The League of Women Voters of Dane County, WI, Inc.
Presents ……

General Meeting and Issues Forum

Wednesday, April 6, 2016

7:00 – 8:30 p.m

Water From the Tap: Is It Safe to Drink?

Speakers:

Ron Seely, Investigative Reporter and Editor, WI Center for Investigative Journalism

Abigail Cantor, Water Quality Engineer, founder of Process Research Solutions, LLC

Location:

The Capitol Lakes Grand Hall*, 333 West Main Street, Madison

(*Free parking in the ramp available across the street. Please bring parking voucher in for validation.)

Speaker Biographies:

Ron Seely joined the Center for Investigative Journalism as a part-time reporter, editor and student mentor in June 2013 after nearly 35 years as an award-winning reporter for the Wisconsin State Journal. For the past two decades, Seely covered science and environment for the State Journal. Seely is also a senior lecturer on the faculty of the Life Sciences Communication Department inUW-Madison's College of Agriculture and Life Sciences, where he has taught science writing for 20 years.

Abigail F. Cantor, PE is a chemical engineer specializing in water quality investigations and proactive prevention of water quality issues, and is the founder of Process Research Solutions, LLC in Madison, Wisconsin. She has more than 30 years of experience in the field of drinking water quality. She is the author of the book "Water Distribution System Monitoring: A Practical Approach for Evaluating Drinking Water Quality" and the co-author of the AWWA Manual of Water Supply Practices M58: Internal Corrosion Control in Water Distribution Systems. She is a member of the American Water Works Association Lead and Copper Rule Task Advisory Workgroup. She earned her BS degree in Civil & Environmental Engineering at the University of Tennessee-Knoxville, and her MS degree in Chemical Engineering at Columbia University in New York City.

Study Questions for April 6:

1. Do you have confidence in the Environmental Protection Agency's guidelines for safe drinking water and if not, how should they be changed?

2. What do you think needs to be done to address agricultural practices that affect the quality of groundwater?

3. Since Madison replaced old lead water pipes, do you feel safe drinking water from your tap?

4. What should the League of Women Voters of Dane County do to address contaminants in drinking water?

Water Quality Forum Planning Committee members: Sue A. Larson, Diane Martin Liebert, Jan Van Vleck

Web Links:

League of Women Voters Dane County – *lwvdanecounty.org*

Wisconsin Center for Investigative Journalism – *WisconsinWatch.org*

Characterizing the Sources of Elevated Groundwater Nitrate in Dane County Wisconsin – *www.lsrwa.org/images/uploads/documents/DaneGWstudy.pdf*

League of Women Voters of Wisconsin

Policy position adopted by delegates at state Annual Meeting, May 31, 2014

WATER

Maintaining access to clean water which supports life and a healthy environment is a public trust, a fundamental human right, and is the shared responsibility of all who live or do business in Wis consin. Managing water as a natural resource is essential to maintaining our quality of life and t he strength of our economy, as well as to ensuring its availability to support the mix of natural flora and fauna which is unique to our state. Decisions about water use and management must be made with consideration for public safety and the impact those decisions will have on all current and future generations of stakeholders.

Water quality and quantity standards need to be addressed in terms of whole basin management and the hydrologic cycle. That is, management not just of the water itself, but of the land and wa tersheds which drain to wetlands, aquifer, meteoric groundwater, river, lake or other body of wat-er, whether it is naturally occurring or constructed, and wherever it is located. Water management is therefore accomplished as management of all parts of an integrated system within basin boundaries and of any water which may move into that system.

All current and future generations of stakeholders in Wisconsin shall enjoy the benefits of equal a ccess to natural sources of clean, fresh water.

We support:
Ongoing testing and monitoring for water quality and quantity on state and local levels.
State, local and citizen legal authority to set and enforce their water quality and water management standards.

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'*Global Understanding of Water on Our Planet*' Taken form the *July 2015 Willy Street Co-op READER, "Conserving Our Greatest Resource: Water" by Mike Burns, Co-op Merchandiser*.

