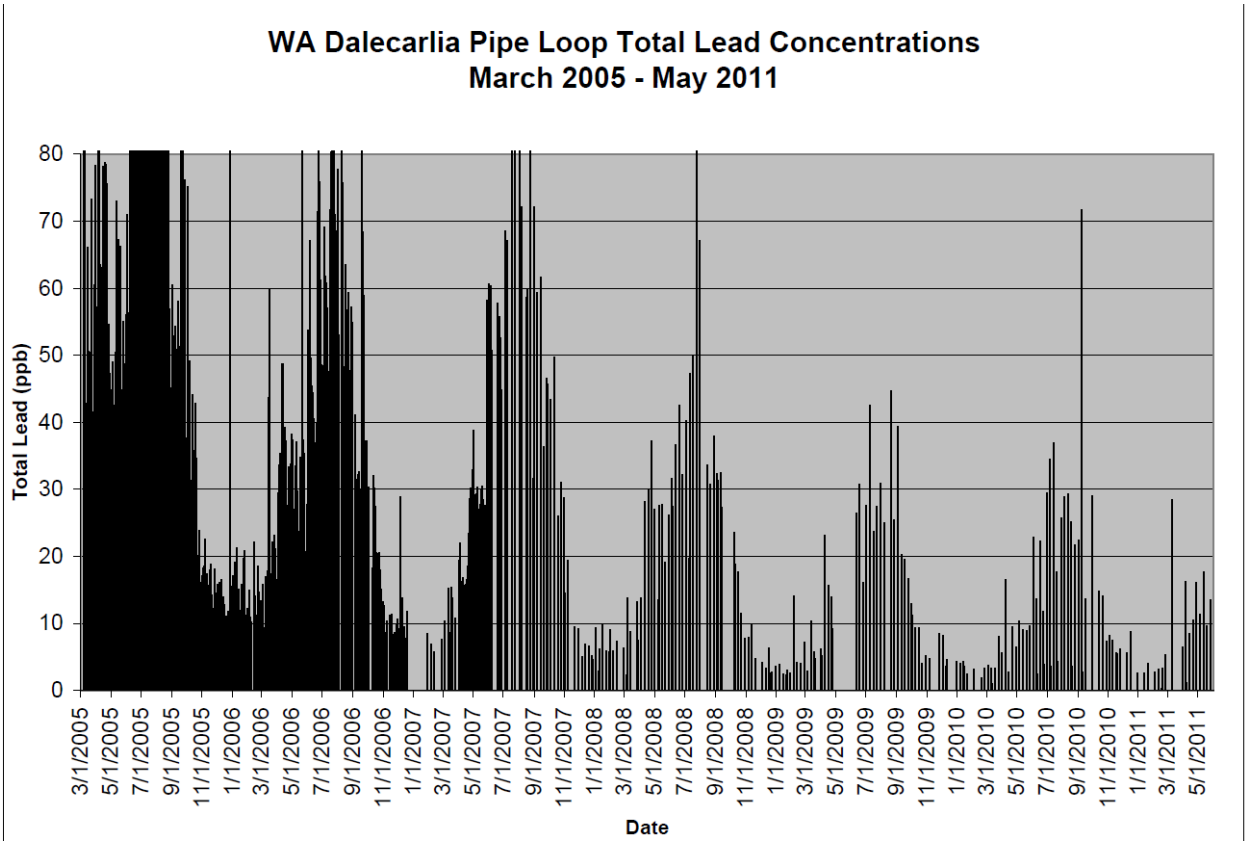


I produced the previous multicolored line chart from the same data that the Washington Aqueduct (WA) produced the following black bar chart below. Both charts appear in the June 2, 2011 TEWG minutes. http://www.epa.gov/dclead/TEWG632011.pdf



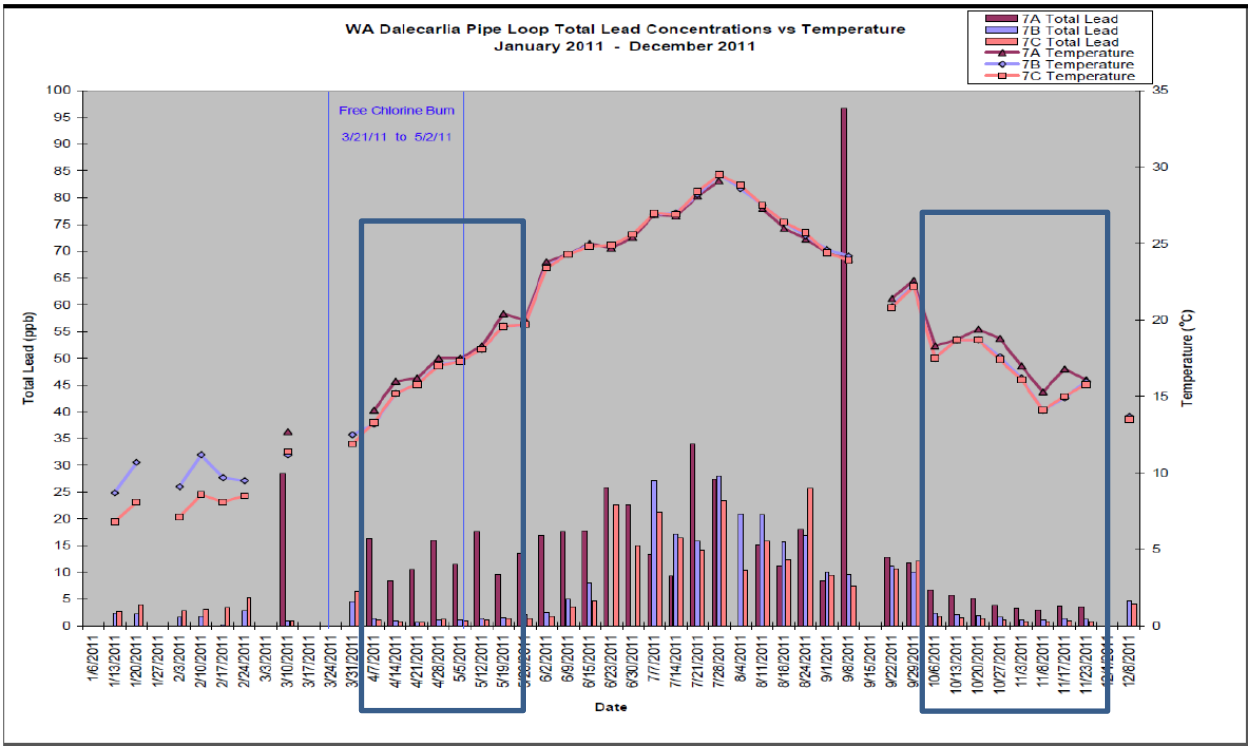

Note the WA version has no legend describing 3 separate loops or that they are from Rack 7 with lime not the discontinued Rack 6 experimental loops with caustic added as posted online until July 2010. The three separate triplicate loops 7A, 7B. 7C cannot be differentiated in this WA version. The data is grossly misrepresented and evidence of manipulation can be seen by comparing to my version of the same data. There is a lack of agreement in the three triplicate loops starting 4/2008 and the totally missing samples of loop 7C in summer 2009. In evidence is three years from 2005 to 4/2008 of lead leaching at over 100 ppb (correcting for sample dilution with plastic tubing) varying exponentially with temperature. After 4/2008 when the contractors no longer monitored this project at the WA, the data losses this pattern and summer peaks are missing and the three loops no longer agree. Now in 2013 predictably as a result of gross manipulation, the WA pipeloops charts have flat lined to no more lead leaching at all. See the chart presented for the Aug 2, 2013 TEWG meeting below. I believe this erroneous collection of data in the chart below is contrived to find agreement with the false impression of the low level of lead leaching from LSL done by DC Water in their presentation of LCR Compliance results.

Stagnation time manipulation was in evidence in the next chart below for WA pipeloops showing only 2011 data. This was hidden by in the black bar chart above by reformatting the three separate data series from loops 7A, 7B, and 7C to black (not the grey scale default setting) to hide in some years over 20% missing scheduled samples and that the three triplicate loops were no longer in agreement.

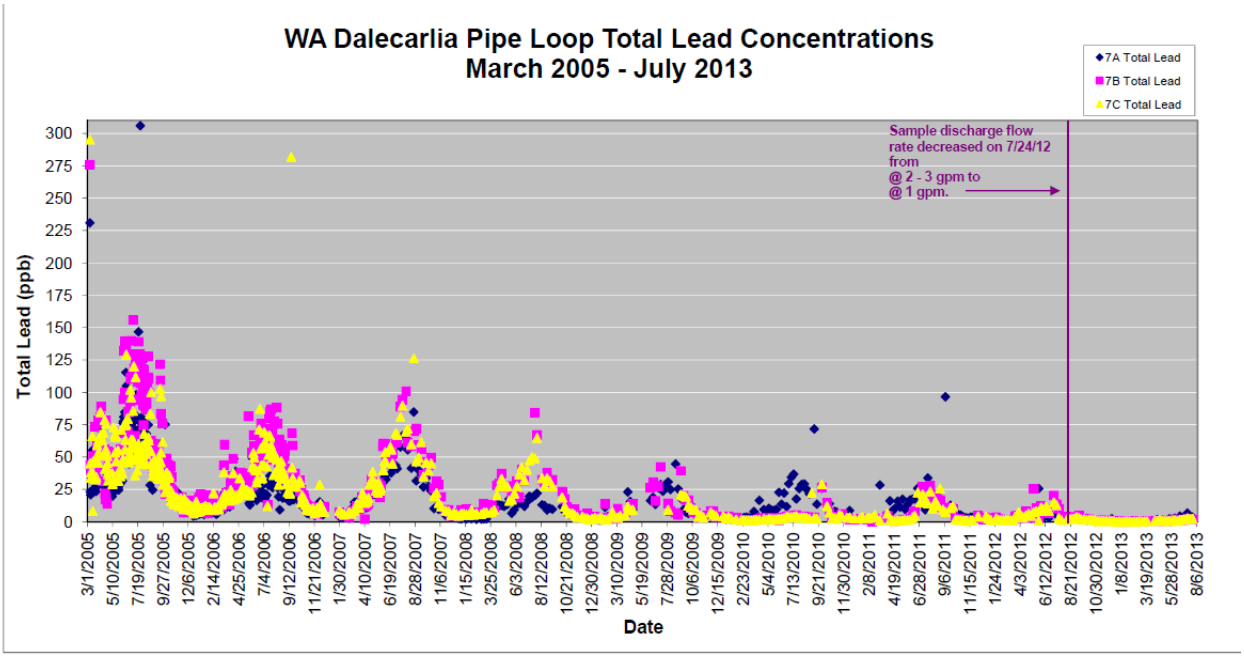
If stagnation time is manipulated in one loop, there can be no confidence that the technique of varying stagnation time is not an ongoing proposition. On my independent sampling there in July 2011, I was not allowed to observe stagnation time of samples in the loops and the LSL pipeloops were still generating 55 ppb lead (corrected for dilution water from non lead piping) as late as July 2011, seven years after optimal corrosion control treatment.

