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RWSA BOARD OF DIRECTORS
Minutes of Regular Meeting
June 22, 2021

A regular meeting of the Rivanna Water and Sewer Authority (RWSA) Board of Directors was held on Tuesday, June 22, 2021 at 2:15 p.m. via Zoom.

Board Members Present: Mike Gaffney, Dr. Liz Palmer, Jeff Richardson, Lauren Hildebrand, Gary O'Connell, Chip Boyles

Board Members Absent: Lloyd Snook.

Rivanna Staff Present: Bill Mawyer, Katie McIlwee, Lonnie Wood, Jennifer Whitaker, David Tungate, John Hull, Andrea Bowles, Dr. Bill Morris, Steven Miller.

Attorney(s) Present: Carrie Stanton.

1. CALL TO ORDER

Mr. Gaffney called the June 22, 2021 regular meeting of the Rivanna Water and Sewer Authority to order at 2:16 p.m.

2. STATEMENT FROM THE CHAIR

Mr. Gaffney read the following statement aloud:

"This is Mike Gaffney, Chair of the Rivanna Water and Sewer Authority.

"I would like to call the June 22, 2021 meeting of the Board of Directors to order.

"Notwithstanding any provision in our bylaws to the contrary, as permitted under the City of Charlottesville's Continuity of Government Ordinance adopted on March 25, 2020, Albemarle County's Continuity of Government Ordinance adopted on April 15th, 2020, and revised effective October 1, 2020 and Chapter 1283 of the 2020 Acts of the Virginia Assembly effective April 24, 2020, we are holding this meeting by real time electronic means with no board member physically present at a single, central location.

"All board members are participating electronically. This meeting is being held pursuant to the second resolution of the City's Continuity of Government Ordinance and Section 6 of the County's revised Continuity of Government Ordinance. All board members would identify themselves and state their physical location by electronic means during the roll call which we would hold next. I note for the record that the public has real time audio-visual access to this meeting over Zoom as provided in the lawfully posted meeting notice and real time audio access over telephone, which is also contained in the notice. The public is always invited to send questions, comments, and suggestions to the Board through Bill Mawyer, the Authority's Executive Director, at any time."

Mr. Gaffney called the roll.

Mr. Chip Boyles, City Manager, stated he was located at 605 E. Main St in Charlottesville, VA.

Ms. Lauren Hildebrand stated she was located at 305 4th Street Northwest in Charlottesville, VA.

Mr. Gary O'Connell stated he was located at 168 Spotnap Road (ACSA Headquarters).

Dr. Liz Palmer stated she was located at her home address of 2958 Mechum Banks Drive in Charlottesville, VA.

Mr. Jeff Richardson stated he was located at the County Administration Building at 401 McIntire Road in Charlottesville, VA.

Mr. Mike Gaffney stated he was located at 3180 Dundee Road in Earlysville, VA.

Mr. Gaffney stated the following Authority staff members were joining the meeting electronically: Bill Mawyer, Lonnie Wood, Jennifer Whitaker, David Tungate, Steven Miller, Dr. Bill Morris, John Hull, and Katie McIlwee.

Mr. Gaffney stated they were also joined electronically by Carrie Stanton, Counsel to the Authority.

3. MINUTES OF PREVIOU.S. BOARD MEETINGS

a. Minutes of Regular Board Meeting on May 25, 2021

Dr. Palmer moved that the board approve the minutes of the previous board meeting as amended. The motion was seconded by Mr. O'Connell and passed unanimously (6-0). Mr. Snook was absent.

4. RECOGNITIONS

There were no recognitions.

5. EXECUTIVE DIRECTOR'S REPORT

Mr. Mawyer stated that RWSA is starting a classification and compensation study with consultant Evergreen Solutions. This was last done by Evergreen Solutions about four years ago. The study is currently underway, and the results should be available later in the fall.

Mr. Mawyer stated RWSA is having its first in-person, team-building event this week (June 21-25) in the Rivanna parking lot, for all staff who are able to attend. This would be the first in-person, team-building event since December 2019.

Mr. Mawyer stated that an intern, Zachary Mountjoy, is joining RWSA this year. He is a student at James Madison University studying engineering and would be helping the water quality specialist and assisting with reservoir water sampling and other duties.