Every aspect of life on our planet is made possible by water. Water circulates around our planet by evaporating from land, bodies of water and organisms. Once water vapor condenses into clouds and these clouds become over-saturated, water falls to earth in the form of rain. This rain moves underground and into lakes while being filtered by ecosystem elements like porous soil and plants and then eventually makes its way to replenish groundwater and surface water supplies. The increasing variation and unpredictability of our climate has disrupted this natural process of redistributing and filtering water. As human population on the planet has increased so dramatically, so has the demand on freshwater, as well as wasteful and extravagant uses. To make matters worse, pollution makes whatever water is available unfit for many uses, further exacerbating supply issues.

About 3/4th of the planet is covered with water, but 97% of that is salt water. Three-fours of the remaining three percent (fresh water) is tied up in glaciers and 0.1% is located in rivers and lakes. This means that the freshwater supply on the planet is in very short supply. Agriculture consumes 70% of the remaining

drinkable water; 22% is taken by industrial use and that leaves just 8% for domestic and household use. To put it lightly, our freshwater supply on the planet is extremely limited. For that reason, it is extremely important that the water we drink be healthy and clean.

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"***Experts Decry Water-Test Rules***," Wall Street Journal, February 5, 2016
by Cameron McWhirter, Kris Maher and Scott Calvert.

Tainted Taps: The lead contamination of Flint, Michigan's drinking water highlights the complex problem facing many aging water systems across the U.S. The contamination isn't in the water source, but rather along the web of pipes that carry the water into homes and businesses.

Water Source: Lakes, rivers, and reservoirs don't usually contain high amounts of lead, but their water can be corrosive for lead pipes, unless properly treated.

Treatment Facility: Potentially corrosive water may need to be mixed with chemicals to reduce the chances of lead leaching into drinking water. Utilities should carefully test water and neutralize corrosive water at the facility. If necessary, they should add phosphates to coat the inner lining of the service popes to reduce corrosion. The main water line popes coming directly form the treatment plant do not contain lead. Service line pipes, however, often are made of lead. People must rest their water for lead – and if found, use filters on faucets or pitchers to reduce lead. Ultimately, utilities and property owners need to replace service lines with non-lead pipes and modernize household plumbing.

Testing: The EPA requires many water systems to test for lead every three years using customers to collect water samples. If more than 10% of the sampled properties have lead levels above the EPA's safety threshold, the agency intervenes. Critics say utility instructions can vary, skewing results, and having customers conduct sampling means the utility can't be certain it was done properly.

The Environmental Protection Agency requires 68,000 U.S. public water systems serving 303 million people to test for lead in drinking water, the vast majority of the nation. For decades, lead was commonly used throughout the U.S. in drinking water pipes, especially in service lines leading from water mains to individual homes and the plumbing inside those homes, until the dangers of lead became clear, particularly how it can damage the developing brains of children.

In 1986, the EPA banned future use of lead pipes, fittings, solder or other plumbing materials above a low concentration. In 1991, the agency published its Lead and Copper Rule, which focused on minimizing contamination from lead service lines and plumbing put in before the federal ban. In December, the EPA's National Drinking Water Advisory Council, a 15-member committee of utility officials, regulators and others, identified a number of flaws with the current testing for lead. For instance, the group said residents, who can be difficult to recruit, may not follow sampling instructions, leading to inaccurate test results.

A 2013 study written by EPA water experts found that changing the way samples were taken greatly affected the lead levels detected in several dozen homes in Chicago. The regulation requires collecting the first liter to come out of the tap after a six-hour period of nonuse. But researchers found that taking further samples after the first liter could lead to a higher reading, especially if those samples included water that was sitting in lead service lines. "Current sampling protocols will often considerably underestimate the peak lead levels," EPA officials wrote.

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"***Treatment Plant Process***" Madison Metropolitan Sewerage District, *www. madsewer.org*

Every day, wastewater goes down toilets and drains in homes, schools, businesses and factories which ends up at the Madison Metropolitan Sewerage District (MMSD). MMSD removes contaminants from wastewater before it is released to local watersheds. How is this done?
At the MMSD plant, physical and biological processes are used to speed up the natural process of purifying water. The process closely mimics how wetlands, streams and lakes naturally purify water. The processes used to purify the water produces solid material called biosolids which is used by farmers as fertilizer.