The room temperature deep in the lower floors of the Dalecarlia treatment plant is slightly different than river temperature and it takes time for the water in the lead pipeloops to equalize to ambient room temperature. The different lead and temperature results in loop 7A as opposed to 7B and 7C indicate the three triplicate loops were not soaking the same length of time therefore not leaching the same amount of lead in the spring and winter of 2011. See inside blue rectangles. Loop 7A has consistently higher temperatures than 7B and 7C for the dates that it has higher levels of lead leaching. All three loops, 7A, 7B, and 7C are supposed to be triplicate samples. Interesting that loop 7A with historically in 2005 to 4/2008 had lower lead levels than the other two loops, in 2009 and 2010, loop 7A has the highest lead levels of the three loops of Rack 7.

Evidence of stagnation time manipulation in the chart below:



Note in this latest WA version below, at my suggestion, the legend is back identifying the three separate loops. The deceptive bars with black reformatting are replaced by three colors of data points. Still their fonts are unnecessarily too large hiding much data. Despite all the irregularities I have pointed out over years, the EPA officials seem to do nothing to hold WA to account. I would volunteer to investigate this experiment with an independent committee to validate that all data was included and experimental conditions were not altered without notification over the course of the experiment.




Misrepresentation of the WA pipeloops in the following AWWA and EPA report:

Awwa Research Foundation
Advancing the Science of Water®

EPA

## Contribution of Service Line and Plumbing Fixtures to Lead and Copper Rule Compliance Issues

The WA pipeloops are discussed in this report posted on

http://www.epa.gov/dclead/corrosion_research.htm with a link to

http://www.waterrf.org/PublicReportLibrary/91229.pdf

My assessment of this report:

## 3 Factors in Error in AwwaRF 3018 concerning WA Pipeloops:

- 1. Dilution by non-lead pipe = **2.0/1.1** ratio of total water volume to leaded pipe volume
- 2. Selective averaging of concentration values of lead at cooler temperatures taken from Nov05 –May06 Racks 2,3,6,7 and average to Nov05-Jan06 values for Racks 1,4,5. Only Rack 7 is valid, all racks used in AwwaRF 3018 average of **7.3 ug/l**. (true level at summer peaks of **80ug/l** for 2005,2006,2007)
- 3. Omitted factor for total number of liters in a LSL, a factor from 4.4 to 10 times. Using factor of 4.7 of Table 3.9:
- RESULTANT % ERROR IN MASS OF LEAD FROM LSL BASED ON WA PIPELOOPS= **683/17.1=4000%**

The data analysis of the WA pipeloops by the EPA and AWWARF missed the contribution of LSL to lead leaching as demonstrated at the WA pipeloops by a factor of 40X. Nevertheless the full report does afirm the major contribution of LSL to lead in drinking water contamination.

**Table ES.1**
**Average % Contribution of Major Lead Sources**

| Lead Source | Average % Contribution to Mass of Lead Measured at Tap during Profile Sampling [1] |
|---|---|
| Lead Service Lines | 50% - 75% |
| Premise Piping | 20% - 35% |
| Faucets | 1% - 3% |

[1] From sites with lead service lines. Based on "mass of lead" results measured at the tap from sequential samples collected for this study

The other two lead pipeloops sites are at the McMillan site in DC and at DC Water utility. Data from these two lead pipeloop sites, if examined carefully, erroneously portray lead leaching from LSL as a problem solved. Since most of the lead is particulate, the McMillan pipeloops being horizontal and sampled at low flow rate leave much of the lead generated behind sedimentated in the loop at the time of sampling see my report on Particulate Lead in the TEWG minutes of 3/2/2012. I demonstrated this in lead measurements of the water to drain immediately after sampling at the McMillan loops. The DC Water pipeloops are a recirculating system with the 100 liter tank water replaced every 24 hours. Any lead leached from LSL in about 1 liter is diluted 100X before sampling. The current DC Water pipeloops

generate lead at the rate of 9X an LCR Compliant sample. My calculations and concerns are outlined in TEWG minutes of 8/26/11 with these calculations below from sampling done July 2011.

All three pipeloop sites have been adjusted to give the public a false sense of security that the lead in water crisis is solved.

| | Length of lead pipe, 1 foot contains 0.095 liter/ft | | Lead results from 3 sites analyzed by Virginia Tech | Dilution by non-leaded compo-nents of the loop | Select a stagnation time | Total lead mass in ug generated per loop | Lead mass in **ug per foot LSL**, 8 hours stagnation, temperature 28 deg C, pH 7.7 | All lead generated contained in the water volume inside lead pipe | Comparing to 15 ppb compliant samples |
|---|---|---|---|---|---|---|---|---|---|
| SITE | Calculate: ⇨ | | ppb or ug/liter | times | times | equals | divide by feet of lead pipe per loop | divide by 0.095liter/ ft | divide by 20 ppb |
| WASA 7/12/2011 | 9 ft (0.86 liter) | | **4 ppb** | 100 liters 0.86 | 8 hours 24 hours | 155ug | 155 ug/ 9 ft = **17** ug/ft | 180 ppb or ug/liter | **9X** |
| McMillan 7/8/2011 | 12 ft (1.14 liter) | | **3.5 ppb** Loop 3 | 2.0 liters 1.14 | 8 hours 8 hours | 6.1ug *10ug | 6.1 ug/12ft = **0.51** ug/ft *10 ug/12ft = **0.83** ug/ft | 5.4 ppb *8.7 ppb | ***0.44X** |
| Dalecarlia 7/7/2011 | 13 ft (1.24 liter) | | **27 ppb** Loop 7B | 2.0 liters 1.24 | 8 hours 8 hours | 44 ug | 44 ug/13ft = **3.4** ug/ft | 36 ppb | **1.8X** |
| | | | | | | | | | |
| LCR compliant sample | 10.5 ft (1.0 liter) | | <15 ppb | none | 8 hours 6 hours | <20 ug | <20 ug/10.5 ft=**<1.9ug**/ft | 20 ppb for 8 hours stagnation | 1X |

*includes ug of lead flushed by two volumes of water through the loops to the drain immediately after sampling, does not include any ug lead generated during 8 hour stagnation left behind in the loop after sampling

## DC WATER LCR COMPLIANCE SAMPLES

Do all sites used by DC Water for LCR Compliance meet Tier 1 requirements? NO

Errors in service line material record keeping is not a new problem with DC Water (WASA). http://www.epa.gov/dclead/index.htm in 2006 "DC WASA to Pay $10,000 Penalty for Reporting Errors". Twelve samples were invalidated from the 2nd semester 2005 LCR Compliance list and 37 sites were removed from the 2006 LCR sampling list **because the LSL was fully replaced**. For 2nd semester 2012 LCR samples from Washington, DC, an amazing 67% rarely produce lead concentrations over 3 ppb in first or second draw. One explanation is some of these sites **have fully replaced LSL**. The site, 43XX 38th St NW, was removed from 2012 LCR sampling list since it no longer had LSL. 43XX 38th NW sampled 11/4/11 was posted online as having a copper service line on DC Water's 2nd semester 2011 LCR sample list. I was told it was posted as copper service in error online, that on 11/4/11 the site still had a partial LSL and it was replaced in 12/2011.

How the non LSL invalidations even showed up in 2005 was the customer wrote on their chain of custody-this house doesn't have a LSL. The second 2005 LCR Compliance was calculated with three sites on it with known LSL totally replaced, non Tier 1 for LCR left on because WASA didn't know at the time

of sampling and reporting the service material. This is OK with EPA. The final LCR calculation for 90 percentile for semester of 2nd semester 2005, the first LCR compliant semester in DC since exceeding LCR action level for lead, a change of ***one site, one ppb of lead*** and the whole city of Washington DC would be out of LCR Compliance. This is absurd. (on the second semester 2005 Compliance list with completely replaced LSL are "A" St. Huidekopper Pl and Carrollsburg Pl). Lisa Donahue of EPA wrote to file signed on June 4, 2006 there were OTHER fully replaced sites on 2nd 2005 LCR Compliance list. How many in 2005, in 2013? For years I have been concerned that up to 50% of the LCR Compliance list may be from fully replaced LSL based on Feb 2002 EPA Guidance documents. How would anyone know?

Since 2005, there are exactly 1666 LCR Compliance samples site collections from DC Water posted online (about 200 per year X8 years). I sorted them by site and marked samples I considered from a site that consistently with few exceptions from year to year produced <3ppb for lead for first and second draw. These could be fully replaced or altered LSL sites. Very disturbing are sites with lead data >3ppb that seem to convert from a lead producing site (>3ppb) **suddenly** in one semester to a non lead producing site (<3ppb) and remain non lead producing from then on. All the 2nd 2005 invalidated sites with nonLSL had less than 3 ppb lead for first and second draw. All three that were revalidated since they had truely LSL had at least one sample over 3 ppb averaging at 7ppb. Possibly, a true LSL may always produce at least one draw over 3ppb lead in water with 2005 protocol. (Pipeloops, 10,000 samples, even in the winter had measurable low lead levels all loops, usually over 3ppb.) Using this low lead level to point to other such fully replaced sites, there are 21 more low level sites in compliance 2nd 2005. Maybe the lost 10 sites of 0508093, are low level lead too and fully replaced LSL. From 2nd semester 2005 there were 3 (revalidated)+ 12 (invalidated and replaced)+21 (low producing lead < 3ppb) +10(missing from #0508093) possibly 46 non LSL sites. WASA may be approaching 50% fully lead replaced sites being initially submitted for 2nd 2005 compliance.

50% fully lead replaced sites is okay with EPA in a 2/2002 Guidance document. I checked for low level lead sites (<3ppb both draws) for first half 2006--close to 50% also!! This percentage has increased about 3% per year and is now 2nd 2012 semester at 67% of LCR Compliance samples at usually <3ppb first and second draw. All compliance semesters for at least 50% of sites <3ppb both draws pointing percentages of potentially fully replaced LSL being used for LCR Compliance. This would also explain EPA directing WASA in the past to ask more questions on the chain of custody forms to be sure that a home with a full lead replacement has at least as an alternative lead solder or interior lead pipes to assure Tier 1 status. If EPA is assured that a fully LSL replaced site meets the lead solder/interior pipes criteria they may or may not have just left it in the sampling pool up to 50% of the sampling sites. Next quote is from EPA Guidance Feb. 2002 interpreting the LCR law.
http://www.epa.gov/ogwdw/lcrmr/pdfs/guidance_lcrmr_monitoring_reporting.pdf

Labeled on page 19 (page 26 of 105 pdf): **"Tier l** sampling sites are single family structures: ***with copper pipes with lead solder installed after 1982 (but before the effective date of your State's lead ban) or contain lead pipes; and/or*** that are served by a lead service line." Labeled on page 20 (or page 27 of the pdf):"If your system contains lead service lines, then, if possible, half of the required sampling sites should be served by a lead service line. "

Research in the above AWWARF table states the LSL contributes 50-75% of lead in water contamination for LCR testing. With no LSL, making LCR Compliance is so much easier. **Every year** 2007-2012, an average of 30 LCR samples are from new sites that are added each year to DC Water's sampling pool. For 2012, also 17/26 of the new sites that are on the LCR Compliance list for the first time show up at with <3ppb first or second draw. A sample testing out at <15 ppb can be considered 'chemically' replaced. How can all these low producing sites at consistently <3ppb first or second draw possibly be worst case sites?