Mr. Mawyer stated the theme in the infrastructure and master planning is pipelines. He stated RWSA is working on the central water line that would largely go through the center of the City

of Charlottesville. He stated RWSA has been working with Lauren, City staff, and ACSA staff on the route. Mr. Mawyer stated there continues to be work on the Ragged Mountain to Observatory Water Treatment Plant water line to replace the older line and build a new pump station, as well as work being done on the easements for that project. He stated that easements are being worked on from the South Rivanna Reservoir to Ragged Mountain Reservoir. Mr. Mawyer stated that RWSA continues to work with the UVA Foundation and some private owners to complete the acquisition of those easements. And he stated that RWSA is working to restart the discussion on the Schenks Branch Sewer Line. Mr. Mawyer stated there is a consultant updating all of the plans, schedule, and cost estimates, and RWSA would coordinate with Lauren and the County to try to move that project forward in the near future.

Operationally, Mr. Mawyer stated RWSA would be providing a new report for the Board this month in the Consent Agenda called the Drought Monitoring Report. He wanted to point out that Central Virginia is still in the green, which means that it's normal for precipitation, ground water levels, reservoir levels, and stream flow. He stated the state maps provided in the presentation were dated from June 13 and June 21, 2021. Mr. Mawyer pointed out that there was a slight decline in the status for a few areas across Northern Virginia that turned from green (normal conditions) to yellow (watch conditions). He stated there is one block that is red in Southwest Virginia for ground water flow.

Mr. Mawyer stated that our water supply is in good shape and the rain that day would help. As commentary, Mr. Mawyer stated if anyone is following, the Southwest portion of the United States is in much worse shape than Virginia in regard to a drought. Presented were images showing Lake Mead at 37% of its capacity, which supplies water to seven states in the Southwest. Additionally, Mr. Mawyer presented images of the Hoover Dam, showing how low the water levels are, and stated that there is a lot of discussion in that area of the country about drought management and allocation of that water. He stated that Virginia is quite lucky to not be in that situation and hopes not to be. He stated that RWSA would continue to monitor drought conditions and report back each month to the Board.

Mr. Mawyer stated that five of RWSA's water treatment plants improved their performance in the Virginia Optimization Program, which is sponsored by the Virginia Department of Health. He stated that from the provided report, those five plants all moved from either a bronze to gold status, or from a bronze to silver status in awards from the VDH. These goals are not regulations but are recommendations from the VDH to improve the quality of the drinking water in Virginia. Mr. Mawyer stated most of RWSA's water treatment plants improved from 2019 to 2020.

Mr. Gaffney asked if there were any questions.

Mr. O'Connell congratulated and thanked Mr. Mawyer on the water plant recognitions.

6. ITEMS FROM THE PUBLIC

Mr. Gaffney opened the meeting to the public.

There are no public comments.

Mr. Gaffney closed Items from the Public.

7. RESPONSES TO PUBLIC COMMENT

Mr. Gaffney opened Items from the Public. He asked Mr. Hull if there was anyone from the public who wished to speak

Mr. Hull replied that there was not.

Mr. Gaffney closed Responses to Public Comment.

8. CONSENT AGENDA

a. Staff Report on Finance

b. Staff Report on Operations

c. Staff Report on Ongoing Projects

d. Staff Report on Wholesale Metering

e. Staff Drought Monitoring Report

f. Personnel Manual Update - Elimination of Compensatory Time

g. Capital Improvement Plan Amendment – Scottsville WTP Lagoon Liner Replacement

h. Contract Authorization – Security Enhancements; Security 101

i. Capital Improvement Plan Amendment and Contract Authorization; Central Water Line Project; MBI Engineering

Dr. Palmer moved that the board approve the Consent Agenda. The motion was seconded by Mr. O'Connell and passed unanimously (5-0). Mr. Snook and Mr. Boyles were absent.

9. OTHER BU.S.INESS

a. Presentation: Cybersecurity Update; Information Systems Administrator, Steven Miller

Mr. Steven Miller, IS Administrator for RWSA/RSWA, opened his presentation on cybersecurity called "Rivanna's Layers of Protection." He stated that cyberattack is the number one threat to the water infrastructure. Mr. Miller explained that cybersecurity is the practice of defending computers, servers, mobile devices, electronic systems, networks, and data from malicious attacks.

Mr. Miller pointed to some of the more high-profile cyberattacks lately, such as the Colonial

Pipeline ransomware attack, which affected a huge population. He continued with the Oldsmar Florida Water Treatment Plan cyberintrusion, as well as the JBS SA meat processing ransomware attack, and also pointed out another incident in California of cyberintrusion. He explained that the two ransomware attacks happened when someone entered the system and encrypted the local networks, which means those organizations had no access to their own networks. Mr. Miller confirmed that the pipeline itself was not affected, but the administrative systems were.

He stated the two water system treatment plant attacks (Oldsmar, FL and California) were almost identical because someone in the organizations left a remote access program open, an operator's password was acquired, and the hackers were able to break in. Mr. Miller stated that in the case of the Oldsmar attack, the operators quickly noticed what was happening and shut down any bad effects. In California, however, Mr. Miller stated it was several hours before anyone noticed what was going on, and the hackers spent several hours deleting things.