You may be wondering how the water gets to the plant and does water really get "cleaned"? After the wastewater leaves a house, school, etc…, it ends up in the sewer system. The sewer system is made up of several thousand miles of sewer pipes that carry the water to a pumping station. MMSD owns 17 pumping stations, but maintains a total 61 pumping stations that are spread throughout Madison~~,~~ and the surrounding municipalities. The pumping stations then transport the wastewater to the MMSD plant where approximately 42 million gallons of wastewater end up daily.

Once wastewater gets to the plant, the treatment process begins. To help explain the treatment process we have 2 friends, Drip and Drop, who will take you through the treatment process at MMSD.

Primary Treatment

Influent

When Drip and Drop and all of the incoming water, called influent, enter the MMSD plant, they pass through fine screens to remove rags and other large material such as: paper towels, feminine hygiene products and flushable wipes. All of the wastewater passes through ¼" round holes on a screen. Drip and Drop head to the Grit Chambers next. The wastewater is about 99.9% water. A vortex action is used in the grit chambers to allow sand, gravel, and other inorganic solids to accumulate in the bottom of the Grit Chamber Tanks.

Primary Settling tanks

Primary Settling Tank is the next stop for Drip and Drop, these tanks are about 9 feet deep and anywhere from 86 to 100 feet long. As Drip and Drop enter the primary settling tanks, also referred to as sedimentation tanks, they are slowed down to allow heavier solids to settle to the bottom of the tanks. The settled solids are called primary sludge. Drip and Drop spend about 2 hours in the primary settling tanks. Next up is Drip's favorite place!

Secondary Treatment

Aeration Tanks

This stop is sometimes referred to as Secondary Treatment. This is where the biological treatment begins. Air is pumped into large mixing tanks that mix the wastewater with bacteria and microorganisms that will consume the organic matter and nutrients that contaminate the water as food. Drip doesn't mind the 12 hour bubble bath!

Final Clarifying Tanks

At this stop you can often see some of Drip and Drop friends: ducks, geese and other birds. The aerated wastewater with the bacteria and microorganisms, called "mixed liquor", flows to the final clarifying tanks. This four hour process allows the microorganisms to be separated from the clean water by settling to the

bottom of the tanks. Ninety percent of these microorganisms are sent back to the aeration tank to clean more water. The other ten percent of the microorganisms are pumped to the solids handling process to be made into fertilizer. The water leaving the final clarifiers has completed the secondary treatment.

UV Light Chambers

In the final step of the cleaning process, the treated water, called effluent, passes through disinfection chambers designed to kill disease-causing bacteria with ultraviolet light. The ultraviolet light disinfection system was installed in 1986; at which time it was the world's largest system.

Treated Wastewater

In less than 24 hours Drop can return to her favorite place, the environment, so she can see friends and start the recycling process all over again.

Earth has a limited amount of water. Through the water cycle, Earth naturally cleans dirty water so that water can be used by plants, animals and humans. It is very important that we protect this natural resource!

*NOTE: The League of Women Voters of Dane County will lead a tour of the Madison Metropolitan Sewerage District in May for members or guests who are interested in touring the plant. Watch for more details on the League website.

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'First in the Nation: City of Madison Replaced all Lead Pipes' By Silke Schmidt
Failure at the Faucet, Wisconsin Center for Investigative Journalism, February 1, 2016

The Madison Water Utility was the first major utility in the nation to demonstrate that a full replacement of both the public and the private portions of lead service lines was possible.

But it was neither easy nor cheap. "It was quite a contentious thing," Tom Heikkinen, the water utility's current general manager, said at a regulatory meeting in May 2015. "I'm glad I wasn't here at the time."