I am requesting that the EPA to do an **independent audit of LCR Compliance samples for service line material**. What documentation of LSL does DC Water actually have on their LCR sampling list? Is 50% fully replaced LSL still acceptable for LCR site selection?

Are all samples that are collected used in calculating LCR Compliance? NO

It is not reasonable that any samples be thrown out at all since this invalidates getting a representative sample citywide. This was done recently in New Orleans where high leaded samples were not included in the LCR percentile calculations. From FOIA'ed data, WA submitted samples from the work order# 0508093 that had 64 samples with 32 first draw and 32 second draw samples. Ten first draw samples within the sequence did not appear on the LCR Compliance list. These were not invalidated due to non LSL material. Were the results thrown out? Why? (#0508093-007, 009, 011, 027, 031, 041, 045, 053, 055, 057).

A very high percentage of sample bottles distributed to DC Water customers do not return. How do we know when these potential samples are lost to the sampling pool? Were they pretested with paper strip tests for lead and discarded if high? I recommend a serial number be placed on sample bottles and the customers mail in a postcard to EPA verifying they took the samples, sealed them with a tamperproof seal, placed then outside for pickup, and noticed they were picked up.

I observed in 2005 many sample bottles (about 200 a week in 2005) labeled for LCR Compliance including names and addresses and date sample. Some returned at one time having had samples in them but were never logged in for LCR testing. Only 400 per year are needed to sample for LCR. Why all the bottles?

Does LCR sampling protocol target portion of water stagnant in LSL? NO

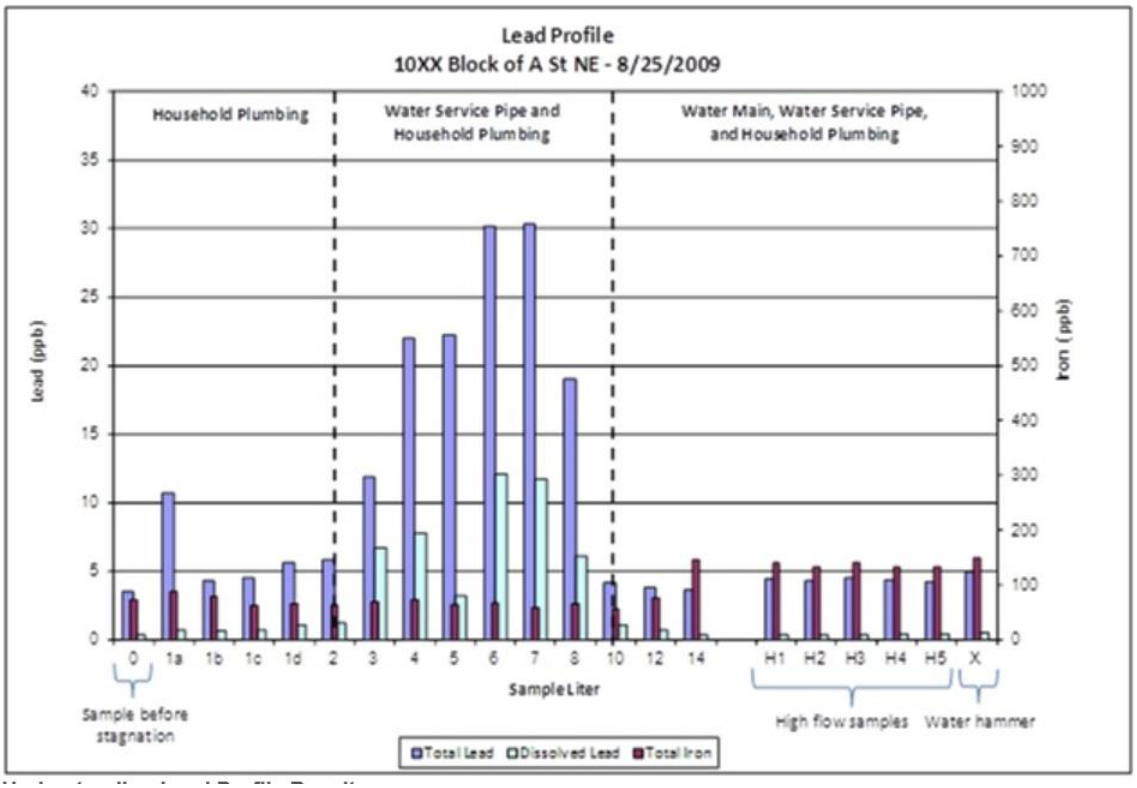
From lead profiles, the water stagnant in the LSL is captured in about the 3$^{rd}$ to 11$^{th}$ liter depending on the site. A tap flows about 7 liters per minute. The LSL exposed water starts to come out the tap at about the time of 30 seconds (0.5 minutes X 7 liters/minute= 3.5 liters into the lead profile) and ends at two minutes (2 minutes X 7 liters/minute = 14 th liter) after the tap is turned on. The first draw sample does not catch the portion of the water exposed to LSL. FOIA'ed results from 2$^{nd}$ semester LCR for DC document that the time between 1$^{st}$ and 2$^{nd}$ draw for LCR Compliance samples averaged 6 minutes. Any water contaminated by LSL is long gone by then. The LCR must be amended to drop the protocol of flushing until a temperature change between draws. No one will answer when I ask during TEWG conference calls, how long the tap runs between LCR samples currently. Also any preflushing the night before removes any water left in the plumbing that may have been exposed to LSL prior to sampling.

Are LCR samples representative of the known highest lead leaching times of the year? NO

All three lead pipeloop research sites demonstrate that the lead levels peek during the summer. DC Water LCR Compliance sampling (see below) routinely misses an average of 60 consecutive days each summer.

| | | | | | TOTAL | DAYS MISSED | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | MAY | June | JULY |
| 2005 | | 15-Apr | TO | 26-Jul | 70 | 15 | 30 | 25 |
| 2006 | | 19-May | TO | 24-Jul | 64 | 11 | 30 | 23 |
| 2007 | | 24-May | TO | 23-Jul | 58 | 6 | 30 | 22 |
| 2008 | | 5-Jun | TO | 29-Jul | 58 | 0 | 30 | 28 |
| 2009 | | 21-May | TO | 27-Jul | 65 | 9 | 30 | 26 |
| 2010 | | 27-May | TO | 27-Jul | 58 | 3 | 30 | 25 |
| 2011 | | 19-May | TO | 26-Jul | 66 | 11 | 30 | 25 |
| 2012 | | 29-May | TO | 23-Jul | 53 | 1 | 30 | 22 |

Example of a Household Lead Profile




This lead profile posted on DC Water website. Note liters #2-10 represent LSL exposure. Lead leaches from the LSL exposed liters at 30 ppb on 8/25/09. This is not the hottest day of that year and most likely it was taken in the morning after stagnation for 6 hours at night which is not the warmest time of the day. This is just an example and may not be the worst case DC Water has in their files. They are reluctant to say on the TEWG calls. As demonstrated at WA pipeloops, the lead concentration that leaches from

LSL doubles every 5 degrees C. This profile could potentially be 60 ppb in the portion stagnant in the LSL at the highest possible temperature it is exposed and this in 2009, five years after EPA declared DC Water LCR Compliant. Much of this lead (up to 70%) is particulate and therefore can sediment and dislodge at a variable rate exposing consumers to much higher slugs of lead precipitate should the flow rate of water sampling be greater for the consumer than the low flow rate recommended by paid consultants to DC Water for LCR sampling.

## Quotes:

12/2005 **Investigation of Higher Than Standard Lead Concentrations in Drinking Water From Washington, D.C**

Adarkwah, N. E.; Ararso, I.; Garcia, N.; Goldman, A.; Lieu, C.; Mondragon, J.; Swamy, V.; Unigarro, M.; Cuff, K. **http://adsabs.harvard.edu/abs/2005AGUFMED43A0839A**

"The majority of samples collected from the D.C. area were obtained from schools and homes located in the central north-northeast section of the District. Of these samples, 72% contained lead in excess of the EPA action limit. Despite reports that lead levels have fallen significantly over the past year, 63% of all homes tested during the second year of our study still contained lead levels that exceed the EPA limit."

**Association between children's blood lead levels, lead service lines, and water disinfection, Washington, DC, 1998–2006** Environ Res. 2011 Jan;111(1):67-74. doi: 10.1016/j.envres.2010.10.003. Epub 2010 Nov 26

http://www.washingtonpost.com/wp-srv/metro/documents/cdc_dc_water12012010.pdf

"Conclusions: LSLs were a risk factor for elevated BLLs even when WASA met the EPA water action level"

**Public Health Protection under the EPA Lead and Copper Rule**

Dr. Yanna Lambrinidou and Dr. Marc Edwards Posted on **April 1, 2013** by **Public Health Law Research**

http://blogs.law.harvard.edu/billofhealth/2013/04/01/public-health-protection-under-the-epa-lead-and-copper-rule/

"The LCR's monitoring requirement allows utilities to conduct testing in ways that can miss serious lead-in-water problems in their jurisdictions. This can lead to prolonged exposures by consumers who assume that their water is safe."

**Detection and Evaluation of Elevated Lead Release from Service Lines: A Field Study**

*Environ. Sci. Technol.*, **2013**, *47* (16), pp 9300-9307 **Publication Date (Web):** July 23, 2013 **DOI:** 10.1021/es4003636 Miguel A. Del Toral, Andrea Porter, and Michael R. Schock

"current sampling protocols will often considerably underestimate the peak lead levels and overall mobilized mass of waterborne lead in a system with lead service lines."

## Summary and suggestions for action

The research from lead pipe loops in DC has been misrepresented and manipulated and underestimates the concentration of lead leaching from LSL. Adherence to LCR is NO guarantee that the public is safe from significant lead exposure from LSL. I observed the >100 ppb particulate lead peak at the WA pipeloops in summer 2005. Others too are also coming to realize that the public is exposed to lead leaching into drinking water from LSL at levels detrimental to health; despite the claims of DC lead pipeloop research and DC Water LCR Compliance numbers.

To the National Drinking Water Advisory Council, please support:
1) A public warning not to use tap water from LSL for making infant formula

2) Appoint independent committee including myself to investigate misrepresentation and manipulation of lead pipeloops at Dalecarlia, McMillian Plants and the DC Water utility.

3) Investigate DC Water LCR Compliance sites actually confirm LSL Tier 1 requirements (full lead or partial lead) and are not altered to miss lead leaching from LSL.

4) Amend LCR protocol to sample water actually stagnant in LSL at warmest time of the year and representative-of-actual-use high flow rate. Prohibit pre-flushing before LCR sampling.

Non-Ferrous Founders' Society

1480 Renaissance Drive • Suite #310 • Park Ridge, IL 60068
Phone: 847-299-0950 • Fax: 847-299-3598 • E-mail: nffstaff@nffs.org • http://www.nffs.org

February 25, 2013

Reduction of Lead in Drinking Water Act of 2011
Jeff Kempic
U. S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
***Mail Code:*** 4607M
Washington, DC 20460

Dear Mr. Kempic:

The Non-Ferrous Founders' Society (NFFS) respectfully submits the enclosed comments in response to the request for additional input put forth during the public meeting on Implementation of the Reduction of Lead in Drinking Water Act that was held on Thursday, August 16, 2012.

To begin, the Society and its member foundries understand the difficult position that Congress placed the agency in, and the difficult challenge the agency faces in developing the standards and regulatory approaches required to achieve the objectives of the Lead Free Act within the constraints of the legislatively-mandated effective date. We commend the agency for its open outreach to stakeholders – including the manufacturers of products that fall under this law –to understand their concerns. We believe that an honest an open and honest dialogue among all parties can provide the basis for successful development of the implementing standards, regulations, and enforcement mechanisms required by the law.

The Non-Ferrous Founders' Society and its member foundries stand ready to collaborate with the EPA in implementing this legislation, thereby achieving the goal of reducing the lead exposures from potable water. To that end, we are pleased to provide our input and comments as contained in the following pages.

Sincerely,

Executive Director

JLM/
Enclosure

# Reduction of Lead in Drinking Water Act of 2011

### Comments on the Scheduled January 4, 2014 Implementation by the Non-Ferrous Founders' Society

## Introduction

The Reduction of Lead in Drinking Water Act was signed on January 4, 2011 and becomes effective on January 4, 2014. It changes the definition of lead free materials used in potable water applications from 8% to not more than 0.25%, and, in addition, expands the definition to cover both the plumbing fittings and fixtures. It was modeled in part upon the AB 1953 law enacted in the state of California that was passed into law on September 30, 2006, with an effective date of January 1, 2010.

EPA held a stakeholder meeting in August of 2012, at which time the agency noted that enacting the required standards and regulations to implement the new law would not be as simple as taking the existing rules and changing the allowable content limit for lead from 8% to 0.25%. In fact, the agency identified several key questions on implementing the requirements of the Act where it needed to solicit additional input from the industry before proceeding.

## Background

Many metalcasting industry organizations - including both the Non-Ferrous Founders' Society and the American Foundry Society - opposed the enactment of the AB 1953 regulation when it was first introduced in California in 2006. Among the reasons cited for this opposition, it was felt that the current performance-based standard (NSF 61), which evaluates the quality of the water coming out of the faucet for consumption, ensured the integrity of California drinking water and adequately protected consumers. Industry suggested that AB1953 legislation represented a rejection of the value of the NSF-61 performance standard and the NSF process in favor of an arbitrary content formula proposed within the bill without proper scientific consideration or justification. Other arguments against AB 1953 were also presented, which in retrospect are no longer deemed relevant to these comments.

Despite this opposition, and almost immediately upon the introduction of AB 1953 bill, the industry formed a consortium comprised of eleven metalcasters, six alloy producers, two

plumbing product manufacturers, a research lab, and three industry trade associations to discuss the technological implications of the enactment of the bill and to begin to lay out a roadmap to research the practical application of various alternative no-lead copper alloys. The consortium established seven sub-committees, each charged with investigation of a critical area of concern, including: health effects; alternative materials, including bismuth and silicon alloys; and production considerations (casting, machining, plating, etc.). The results of the consortium's research efforts were published in 2010.

Upon the enactment of AB 1953, and despite their prior opposition to its passage in California, the industry supported the introduction in Congress and eventual passage of national legislation which became The Reduction of Lead in Drinking Water Act of 2011, although not entirely for altruistic reasons. Rather, it was the industry's position that enactment of a national lead content standard for plumbing brass was vastly preferable to having to address a plethora of lead content rules as might be enacted by each of the 50 states. In fact, in the period between the enactment of the California law in 2006 and the passage of the RLDW Act in 2011, similar though varying laws had already been proposed or enacted by several other states.

**Current Status and General Concerns**

Upon its introduction, and even at its enactment, AB 1953 was a seriously flawed bill. It established a lead content limit for plumbing brass with no scientific investigation or justification as to whether it would achieve the goal of reducing lead exposures from water consumption. Rather, since lead exposure is known to have significant health effects, the law was guided by the common but impractical assumption that the only acceptable exposure risk level for lead should be zero. The level the law set also gave no consideration to whether companies that produce the products to be regulated could in fact actually meet the requirements of the law, nor did it provide any guidance for enforcement or standards for determining compliance. And it gave no consideration whatsoever to the costs that would be imposed on any of the affected parties, including producers, consumers, or public water systems.

To address some of the shortcomings within AB 1953, its companion bill (SB 651) proposed to strengthen the law by clarifying some of its terms and definitions, and by including a

requirement for third party certification. This is done primarily to ensure that all potable water component manufacturers – both foreign and domestic – would be required to comply with its requirements. But again, while outlining an enforcement inspection methodology, the law still gave little if any guidance on how the state of California would pay for its enforcement.

The transition of the reduction of lead content in plumbing brass regulation to the national level placed the task of overcoming the shortcomings within the California law in the hands of Congress. Regrettably, the enactment of the Safe Drinking Water Act Amendments has once again simply shifted the problem downstream. Congress adopted the national lead content limit for plumbing brass and established its effective date, but shifted the burden of enacting the required standards and regulations to implement the new law to the EPA. The problem of enforcing the law was delegated to the states.

During the stakeholder meeting on August 16, 2012, EPA staff suggested that the issues surrounding the implementation of the Safe Drinking Water Amendment would probably not be answered in a timely fashion for manufacturers. The agency has elected to incorporate revisions of the lead free content to the proposed *Lead and Copper* rule scheduled to be proposed in 2013, then, as a best case scenario, to promulgate final revisions somewhere around the date at which the SDWA amendments go into effect. It will take time to resolve questions such as product marking & labeling, third party certification, and treatment techniques that are applied to public water supply systems, but making these revisions as part of the national primary drinking water rule means they would go into effect three years after the Lead and Copper regulation is promulgated. Doing a separate rule would take considerably longer for the agency. Meanwhile, the lower lead content limits become the law of the land on January 4, 2014, and there is no regulation that the agency can use to change the effective date of the legislation.

**Specific Input Requests from EPA Stakeholder Meeting Held 8-16-2012**

During the stakeholder meeting, the agency posed several questions for which it is seeking guidance from the affected parties.

***Should manufacturers be required to demonstrate that a product is lead free, and if so how?*** The lack of compliance / enforcement guidance was one of the principal flaws in AB 1953. The requirement for third party certification was added to address that deficiency, as

well as to establish a basis for assuring that all products being offered in the marketplace would meet the requirements of the law. We believe this is the only valid mechanism by which to assure that products are lead free.

There is no way to visually inspect a product to verify that it meets the content limits of the law. Nor does EPA have either the expertise or resources necessary to specify how such testing should be performed. Should the agency therefore certify or approve third-party certifiers? We believe not. Third party certifiers have already been functioning for many years, and very successfully. Organizations such as the American National Standards Institute (ANSI) already have established procedures to achieve that objective. Should EPA mandate that a particular certifying agency be used? Absolutely not. Such action would create a certification backlog far worse than could ever be imagined. Even the International Organization for Standardization (ISO) allows for any qualified certification service (registrar) to be engaged.

Should companies be allowed to self-certify that their products are lead-free? Again, we say no. Some level of assurance beyond *"we say they are"* is needed - for the consumer, for the marketplace, and for those manufacturers who have invested heavily to assure that their products do indeed meet the law. Several agencies can provide certification/listing of NSF 372 compliance. Other test methods should also be permitted as long as equivalence is established.

***How should lead content be calculated?*** The law states that *the weighted average lead content of a pipe, pipe fitting, plumbing fitting, or fixture assembly shall be calculated to address total wetted exposure of the product, based upon each component's wetted surface area and maximum % lead content.* The lead content of the non-wetted areas are not of concern.

It is important to bear in mind that this is a content-based law. The lead content of the surface or wetted areas must be in conformance, but no treatment, wash or coating will conform to the "*content"* limit for the material. The lead leaching provisions of the earlier law were not retained in the current revision, notwithstanding the incorporation by reference of NSF 61 as a voluntary consensus standard.

***How should lead-free products be identified?*** Lead free products that meet the California AB 1953 law are already being manufactured and have been in the marketplace since January, 2010. Some manufacturers have elected to make products from both the lead-free and traditional materials, and to label products as to whether or not they are *suitable for potable water applications,* but those markings might be different for each product and/or product line, and what works in one application may not work in another.

Some manufacturers choose to incorporate a mark on the casting itself noting that it is made of a lead-free material. This mark means little to the consumer, but is essential in the recycling of products to avoid contamination of the scrap stream and to maintain the value of more expensive metal. Moreover, there are several alternative materials already in use that meet the lead content law, but might have different alloying elements. Identifying these varying materials is more important in recycling than in in-service application. Industry must be the best judge as to how these products can and should be marked.

Painting, marking, and labelling products do impose a cost on the manufacturer, but these costs pale in comparison to the cost of adapting or changing the manufacturing process itself to the lead-free material. Put another way, what goes on the outside costs far less than what goes into the product. Foundries and plumbing manufacturers have been engaged in the effort to adapt their manufacturing systems to make lead-free products since 2006.

***Should all plumbing products be required to meet the lead-free definition, or should there be "dual lines" of products allowing higher lead content for some statutorily noted exemptions?*** The law does not portend to outlaw the manufacture or the offer in commerce of products not intended for use in potable water applications. Moreover, the law as enacted contains two exemptions – one for products specifically intended for non-potable applications, the other for products such as shower valves, service saddles, or water distribution main gate valves that are 2 inches in diameter or larger. EPA does not, in our opinion, have the authority to change the intent of the law, to restrict or eliminate the manufacture or distribution of products not required to conform to the Safe Drinking Water Act Amendments, nor to mandate how they will be manufactured. The question of whether there should be “dual lines” of products has been answered within the language of the law.

***If dual product lines are allowed, how should non-potable products be identified?*** As previously noted, such products already exist in the marketplace without markings. Parts made from traditional materials (7 or 8% lead) make no reference on packaging or labeling claiming to be lead free. If products that are lead-free and thus suitable for potable water application are properly identified, no physical markings on non-potable water products should be required.

Product packaging or labelling is the most efficient way to inform the consumer that a product is fit for use in drinking water applications. Once a product has been purchased or installed, the consumer does not care how it was marked. Moreover, a non-conforming product that was introduced into commerce legally on or before January 3, 2014 cannot be used in the installation or repair of a PWS or residential or non-residential facility providing water for human consumption after the effective date of the SDWA amendments. However, it is impossible to guarantee that even an informed consumer will not knowing misapply a product not intended for use in potable water applications. As a matter of enforcement delegated to the states, EPA should not try to regulate against such an occurrence.

***Should just the package be labelled, or should there be some sort of identification on the product itself, or should both be required?*** The purpose of the marking should dictate what is required. A label should be adequate to inform the consumer that a pipe, pipe fitting, plumbing fitting, or fixture assembly is suitable for drinking water use. A mark on a lead-free product – even if not readable or even visible to the consumer – is better used to distinguish lead-free materials in recycling. As stated above, product packaging or labelling is the most efficient way to inform the consumer that a product is fit for use in drinking water applications.

***Can one part of a system or facility be repaired using lead-free component parts and returned to service, even if other component parts that were not repaired do not meet the new lead-free definition?*** The law does not require that products currently in service must meet the definition of lead free. While the replacement of components must be done with parts that meet the content limits of the law, the law does not specifically require that every part of a system or facility – including those not being replaced – be returned to service as 100% lead-free. Clearly, over time, all parts will become lead-free, but the costs of

replacement can be spread over the useful life of the component, thus mitigating the cost impact.