The effort to replace all of Madison's lead pipes took more than a decade beginning in 2001, and cost roughly $19.4 million. About 20 percent of the cost was borne by homeowners. The city covered half the cost of replacement, up to $1,000, for the 5,600 property owners who participated.

Robin Piper, the utility's financial manager at the time, said the solution "made the most sense in the long run." It made the city's drinking water safe and did not pollute Madison's lakes with orthophosphate, an anti-corrosive that was the other solution Madison could have chosen for preventing lead from leaching into water.

Madison's decision in the early 2000s to replace all of the lead lines owned by the Madison Water Utility and private customers was controversial at the time but is now hailed as a model as the U.S. Environmental Protection Agency studies how to better protect drinking water from lead contamination.

Sandra Rusch Walton, spokeswoman for Milwaukee Water Works, said the cost of replacing all of that city's 70,000 lead pipes has been estimated at between $511 million and $756 million.

Cost is not the only barrier, said Amy Barrilleaux, spokeswoman for the Madison Water Utility.

"Just getting Madison's lead service replacement program approved by lawmakers and the agencies that oversee us took years, not counting the actual pipe replacement work itself, which took another decade," she said. "It's not surprising that other utilities have been reluctant to go down that path, but we're glad we did."

Speaking at the May regulatory meeting, Steve Elmore, the Wisconsin Department of Natural Resource's public water supply chief, said because of Madison's project, Wisconsin has "had a big part" in the current effort to rewrite the federal Lead and Copper Rule. An advisory panel has recommended that any updates to the rule require utilities to pursue full replacement of all lead service lines with customers.

Even full replacement of pipes must be approached with caution to avoid dislodging lead particulates that could linger in the tap water for several years, according to a study of Madison's lead levels after the full replacement program.

One of the authors, Abigail Cantor, a Madison-based chemical engineer and technical consultant, had this message for water utility managers: "If we are going to replace these pipes, it has to be done correctly. … Lead is a bad substance. The level that humans can tolerate without any severe effects is zero. So let's try to get the lead out of our water systems."

(This story was produced as part of The Confluence, a collaborative project involving the Wisconsin Center for Investigative Journalism and University of Wisconsin-Madison School of Journalism and Mass Communication reporting classes. The nonprofit Center (www.WisconsinWatch.org) collaborates with Wisconsin Public Radio, Wisconsin Public Television, other news media and the UW-Madison School of Journalism and Mass Communication.)

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'Lead pipes, Antiquated Law Threaten Wisconsin's Drinking Water Quality'

by Silke Schmidt and Dee J. Hall, *WisconsinWatch.org*, February 1, 2016

A water utility is compliant with the federal law when at least 90 percent of household samples are below the action level of 15 parts per billion (ppb) of lead. Even when utilities greatly exceed the action level, unless it involves more than 10 percent of the samples, no system-wide remediation efforts are required.

If more than 10 percent of samples exceed 15 ppb, a water utility may be required to install or improve corrosion control. This involves adding a chemical, such as orthophosphate, to the water to make it less likely to eat away at lead pipes. Determining the water treatment method that works best requires money, ongoing maintenance and specialized knowledge about water chemistry. Systems required to use corrosion control include those serving 50,000 or more customers and those in which 10 percent or more of the water samples tested above the federal action level.

(Corrosion control) is a complicated subject that has kept water quality experts searching and even arguing for decades," said Abigail Cantor, a Madison-based chemical engineer who has worked with several Wisconsin water utilities as a technical consultant.

In addition, orthophosphate harms surface water quality. When treated water is released into lakes by the wastewater treatment plant, phosphate contributes to algal blooms, which can cause oxygen depletion and trigger the production of toxic chemicals. That is one of the reasons that Madison, a city proud of its lakes, rejected corrosion control and instead replaced all of its lead service lines with copper pipes.

Required pipe replacements can boost danger

When a utility is not in compliance with the federal law and corrosion control is ineffective or rejected, it must replace 7 percent of the lead service lines that it owns. Additional replacements are required every year until the utility comes back into compliance. The utility-owned portion of the service line typically runs from the water main to the curb stop, while the section between the curb stop and the house is usually privately owned. However, replacing only the utility-owned portion of the pipe, a so-called partial replacement, can have severe unintended consequences: it may increase, rather than decrease, lead levels in consumers' tap water.