***What about routine check, then reinstalling old non-compliant product*?** As a corollary to the previous comments, it is logical to presume that a product that is removed for routine inspection and found to be performing properly does not need to be replaced – even though it does not meet the content limit imposed by the law. Mandating the replacement of properly-functioning elements of the water distribution system was not intended and is not mandated by the law, and would simply add needless costs.

***Will industry have difficulty meeting certification or labelling requirements by Jan. 4, 2014, because obtaining an ANSI accredited third-party certification takes time?*** Conforming products are already in the marketplace in several states, and foundries and plumbing manufacturers are positioning to being able to supply these products on a national basis prior to January 4, 2014. While it might be considered useful to have a uniform labeling system in place prior to the effective date of the SDWA Amendments, EPA has already acknowledged that this cannot be achieved – perhaps unless done on a voluntary basis by industry. However, even gaining EPA's endorsement of a voluntary labeling regime is both improbable and unrealistic.

ANSI accredited third-party certification takes time, and domestic manufacturers are already struggling to meet this objective. However, as the only acceptable means of demonstrating that products being offered in the marketplace will in fact meet the content limits of the law, they are aware that this must be accomplished. EPA cannot definitively regulate how that certification is to be attained prior to the effective date of the law.

## Conclusion

Congress adopted the national lead content limit for plumbing brass and established its effective date at January 4, 2104 but shifted the burden of enacting the required standards and regulations to implement the new law to EPA. EPA has already stated that, as a best case scenario, incorporating the revisions into the national primary drinking water rule cannot be achieved until perhaps three years ***after*** the SDWA amendments take effect, and there is no regulation the agency can use to change the effective date of the legislation. EPA should

recognize that this is a content-based law and be guided accordingly when developing the implementing standards. Meanwhile, states must be prepared to enforce the law upon its effective date, but must also be prepared to exercise great discretion in enforcing against standards, procedures and protocols that will not be finalized for several years after the effective date of the law.

The Non-Ferrous Founders' Society and its member foundries stand ready to collaborate with the EPA in implementing the Safe Drinking Water Act amendments, thereby achieving the goal of reducing the lead exposures from potable water. To that end, we have been pleased to provide our input and comments as contained in these pages, and we will welcome the chance to respond directly to any comments and/or questions the agency may have on anything noted herein.

**Public Comment on Lead and Copper for December 11 and 12 NDWAC Meeting**
**September 4, 2013 at 10:59 am by e-mail to the DFO**

Dear Mr. Simon:

Due to the distance I would not be able to attend any meetings however I would like to address some concerns that we have here in Sturgis S.D. We have been testing for lead and copper for around fifteen years with no bad results but yet we must continue to do these tests that are costly. Also there is a new rule that we must start using no lead meters and repair fittings in January of 2014 which I have no problem with other than the fact that we were not told about this rule until sometime around November of 2012 and they did not stop selling the leaded fittings until just recently. This left a lot of small rural cities and water systems with an expensive inventory that we will have to replace in January of 2014 at a very high cost and for no good reason as I have stated we have been testing with no bad results. We should be able to use our inventory and replace with no lead fittings when we run out of our inventory. I would think there should be waivers allowed for the lead and copper if everything has been testing ok for that many years.

Thanks
Dale Olson
Water Superintendent
City of Sturgis,S.D
605-347-4425

# Statement by the Non-Ferrous Founders' Society to the National Drinking Water Advisory Council Meeting, December 11-12, 2013

Good afternoon. My name is James L. Mallory, and for the past 28 years I have been proud to serve as the Executive Director of the Non-Ferrous Founders' Society (NFFS), a 70 year old trade association representing the non-ferrous metalcasting industry. Many NFFS members produce castings that are used in potable water delivery systems nationwide. Other NFFS members are ingot producers that supply the alloyed material melted by foundries that is then cast into valves, faucets, water meters and other such components.

The Society was pleased to submit written comments on February 25, 2013 in response to EPA's request for input on issues surrounding the implementation of the Reduction of Lead in Drinking Water amendments to the Safe Drinking Water Act. We have provided copies of those comments for distribution to this committee, and we respectfully ask that they be referenced in their entirety and appended to this statement for the record. But let me try to summarize and reiterate some of the concerns raised in that document.

The Reduction of Lead in Drinking Water Act that was signed into law on January 4, 2011 and which becomes effective on January 4, 2014 changes the definition of lead free materials used in potable water applications from 8% to not more than 0.25%. The amendments were modeled in part upon the AB 1953 law enacted in the state of California that was passed into law on September 30, 2006, with an effective date of January 1, 2010.

At its stakeholder meeting last August, EPA stated that enacting the required standards and regulations to implement the new law is not be as simple as taking the existing rules and changing the allowable content limit for lead from 8% to 0.25%. The agency identified several key questions on implementation issues and solicited input from the industry before proceeding. The response from our association, as well as those from other organizations representing our industry, was crafted in response to that request.

The metalcasting industry has been actively engaged in seeking alternative materials for plumbing applications that could reduce lead exposures in drinking water for more than 20 years. As EPA moves to implement the new requirements incorporating the Reduction of Lead

in Drinking Water Act of 2011, agency officials need to consider the current Safe Drinking Water Act (SDWA) requirements and how they have been successfully implemented and regulated by States, municipalities, and end users without significant governmental oversight. Substantial reductions of lead in drinking water have already been achieved through the implementation of national standards such as AWWA and ASTM, through user specifications as part of contracts and bid documents, by demonstrations of compliance, and as a result of industry and trade group oversight.

Almost immediately upon the introduction AB 1953 in 2008 California in 2008, the metalcasting industry formed a diverse consortium to investigate the technological implications of the bill and to begin to lay out a roadmap to research the practical application of various alternative no-lead copper alloys. The results of the consortium's research efforts were published in 2010, but investigations into the viability of other potential replacement alloys for plumbing applications continued to be pursued.

At its introduction, and even upon its enactment, AB 1953 was a seriously flawed bill. It established a lead content limit for plumbing brass with no scientific investigation or justification as to whether it would achieve the goal of reducing lead exposures from water consumption. Rather, the law was guided by the common but impractical assumption that the only acceptable exposure risk level for lead is zero.

The transition of the reduction of lead content in plumbing brass regulation to the national level placed the task of overcoming the shortcomings within the California law in the hands of Congress, but regrettably once again the problem simply shifted downstream. Congress adopted the national lead content limit for plumbing brass and established its effective date, but delegated the burden of enacting the required standards and regulations to implement the new law to the EPA.

During the August stakeholder meeting, EPA suggested that the implementation issues could not be answered in a timely fashion for manufacturers. Instead, the agency elected to incorporate revisions of the lead free content to the proposed *Lead and Copper* rule, which we now know is a central issue being addressed at this meeting. However, given the presumed schedule to enact the Lead and Copper Rule, it is obvious that the SDWA amendments will have been the law at least several years before the implementing

regulations will be enacted. So how should this committee proceed? Let me try to offer a few suggestions.

***1.*** The lack of compliance / enforcement guidance was one of the principal flaws in AB 1953. A requirement for third party certification was added to address that deficiency, as well as to establish a basis for assuring that products being offered in the marketplace would meet the requirements of the law. The Non-Ferrous Founders' Society agrees that this is the only valid mechanism by which to assure that products are truly lead free, but some consideration must be given to both the cost of the testing and the practical enforcement of the law. If domestic producers are required to provide third-party documentation as evidence of compliance, then the same rules must be applied to products made in other countries and imported for sale in the U.S. Failing to do that places American manufacturers that are required to pay for testing at a competitive disadvantage in the marketplace. Without effective enforcement, a law is nothing more than a suggestion.

***2.*** The committee should not try to specify how lead-free products are to be marked, labelled, or otherwise packaged. Lead free products are already being manufactured and have been in the marketplace since January, 2010. Some metalcasters went "lead free" even before that. Some companies make products from both lead-free and traditional materials and label products as to whether or not they are *suitable for potable water applications,* but the markings may be different for each product and/or product line, and what works in one application may not work in another. If products that are lead-free - and thus suitable for potable water applications - are properly identified, it really shouldn't matter whether a common system of marking has been applied. Moreover, EPA has already acknowledged that a uniform labeling system cannot be achieved prior to the effective date of the SDWA Amendments. Imposing new marking or labeling requirements years after the law takes effect – and after companies have already made significant product marketing investment decisions - is both impractical and counter-productive.

***3.*** The committee **MUST NOT** seek to reduce the content limits for lead and copper beyond the level specified in the current law. As previously noted, the metalcasting

industry has been voluntarily seeking ways to reduce the lead content in plumbing brass, and significant investments in retooling production lines have already been made by many companies in their efforts to meet the 0.25% content limit. As the agency has itself recognized, enacting the required standards and regulations to implement the new law is not be as simple as taking the existing rules and changing the allowable content limit for lead from 8% to 0.25%. Changing production capabilities, switching materials within a metalcasting facility, is far more complicated – and costly - than that.

In conclusion, the Society and I thank the agency for allowing me the opportunity to present this statement today, and we stand ready to assist the Council in its further discussions on the proposed regulatory revisions to the Lead and Copper Rule under the SDWA and other program issues as may be helpful.

## Contents

## Background for the Current Lead and Copper Rule Revisions Process

Under the Safe Drinking Water Act (SDWA) EPA sets public health goals and enforceable standards for drinking water quality.[1] The Lead and Copper Rule (LCR) is a treatment technique rule. Instead of setting a maximum contaminant level (MCL) for lead or copper, the rule requires public water systems (PWSs) to take certain actions to minimize lead and copper in drinking water, to reduce water corrosivity and prevent the leaching of these metals from the premise plumbing and drinking water distribution system components and when that isn't enough, to remove lead service lines.

The current rule sets an action level, or concentration, of 0.015 mg/L for lead and 1.3 mg/L for copper. An action level is not the same as an MCL. An MCL is based on health effects; whereas an action level is a screening tool for determining when certain treatment technique actions are needed. Because the LCR is a treatment technique rule, the LCR action level is based on the practical feasibility of reducing lead through controlling corrosion. In the LCR, if the action level is exceeded in more than ten percent of tap water samples collected during any monitoring period (i.e., if the 90$^{th}$ percentile level is greater than the action level), it is not a violation, but triggers other requirements that include water quality parameter monitoring, corrosion control treatment (CCT), source water monitoring/treatment, public education, and lead service line replacement (LSLR). The rule also requires States to report the 90$^{th}$ percentile for lead concentrations to EPA's Safe Drinking Water Information System (SDWIS) database for all water systems serving more than 3,300 persons, and for those systems serving fewer than 3,300 persons only when the lead action level is exceeded. States only report the 90$^{th}$ percentile for copper concentrations in SDWIS when the copper action level is exceeded in water systems regardless of the size of the service population. Public education requirements ensure that drinking water consumers receive meaningful, timely, and useful information that is needed to help them limit their exposure to lead in drinking water.