Several factors can cause these lead spikes. One of them is the physical shaking of the lead pipes during the replacement work, which can knock off lead inside the pipe. In 2012, a federal Centers for Disease Control and Prevention study reported direct evidence that partial replacements may cause elevated lead levels — not just in drinking water, but also in the bodies of children under 6 years of age.

"Compared with children who had never had a lead service line," the authors found, "children having had a partial lead pipe replacement were at increased risk for increased (blood lead levels)." They concluded that "the practice of partially replacing lead service lines as a method to comply (with the Lead and Copper Rule) should be reconsidered."

Because of the potential danger, a 2014 communications guide by the American Water Works Association urged utilities to notify customers of steps to protect their drinking water whenever nearby water mains are repaired or lead service lines replaced. Milwaukee Water Works spokeswoman Sandra Rusch Walton said the city takes precautions against lead when it repairs broken water mains by flushing the line and asking homeowners to do the same.

Cantor said that may not always have the desired effect. "Flushing of building water lines is a complicated subject," she said. "Sometimes it does solve the problem. Sometimes, it riles up pipe wall debris (including lead) and makes matters worse." Cantor also said that monitoring for lead in a building is difficult.

New regulations years away, public on its own

A quick fix of the nation's lead pipe problem is unlikely. An EPA-convened working group tasked with proposing changes to the Lead and Copper Rule released its final report in August. One of the group's major recommendations: requiring water utilities to pursue full replacement of all lead service lines in collaboration with customers.

Amy Kubly, a water supply engineer with Wisconsin's Department of Natural Resources, agrees that the EPA ought to move faster, given that the dangers of lead have been known for a very long time. "I think (the Lead and Copper Rule) is overdue for revisions," Kubly said. "I've heard for years now that they're working on them, but haven't heard anything concrete as to what they would contain. Hopefully we'll hear something soon."

Until all lead pipes in the water infrastructure system are safely replaced, however, consumers are largely on their own. Specific recommendations for residents include testing their water, ideally before starting a family, installing a water filter certified to remove lead and other metals, using only cold water for cooking and never drinking or cooking with tap water that has been sitting in pipes for several hours.

Even Cantor — who has a copper water system, has tested her water and knows she has no metals issues in her house — takes precautions. "A good rule of thumb is to never drink water that has been stagnating — in any building," she said. "I fill up a big water jug after I wash dishes at night and put the jug in the refrigerator. That way, I know that I am always drinking water that came fresh from the water main instead of water that has been sitting in the pipes in my house."

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'Major Study of Contaminated Water Shows Progress, Challenges Ahead', by Steven Verburg, Wisconsin State Journal, January 17, 2016

A sophisticated study blending 35 years of well contamination tests shows high levels of toxic nitrate is turning up a little less frequently in Dane County-area drinking water.

But because the substance is so widespread and hazardous to human health, scientists from five state and local agencies who conducted the study are urging broader efforts to limit farm fertilizer use that is the primary source of contamination.

More than one in five tests of wells providing water to homes, churches, schools, bars and restaurants exceeded the safe limit from 2010 through late 2014. That's down from 30 years ago when more than one-third showed unsafe levels, but still more than twice the statewide rate.

A 43-page report summarizing the landmark study also recommends more testing of water from more than 20,000 residential wells in the county, especially in highest risk areas, which the scientists mapped with greater precision than ever before. "It's still a problem, but the fact that it has leveled off shows that some of these efforts have worked," said Dick Lathrop, a UW-Madison expert on fresh water systems who served as one of the study's principal investigators. "It should give Dane County a chance to have more conversations with farmers."

But another expert suggested that government efforts to entice farmers into statewide programs designed to control fertilizer and manure spreading aren't likely to substantially offset powerful market forces that drive up nitrate pollution.