In early 2004, EPA began a wide-ranging review of the implementation of the LCR to determine if there was a national problem related to elevated levels of lead in drinking water. As part of its national review, EPA collected and analyzed lead concentration data and other information, carried out a review of implementation in States, held four expert workshops to discuss elements of the regulations, and worked to understand local and State efforts to monitor for lead in school drinking water, including a national meeting to discuss challenges and needs. EPA released a Drinking Water Lead Reduction Plan (DWLRP) in March 2005. This plan outlined short-term and long-term goals for improving implementation of the LCR. The plan can be found at the following web address:
http://water.epa.gov/lawsregs/rulesregs/sdwa/lcr/lead_review.cfm

In 2007, EPA promulgated regulations, which addressed the short-term revisions to the LCR that were identified in the 2005 DWLRP. These requirements enhanced the implementation of the LCR in the areas of monitoring, treatment, LSLR, public education, and customer awareness. These revisions better ensured drinking water consumers receive meaningful, timely, and useful information needed to help them limit their exposure to lead in drinking water.

EPA has continued to work on the long-term issues that required additional data collection, research, analysis, and full stakeholder involvement, which were identified in the 2005 DWLRP and the 2007 rule revisions. This new action is referred to as the LCR Long-term Revisions (LTR) The LCR LTR would apply to all community water systems (CWSs) and non-transient non-community water systems (NTNCWSs). EPA's primary goal for the LCR-LTR is improve the effectiveness of the corrosion control treatment in reducing exposure to lead and copper and to trigger additional actions that equitably reduce

[1] EPA establishes national primary drinking water regulations (NPDWRs) under SDWA. NPDWRs either establish a feasible maximum contaminant level (MCL) or a treatment technique "to prevent known or anticipated adverse effects on the health of persons to the extent feasible."

the public's exposure to lead and copper when corrosion control treatment alone is not effective. While not inclusive of all potential revisions to the LCR, key categories where revisions are being considered are:

- Sample site selection criteria for lead and copper
- Lead sampling protocols
- Public education for copper
- Measures to ensure optimal corrosion control treatment
- Lead service line replacement

## Previous Federal Advisory Committee Involvement

EPA has sought input from Federal Advisory Committees on two previous occasions. The Science Advisory Board (SAB) provides comments to EPA on the quality and relevance of scientific and technical information supporting EPA's national drinking water standards. The Office of Ground Water and Drinking Water (OGWDW) formally requested SAB evaluation of current scientific data to determine whether partial lead service line replacements are effective in reducing lead drinking water levels. The SAB issued their report on September 28, 2011. (See http://yosemite.epa.gov/sab/sabproduct.nsf/0/964CCDB94F4E6216852579190072606F/$File/EPA-SAB-11-015-unsigned.pdf)

EPA also previously consulted with the National Drinking Water Advisory Council (NDWAC) in meetings on July 21-22, and November 18, 2011(see http://water.epa.gov/drink/ndwac/meetingsummaries/index.cfm) and wrote a letter to EPA on December 23, 2011 (see http://water.epa.gov/drink/ndwac/upload/ndwaclettertoepadec2011.pdf).

EPA continues to require input on the feasibility, and cost effectiveness of potential revisions to the Lead and Copper Rule. Therefore, EPA is convening a NDWAC working group to consider several key questions for the LCR LTR, taking into consideration previous input.

## Key Issues for Consideration

EPA's goal for the LCR-LTR is to improve the effectiveness of corrosion control treatment in reducing exposure to lead and copper and to trigger additional actions that equitably reduce the public's exposure to lead and copper when corrosion control treatment alone is not effective. Lead and copper are present in plumbing materials and water distribution system components throughout the United States. Therefore, treating the water to make it less likely to corrode lead and copper from these materials remains the most cost effective way to reduce exposure to these metals. However, because corrosion control is not always effective, the LCR must compel additional actions in those systems that cannot sufficiently reduce lead and copper levels. Those actions should provide equitable protection to all of the consumers. In making these improvements, EPA seeks to advance the goal of environmental justice, which is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income. The following is a description of key issues and questions for which EPA seeks stakeholder input in achieving these goals. This document is meant to lay the initial foundation for the stakeholder process, with more detailed technical information and questions likely to be raised during future working group meetings.

## A. Sample Site Selection Criteria

***Goals/objectives of rule change:*** In the preamble to the LCR in 1991, EPA wrote that it believes, "…that the requirement to collect samples from locations that are most likely to have high concentrations of lead and copper in drinking water is reasonable and necessary given the nature of the problem of corrosion…" Thus, the goal of the LCR sample site selection criteria is to target locations with high-risk lead and copper in drinking water systems in a cost-effective manner. Selection and use of the highest risk sites is important, because the number of samples collected is relatively small and contaminant levels can vary between systems and sites based on water quality, and distribution system and usage characteristics. Targeting these locations helps ensure that appropriate action is taken if a lead or copper problem is identified in the system.

### Background Information

The 1991 LCR established a tiering system for prioritizing the selection of sampling sites based on the likelihood of the sites to release elevated levels of lead and copper; for lead, sites with lead service lines (LSLs), lead pipes, or copper pipes with lead solder; for copper, copper pipes with lead solder. The figure below outlines the current rule requirements.

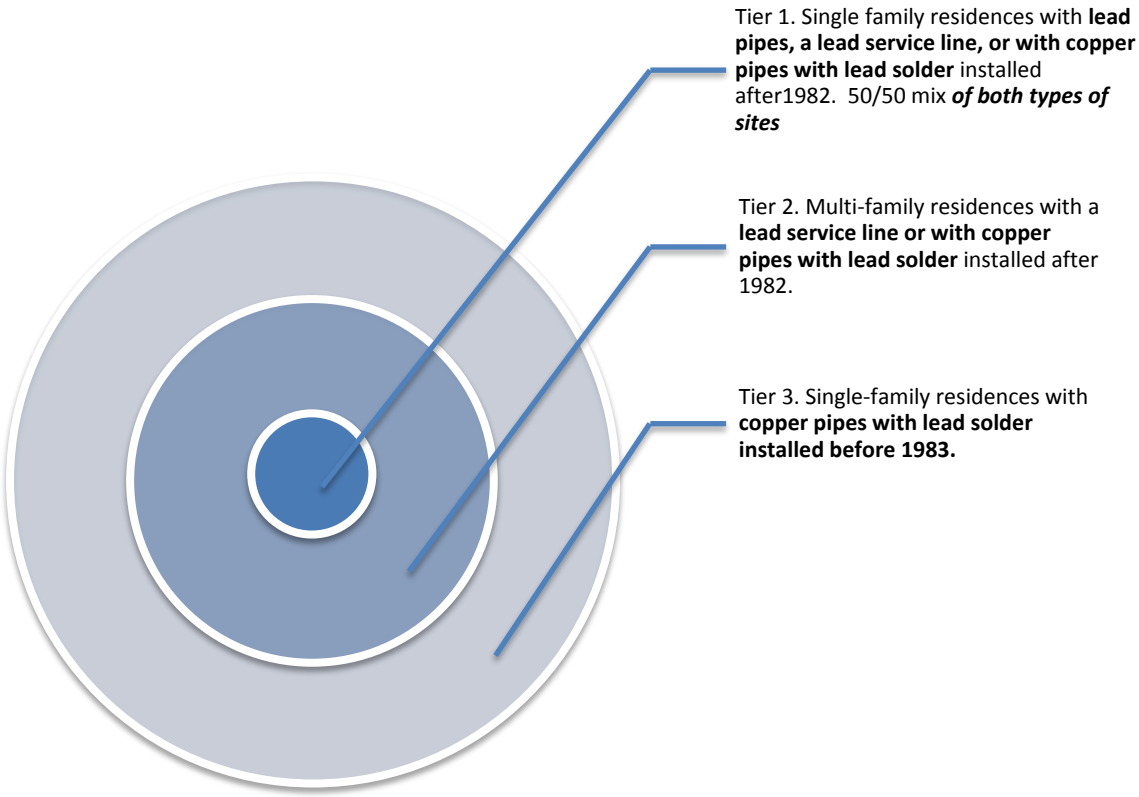



Figure 1: Current Site Selection (tiering) Structure

Although EPA made short-term revisions to the LCR in order to address some implementation issues in January 2000 (65 CFR 1950) and October 2007 (72 CFR 57781), the Agency has not revised the tiering criteria since the rule was promulgated in 1991. New information exists regarding lead and copper release

patterns, which raises the question of whether the current sample site selection criteria should be revised. Key points include:

Lead

- Full and partial LSLs represent the greatest source of lead to drinking water. PLSLRs are frequently associated with short-term elevated drinking water lead levels, that tend to gradually stabilize overtime, sometimes at levels below and sometimes at levels similar to those observed prior to the replacement. The current criteria do not solely prioritize sampling from LSLs (full or partial).
- Over twenty years have passed since lead solder was banned in all jurisdictions. Because lead release from solder decreases with time, these sites now are likely to be releasing levels of lead comparable to contributions by brass plumbing components and interior pipe corrosion byproduct scales.
- Studies have shown that much higher lead levels are frequently found in water in contact with lead service lines.
- Lead has been shown to accumulate in corrosion scales or deposits formed in premise plumbing, downstream of LSLs, and can be released sporadically, often in response to treatment changes or line disturbances.

Copper

Since 1991, a large body of published corrosion literature on copper has shown that copper and lead release patterns differ. The original LCR sample site selection criteria for copper no longer targets highest-risk copper, since these sites have now aged. Water chemistry and pipe age play a more dominant role than what was originally thought for copper release.

- Corrosion can occur to copper plumbing of any age. However, in the presence of certain water qualities, copper levels in excess of the action level are most likely to occur in newly constructed homes and buildings with copper plumbing, or at sites that have been recently renovated with new copper plumbing. Corrosion of new copper pipes is not a problem for many water systems. It is limited to water systems that have water quality aggressive to copper.
- Water chemistry characteristics that contribute to copper release also can vary in different zones within a distribution system as well as between different systems with respect to aggressiveness to copper.

Lead and Copper

- Differences exist between lead and copper release patterns in water systems.
- Water chemistry variations within the water distribution system vary temporally and spatially. This phenomenon affects the site selection for lead, as well as copper. In order to capture high-risk sites, it is important that sampling reflect zones where water quality is aggressive to these contaminants.
- Research since the 1991 rule indicates that brass and other metallic premise plumbing materials may be a more significant immediate and long-term source of lead and copper in drinking water than originally believed, especially in newer homes.

EPA is evaluating whether the sampling sites as outlined in 1991 are still the appropriate sites to monitor to assess the effectiveness of corrosion control treatment for both lead and copper. EPA is revisiting these criteria to examine whether they target the sites most likely to leach elevated levels of lead and copper

and, thus, serve as good indicators of whether corrosion control treatment is needed or has been optimized. Selection and use of the highest risk sites is important, since the number of samples collected is relatively small, contaminant levels can vary between systems and sites (water quality, plumbing configuration(s), and usage patterns contribute to variations in lead and copper levels). Public health protection is the main goal of the LCR, but because the LCR is a treatment technique rule, sites are selected to assess performance of systems' corrosion control treatment not to assess exposures.

- In order to better target each contaminant, EPA is considering revising the site selection criteria to create two separate tiering structures, one for systems with LSLs and another for systems without LSLs.
- EPA also is evaluating whether to monitor at separate sites for copper. EPA is considering requiring PWSs to conduct copper monitoring at separate sampling sites with new copper piping, which are likely to have elevated copper levels.
- EPA also is considering allowing a copper monitoring waiver which would allow systems with water qualities not considered aggressive to copper to eliminate copper monitoring. This copper waiver could reduce costs for systems that can demonstrate water qualities which are unlikely to leach copper (e.g. a system that provides no disinfection or oxidation treatment, and meets a specific pH criterion; or a system with disinfection and/or oxidation treatments that has water quality parameters within the specified pH and alkalinity ranges).

***Discussion questions:***

- How should sample site selection criteria be developed to capture the highest risk sites for both lead and copper in a simple, health protective, and cost effective way? Is the knowledge base on both lead and copper sufficient to confidently respond to the question?
- At what sites should lead and/or copper samples be taken to be representative of the greatest release for each contaminant?
- Should sampling for lead and copper occur at separate sites? If so, what could the potential sampling scheme look like?
- What are the cost implications of developing separate sampling sites
- Should the sample site selection criteria for LSL systems and non-LSL systems differ to prioritize sampling from locations likely to demonstrate the greatest release for each contaminant? If so, what would that sample site selection criteria look like?
- How many samples for each contaminant would be needed to be statistically significant?
- What age copper piping should be sampled in order to capture the greatest likelihood of copper release?
- In what ways could evaluating water quality parameters from all systems be used to help identify systems with zones of water quality aggressive to copper? For lead?
- Would taking copper samples from pipe rigs (with copper the same age as in the distribution system) be useful in helping to reduce sampling burden for large systems? If so, how, and how should the data be used to determine action level compliance?
- What might copper waiver conditions look like, including water quality and non-water quality based conditions?
- How many systems can consistently meet water quality parameters, showing that water is not aggressive to copper, to obtain a copper waiver?

- How could water quality parameter data be used to accurately assess which systems are likely to need copper monitoring and which do not?
    - How might these data be used to develop copper monitoring waivers for systems meeting specific water quality criteria?
    - Do you have or know of data that EPA could consider to develop such waivers

## B. Lead Sampling Protocol

***Goals/objectives of rule change:*** Establish procedures that will result in a PWS having a set of samples that will assess the corrosivity of the water being provided and/or to indicate if the corrosion control is effective in reducing lead and/or copper corrosion from LSLs and plumbing materials.

**Background**

The current LCR contains a single sampling procedure for both sites with lead service lines and sites with lead-soldered copper pipes. A one-liter first draw sample (no water wasted prior to drawing the sample) is taken after a minimum six-hour stagnation time. The current sampling protocol allows residents to collect the first-draw samples.

*Lead Service Line Sampling*

EPA analyzed data from a number of studies where sequential samples were taken at the same site to generate a profile (i.e. several consecutive liters of water were taken and analyzed until water that had been in contact with the LSL was reached) and found that the first draw sample may underestimate the amount of lead that can be in samples in contact with the LSL. Where they are present, LSLs (full or partial) are the greatest source of lead in the distribution system. EPA is considering different sampling procedure options for sites with a partial or fully intact LSL to better assess the amount of lead contributed by lead service lines and, thus, whether further action is needed to reduce the corrosivity of the water.

One service line sampling approach is to collect and discard a specific number of liters prior to taking (using a fresh bottle) a one-liter sample representative of the service line. The sampling instructions would be the same for all sites in the sampling pool. A challenge to this approach is determining the specific number of liters to collect and waste to get a representative sample, since plumbing configurations and service line lengths will vary across sites.

Another service line sampling approach is to collect a series of sequential samples at each site in the sampling pool to identify the liter containing the highest lead at the site (an initial profile), and use that site-specific identified liter for subsequent monitoring and compliance purposes. In subsequent monitoring periods, the number of liters to get to that sample would be wasted before the one-liter service line sample for that site would be collected in a new sample bottle. The volume of water being wasted prior to sample collection will vary among sites under this approach. This approach seeks to balance obtaining site-specific samples while reducing analytical costs since sequential sampling to identify the liter containing the highest lead would be conducted one time at each location and when new sampling sites were added to the pool. An important consideration with this approach would be whether the added complexity could be appropriately managed by the public and drinking water utilities to ensure reproducible results.

The logistics of sampling present other challenges, e.g. in working with homeowners to collect service line samples.

*Aerators*

Another sampling instruction issue is the inclusion of recommendations to remove the aerator and clean it before the start of the stagnation period. EPA issued guidance on October 20, 2006 indicating that PWSs should not recommend that customers remove or clean aerators before or during the collection of tap samples for lead. While removal and cleaning of the aerator is advisable on a regular basis, if customers are only encouraged to remove and clean aerators prior to drawing a sample for lead, the system could fail to identify the typically available contribution of lead from that tap and thus fail to take additional actions needed to reduce exposure to lead in drinking water.

*Pre-stagnation Flushing*

A third sampling instruction issue for service line samples is pre-stagnation flushing and what that means with respect to whether the sample was in contact with the faucet and interior plumbing or with the lead service line. Some systems' sampling instructions recommend flushing the tap for an extended period of time (5 minutes or longer) prior to the start of the minimum six-hour stagnation time. Concerns about this practice include whether it leads to biasing the sample downward (e.g. by flushing particulates). One approach would be to prohibit recommendations on pre-stagnation flushing in the sampling instructions. EPA is looking for input on other alternatives that best represent the water in the service line.

*Number of Required Sample Sites*

The number of sample sites in the current LCR varies by the size of the system and monitoring frequency. The number of sites range from 5 to 100 under standard monitoring and from 5 to 50 under reduced monitoring. Each sample is analyzed for both lead and copper. The distribution of sample sites is not addressed in the current LCR. A sampling protocol that better represents the contribution of the service line to lead levels in the water may allow a reduction in the number of sites that need to be monitored to assess the effectiveness of corrosion control in lead service line systems.

The number of sample sites needed to target high-risk sites (and to assess corrosion control for those systems using CCT) should be considered for systems with and without LSLs. Sampling sites that better represent the contribution of copper may necessitate separate sampling sites, and perhaps a different number of samples, for lead and copper, rather than a single sample being analyzed for both contaminants. LSL samples may not adequately reflect copper levels because of limited contact with copper; however, it may be possible to assess the effectiveness of corrosion control solely by the lead levels from the service line samples.

Another issue is that a water system may have a variety of water sources within its system, and the sampling sites as they are currently configured may not be able to capture all the water quality variability (which affects lead and copper corrosion) within the distribution system. Thus, it may requiremore specific targeting of sampling sites to assess over all corrosion control effectiveness given this variability.

While there are a variety of factors that can influence the number of sampling sites necessary to assess the effectiveness of corrosion control in an individual system, the LCR does need to have baseline monitoring for all classes of systems for effective rule implementation.

***Discussion questions:***

- For locations with LSLs, what does a cost-effective lead sampling procedure look like that captures lead where concentrations are likely highest?
    - Who should collect samples? The PWS? The homeowner/resident? If the latter, how can the procedure be reliably executed? How can instructions to homeowners/residents be as clear and easy to follow as possible?
    - Should aerator removal be addressed? If so, how?
    - What are the pros and cons of addressing pre-stagnation flushing of pipes? How should this issue be addressed, if at all? What is the best way to represent the water in the service line?
    - What are the advantages/disadvantages of a single prescriptive liter versus a site-specific sequential sampling approach?
    - Under what conditions could OCCT be based on the lead results from the lead service line samples?
- What is an appropriate number of samples to be collected by a water system to capture the highest risk lead and copper sites in the distribution system and, where CCT is in place that will indicate if the corrosion control is effective in reducing lead? In reducing copper?
    - How important is the size of the PWS population in determining this number?
    - How much does geographic distribution of samples matter, particularly with respect to non-homogenous water quality and non-homogeneous construction distribution?

## C. Public Education for Copper

***Goals/objectives of rule change:*** To improve the health of consumers by motivating consumers to take actions in reducing exposure to copper in drinking water in systems with elevated copper levels.

**Background**

While corrosion can occur to copper plumbing of any age, in certain water qualities copper levels in excess of the action level are most likely to occur in newly constructed homes and buildings with copper plumbing, or at sites that have been recently renovated with new copper plumbing. Corrosion of new copper pipes is not a problem for many water systems. It is limited to water systems that have water quality that is aggressive to copper. The health effects of copper are nausea and vomiting (short-term), and there may be liver damage and possible nervous system effects in sensitive subpopulations (e.g. individuals with Wilson's disease). Both the maximum contaminant level goal (MCLG) and action level for copper (1.3 mg/L) were established based on the prevention of acute nausea as a result of elevated copper levels in drinking water. EPA recommends that individuals with Wilson's disease should consult their personal physician if the levels of copper in their water exceed the action level. Infants fed formula prepared with copper-tainted tap water consume a higher amount of tap water on a per body weight basis than adults, which may increase their risk for an adverse response.

Currently, there are no public education materials[2] or informational statements[3] provided on the health risks of copper exposure, or steps consumers can take to reduce their risk of exposure. EPA is evaluating whether materials should be provided to consumers to address potential exposures to copper in premise

[2] These "public education materials" may be delivered to all consumers in the distribution system when the public water system has exceeded the copper action level. The mechanism of delivery could be similar to the way consumers are educated about lead after a lead action level exceedance.

[3] The term "informational statements" describes educational materials that would be delivered to consumers in the distribution system when systems have water quality that is aggressive to copper but delivery would not be based on exceeding the copper action level

plumbing. EPA is also evaluating the target audience for any materials that might be developed. The Agency is considering requiring copper public education materials for systems exceeding the copper action level and/or a brief informational statement to consumers served by systems which have water quality aggressive to copper.

Outreach materials[4] could explain the potential health effects of elevated copper, the likelihood of copper levels being higher at newly built homes and buildings where water quality is aggressive to copper, and actions that the consumer can take to reduce their exposure to copper.

The following are key elements that EPA is considering for a public education requirement for copper in the event of a copper action level exceedance:

(1) Explanation of what copper is, the possible sources of copper in drinking water and how copper enters drinking water;
(2) Explanation of copper health effects;
(3) Steps the consumer can take to reduce their exposure to copper in drinking water;
(4) Explanation of why there are elevated levels of copper in the system's drinking water (if known) and what the water system is doing to reduce the copper levels in homes/buildings in the area; and
(5) Explanation of the likelihood of concern related to copper leaching from copper pipes in homes/buildings in the area.
(6) Explanation of what other plumbing materials are available for use in water qualities aggressive to copper, that a builder or consumer might choose to reduce their exposure to undesirable levels of copper in the water.

***Discussion questions:***

- Are there aesthetic warning signals of copper corrosion in drinking water and, if so, what are they and what recommendations should be given to consumers to help them avoid the health effects of copper through consumption of drinking water?
- Should copper public education materials be included in the LCR using the same basic structure as the public education materials for a lead action level exceedance?
- Should different types of outreach materials to consumers with different content be required depending on whether or not the copper action level is exceeded? If so, what information should be included (e.g., public education for an action level exceedance, informational statement about copper if an action level is not exceeded)?
- If copper public education materials or informational statements are required, what should the delivery frequency be?
- If public education is not required for copper action level exceedances, should EPA require systems to deliver outreach materials/informational statement to consumers who visit or live in a newly/recently built or renovated building/dwelling with new copper piping?
  - Should systems be required to identify newly/recently built or renovated building/dwelling with new copper piping?
  - Should systems be required to work with local inspection services to incorporate the outreach materials or informational statement into building/dwelling occupancy permits?
  - How much and what kind of direction should be provided by EPA with respect to public education materials or informational statements?