Acute risks to infants

Drinking water contaminated with more than 10 milligrams per liter of nitrate poses acute risks to infants and women who are pregnant, a possible risk to fetuses in early stages of pregnancy, and a longer-term risk of serious disease in adults.

Nitrate is the state's most widespread groundwater contaminant, and its extent and severity have been increasing, top state agency officials appointed to the Wisconsin Groundwater Coordinating Council said in their 2015 report to the Legislature.

It's not just residential wells that are at risk. In Dane County alone there are 232 facilities such as churches, bars, day cares and restaurants with wells, most of which draw water from the shallow aquifer, typically 100 to 300 feet down, that is most vulnerable to nitrate pollution. Previous studies have estimated that 90 percent of nitrate in groundwater comes from spreading of synthetic fertilizers and dairy manure on farm fields, with most of the remainder from septic systems.

About 31 percent of the state's 9 million crop acres are covered by nutrient management plans, according to a November report of the Department of Agriculture. The plans require soil testing and other practices to control nutrients that can end up in lakes, streams and groundwater. Most farmers try to limit fertilizer costs even if they aren't enrolled in nutrient planning programs, which are mandatory only for farmers enrolled in certain subsidy or preservation programs, and those who have been caught polluting or have 1,000 or more animals.

Dane County has 130,000 acres enrolled in plans, more than all but four other counties. The county has subsidized construction of two manure digesters designed to generate electricity while reducing the nutrients in manure before it is applied to fields, said Kevin Connors, director of the Dane County land and water resources department. "We're not out of the woods, but we've made progress," Connors said. "The ag community should be proud."

Another major component in fertilizer and manure, phosphorus, contributes to abnormal algae growth in lakes and streams when it runs off the land with rain and snowmelt. Nitrate behaves differently. Relatively little lingers near roots where it can be absorbed. Water washes it down into shallow groundwater that is the source of drinking water for one-quarter of Wisconsin residents.

An estimated 9 to 10 percent of Wisconsin wells have tested over safe limits for nitrate,

The study mapped nitrate hot spots, but contamination can vary over very short distances, said co-author Kirsti Sorsa, the health department's environmental health labs supervisor. "Because of the variability, it's still important that people know they should test their wells," Sorsa said." Very few people do test their water. We certainly advocate more testing."

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"Safeguarding Your Drinking Water: What You Can Do" by Ron Seely, *WisconsinWatch.org*, November 8, 2015

Hundreds of thousands of Wisconsin residents face the specter of drinking unsafe water, the Wisconsin Center for Investigative Journalism has found. Contamination in drinking water persists, and in some areas is worsening, because of flawed agricultural practices, development patterns that damage water quality, geologic deposits of harmful chemicals, porous karst and sand landscapes, lack of regulation of the private wells serving an estimated 1.7 million people, and breakdowns in state and federal systems intended to safeguard water quality.

Wisconsin residents can take a number of steps to make sure their drinking water is safe. Here are a few suggestions:

- If you live in one of the 940,000 households in Wisconsin that rely on a private well, have your water tested or test it yourself. The state Department of Natural Resources recommends getting your well tested once a year for coliform bacteria and any time you notice a change in how your water looks, smells or tastes. Check with your county health department on what contaminants may be found in your area and for which you might also want to test.
- You can get more information on testing from the Wisconsin State Laboratory of Hygiene, including details on how to obtain testing kits and the costs of various tests. The test for coliform bacteria, for example, costs $29, as do the tests for lead and nitrate.
- For those using municipal water, get the consumer confidence report from your local water utility. Or you can access the reports on the DNR's database of public water systems. Also, find out if your utility disinfects for viruses or uses corrosion control to help keep lead out of pipes.
- If your home was built before 1984, consider having it assessed for lead in the water. While pre-1950 homes often have lead service pipes, some homes built before 1984 may have lead solder on the pipes or fixtures that contain lead. Consult the DNR website for safer ways to use water that may contain lead.
- Consider a filter for your water. But make sure that the filter you choose is effective for removing the specific contaminants that are in your water. The University of Wisconsin-Extension website has advice on which to choose.