[4] The term "outreach materials" is a general term used to describe any materials that are distributed to the public.

- If a water system demonstrates water quality aggressive to copper, should those consumers receive informational statements about copper? If so, what information should be included?

## D. Measures to Ensure Optimal Corrosion Control Treatment

***Goals/objectives of rule change:*** Enhance the process for systems to improve the effectiveness of their corrosion control treatment; ensure adequate incentives for optimization and provide greater clarity about treatment optimization.

**Background information**

The Lead and Copper Rule requires systems to install optimized corrosion control treatment (OCCT) while insuring that the treatment does not cause the water system to violate any NPDWRs. Since the promulgation of the LCR and the initial optimization of corrosion control, systems have faced the ongoing challenge of continuing to maintain optimal corrosion control while making necessary adjustments to treatment processes or system operations unrelated to corrosion control to comply with other NPDWRs. The current optimization process includes requirements for systems to:

- Conduct monitoring
- Conduct a CCT study (if required by the State)
- Obtain State designated OCCT
- Adjust existing CCT
- Conduct follow-up monitoring
- Obtain State review of installation of CCT and designation of optimal water quality parameters (OWQPs)
- Operate the treatment in compliance with OWQPs

Research has shown that there are many factors that can affect lead and copper levels. Maintaining OCCT can be challenging; therefore EPA is evaluating a number of revisions to the corrosion control requirements that make targeted improvements to the current process:

- Expand scope of study for systems with LSLs to include a system-wide assessment of factors that may limit the effectiveness of the CCT or the ability of the system to optimize their treatment. Allow the State and/or EPA to tailor study requirements for systems without LSLs. LSLs contribute about 50-70% of the total mass of lead at consumer's taps. To a lesser extent, premise plumbing contributes about 20-35% of total lead mass measured at the tap and meters contribute less than that.
- Consistent with international experience, require systems using orthophosphate to evaluate higher doses and those systems not using orthophosphate to study its use for their system.
- Revise steps and deadlines for corrosion control treatment.
- Allow Non Transient Non Community Water Systems (NTNCWSs) serving fewer than 10,000 people the option of installing Point of Use (POU) treatment units in lieu of having to install CCT as a potentially more effective mechanism to reduce lead exposures in these systems.

Determining whether treatment is optimized can be challenging, given the variety among systems in their distribution system composition, water qualities and other circumstances. One idea under consideration is the addition of a system-wide assessment as part of the mandatory CCT study requirements for systems with LSLs. This is intended to ensure the studies are comprehensive and that the proposed treatment addresses any existing or anticipated water quality, treatment or operational issues that may interfere with or limit the effectiveness of the corrosion control optimization or re-optimization.

While some changes are well understood for their potential to adversely affect lead and copper levels, such as fluctuations or changes in pH or alkalinity, others are more complex and involve factors like the quantity and type of disinfectant used or the chemical composition of the protective scales within the lead service lines. In a system-wide assessment, a water system will evaluate the variability of water quality throughout the distribution system due to differences in source water quality within distinct hydraulic boundaries, different or variable residence times and multiple types of distribution system materials. Revisions to the study elements would also target key parameters that are known to affect or limit the effectiveness of CCT generally, such as the variability of pH and alkalinity, as well as more system-specific water quality or process control parameters. Since the promulgation of the original LCR, research has confirmed the most effective treatments for optimization of corrosion control are pH/alkalinity adjustment, and the use of orthophosphate. Consequently, EPA is considering removal of the requirement for systems to study calcium hardness adjustment as a potential option for optimizing corrosion control, along with the associated mandatory monitoring for calcium, conductivity and water temperature. EPA is also considering more specific requirements for systems that are currently not using orthophosphate to study the use of orthophosphate and for systems using orthophosphate to study the use of higher dosages of orthophosphate. EPA will consider alternatives to orthophosphate where appropriate and effective to reduce the waste water discharge burden of phosphorous in those areas sensitive to phosphorous release.

A key provision of the LCR requires water systems to sample for State approved OWQPs. OWQPs are measurable indicators that help systems determine if they are maintaining optimal CCT. Corrosion control treatment techniques are means specified in the rule, such as pH/alkalinity adjustment and the addition of corrosion inhibitors (e.g., orthophosphate) that promote the formation of insoluble scales that prevent lead from leaching from pipes into the drinking water. Having proper OWQPs is the method by which EPA, States, and water systems know whether water characteristics are in the ideal range (determined through CCT optimization studies) for their corrosion control methods.

After water systems recommend OWQPs, it is up to the States to approve them. Currently, OWQP ranges may not be set as tightly as needed to effectively control lead corrosion for those systems that continue to exceed the lead action level. EPA is evaluating whether to require systems exceeding the lead action level to re-optimize CCT, before being triggered into LSLR, and if that re-optimization process should be well-defined.

Under the current LCR, a system that exceeds an action level is required to install CCT, but may cease conducting lead and copper tap and WQP monitoring while it is evaluating and installing CCT. Regular monitoring during this timeframe may provide additional information to the systems and States to ensure the proper treatment is installed and fully optimized.

EPA is considering designating lead service line systems that have optimized or re-optimized corrosion control for lead to also be deemed to have optimized corrosion control for copper.

***Discussion questions:***

- How can LCR requirements be structured to encourage optimal corrosion control treatment and retain enforceability?

- How can existing OWQP monitoring requirements be strengthened while retaining implementability? What is the most effective way for reducing lead exposure?
- What are the challenges to optimizing corrosion control treatment?
- What are some of the lessons learned from implementing corrosion control treatment?

## E. Lead Service Line Replacement

***Goals/objectives of rule change:*** Remove sources of lead in the distribution system; encourage optimization of CCT to prevent lead leaching; address environmental justice concerns associated with LSLR; and maintain and enhance enforceability of the LCR.

### Background

Under the current LCR, water systems that exceed the lead action level after the installation of CCT and/or source water treatment must annually replace at least seven percent of the initial number of LSLs in their distribution system. To meet the seven percent annual LSLR requirement, systems can do full or partial LSLRs or "test out" a LSL if all samples from it are at or below the lead action level (*i.e.*, a "tested-out" line is not physically replaced, but is still counted as such for the seven percent LSLR requirement). A concern with "test outs" is they may not reliably reflect the lead levels in the water because they only represent a single snap shot in time. Under the current LCR, systems must replace the portion of the LSL they own/control. Where a system does not own/control the entire LSL, it must offer to replace the owner's portion at his or her expense. If the owner elects not to have his or her portion replaced, then the system is not required to replace the privately-owned portion. This results in a PLSLR.

One of the challenges of full LSLR versus PLSLR is environmental and public health equity among customers of different economic means and home ownership status.

For the LCR, EPA's current interpretation of the term "control" is limited to what a water system owns. But in the original 1991 LCR EPA established a broad definition of control as it applies to LSLs in the distribution system that included: (1) authority to set standards for construction, repair or maintenance of the line; (2) authority to replace, repair or maintain the service line; or (3) ownership of the line. American Water Works Association challenged EPA's original definition of control. The court remanded the matter because EPA failed to provide adequate notice and comment on the control definition. In 1996, EPA proposed a revised definition of control. EPA solicited comments regarding the degree to which systems may have the authority to replace the privately-owned portions of LSLs. EPA also solicited comments regarding the option of only requiring replacement of the portion of the LSL owned by the system. In the final rule in 2000, EPA elected to define control as ownership to eliminate confusion and avoid rule implementation delays. Thus, under the current LCR a water system is not required to pay the cost of replacing the portion of the LSL that it does not own.

EPA asked the Science Advisory Board (SAB) to evaluate the current scientific data regarding the effectiveness of PLSLR and the review centered around five issues: (1) associations between PLSLR and blood lead levels in children; (2) lead tap water sampling data before and after PLSLR; (3) comparisons between partial and full LSLR; (4) PLSLR techniques; and (5) the impact of galvanic corrosion.

The SAB found that the quantity and quality of the available data are inadequate to fully determine the effectiveness of PLSLR in reducing drinking water lead concentrations. The small number of studies available had major limitations (small number of samples, limited follow-up sampling, lack of information about the sampling data, limited comparability between studies, etc.) for fully evaluating

PLSLR efficacy. Nevertheless, despite these limitations, the SAB concluded that PLSLRs have not been shown to reliably reduce drinking water lead levels in the short-term, ranging from days to months, and potentially even longer. Additionally, PLSLR is frequently associated with short-term elevated drinking water lead levels for some period of time after replacement, suggesting the potential for harm, rather than benefit during that time period. The available data suggest that the elevated tap water lead levels tend to increase then gradually stabilize over time following PLSLR, sometimes at levels below and sometimes at levels similar to those observed prior to PLSLR.

The SAB also concluded that in studies comparing full LSLR versus PLSLR, the evaluation periods were too short to fully assess differential reductions in drinking water lead levels. However, the SAB explained that full LSLR appears generally effective in reliable achieving long-term reductions in drinking water lead levels, unlike PLSLR. Both full LSLR and PLSLR generally result in elevated lead levels for a variable period of time after replacement. The limited evidence available suggests that the duration and magnitude of the elevations may be greater with PLSLR than full LSLR.

EPA is contemplating several revisions to mandatory LSLR requirements. Options that would be helpful to evaluate include:

- Delaying mandatory LSLR requirement until after CCT re-optimization.
- Considering an expanded definition of control similar to what was included in the 1991 LCR to facilitate full LSLRs.
- Eliminating the requirement to do a PLSLR when the property owner does not agree to pay for the replacement of the portion of the LSL on private property after the action level has been exceeded. Full LSLR would be required by the LCR if the water system owns the entire LSL, or the property owner agrees to pay for the replacement on the private side or if the water system voluntarily pays the entire cost after the action level has been exceeded.
- Eliminating the "test-out" provision.
- Requiring water systems to provide impacted owners and residents with a NSF/ANSI 53 certified pitcher-filter or other treatment unit that removes lead before the system begins any LSLRs.

***Discussion Questions:***

- Has the seven percent annual LSLR requirement been an effective part of the LCR and, if so, what has been achieved? How does it impact compliance tracking and enforcement? If PLSLR requirements were to be eliminated, what other options could accomplish similar results?
- Should EPA consider another percentage requirement for LSLRs instead of 7%? If so, what. What would the impact be on incentives for treatment optimization?
- If PLSLRs and "test outs" are no longer allowed, then how might a water system obtain a sufficient number of agreements from owners and residents to achieve full LSLRs at an annual rate of at least seven percent?
- When optimization does not bring lead levels under the action level how should systems reduce exposure from LSLs in a way that protects public health, is feasible and assures equitable protection among the system's users?
- If EPA requires the public and privately-owned portions of the LSLs to be removed, how would systems go about educating owners and residents about the importance of LSLR once triggered into the mandatory replacement program?

- Would water systems be more likely to achieve greater LSLRs with an expanded definition of control? What would result if EPA does not change the definition of control?
- What are the environmental justice concerns associated with LSLRs? How can an even distribution of benefits be achieved, to avoid either disproportionate health or economic impacts?
- If the definition of control is expanded beyond ownership and the water system is required to replace the entire LSL, including any portion on private property, how can costs be allocated equitably?
- What measures might a PWS and/or its customers employ to address temporarily elevated lead levels during the times of exposure when LSRL and/or reoptimization is occurring?