Mr. Miller stated common attacks of cybersecurity include viruses, malware, phishing emails (clicking on an email from unknown sources is often how this is delivered), social engineering (obtaining passwords from users), theft (stealing of username and passwords, which is what happened in the two water treatment plan attacks), and intercepting communications (a fairly rare form, usually done through emails when a username/password are sent in an email).

Mr. Miller stated Certified Information Systems Auditors (CISA) and the FBI urge several ways of mitigating the consequences from and vulnerability to these attacks. He stated this list can be found in the presentation and confirmed that RWSA/RSWA are doing everything on the list and more.

Mr. Miller stated they named their system the "Rivanna's Layers" because RWSA/RSWA uses a layered defense-in-depth strategy. He stated they don't rely on just one system or one type of defense but use many different types of software and other things to defend against attacks. He stated that they have them at different parts, or layers, of where you need them. He stated this is the most recommended approach and also allows RWSA/RSWA to be nimble and add pieces without having to disrupt operations.

Mr. Miller stated the first layer of protection is physical. This is done by ways such as locking the water plants, and the policy that people are not allowed to just walk up to computers and use them. He stated contractors are kept away from the systems, and facilities are monitored to make sure no unauthorized people can physically walk up to any computer and use it.

Mr. Miller continued by saying the next layer of protection comes by using next-generation firewalls and camouflage products. He explained that a next-generation firewall is a firewall that does more than just be a wall. He stated it allows a user to tune it for various intrusions. He stated that the first firewalls in the routers, and those are called outer firewalls, which are smart firewalls that adapt. He stated that RWSA/RSWA is in the process of installing new software and systems that would camouflage our systems and hide them from the outside world—becoming extremely hard to find—and then once found, they make it difficult for the hacker to see what was actually hacked into. He stated that firewalls allow for geofencing, which allows all traffic

from a specific area to be blocked. He gave the example that there is no reason to have any traffic going to, or from, China to a water plant. Mr. Miller explained that this system allows for blocking anything going to or from China. He stated that specific access can be made if needed but allow for limiting huge amounts of traffic that do not have any need for access. Mr. Miller stated they are also adding specific firewalls to the PLCs (the industrial computers that run everything) over the coming year, so that each machine would have its own individual firewall.

Mr. Miller stated RWSA/RSWA run antivirus/malware software in both the routers looking at everything coming and going, and there is an antivirus software installed on devices (cell phones, workstations, laptops). He stated both are from different companies, using different logic, so that if one doesn't find an issue, the other will.

Mr. Miller stated that all communication between sites is done by encrypted tunnels created by each router, so users would need a key at each end for each router. He stated even if that were intercepted, there would not be any information that would be able to be used.

Mr. Miller stated that another layer includes access restrictions, which includes all users being required to use a username and password to get onto the system. If a user is entering the system remotely, which is not allowed at random, all remote authentication requires two factors including a username and password, as well as a token. He stated that adds an additional layer of protection, so that if a username and password has been stolen, the hacker still cannot enter the system without a token, which Mr. Miller stated is specifically recommended by the FBI.

Mr. Miller stated the most vulnerable part of any system is the actual users. He stated they offer training and simulations, and all users are adept at not falling for the phishing emails and clicking on things that should not be clicked on.

Mr. Miller stated one of the last layers is the disaster recovery. He stated backups are done in numerous ways and are stored offsite and off network, so even if an attack were to happen that was to encrypt the entire network, there are backups for all critical systems, stored where the attack would not be able to reach them.

Mr. Miller stated RWSA/RSWA completes various types of threat monitoring, and they have an appliance in-house that gathers information directly from the routers, which tells them where traffic is coming from and going to, and also is looking for patterns and would give warning if anything is identified as bad or suspect. He stated they are also given alerts from a large number of organizations and federal agencies, with the most recent being from a cyber-detect and respond portal, which takes all warnings received and filters what is appropriate based on criteria set by RWSA/RSWA.

Mr. Miller concluded by saying that RWSA/RSWA specifically mitigate strategies for the types of attacks seen in the news, but also do much more beyond that.

Mr. Mawyer asked Mr. Miller to explain how someone outside of the organization could take over a treatment plant, like what happened in Oldsmar.

Mr. Miller responded by saying that type of access is not allowed by RWSA/RSWA. He continued by saying the type of access used in Oldsmar is specifically not allowed at any of the control facilities, and any remote access requires the two-factor authentication.

Mr. Mawyer stated that the RWSA/RSWA controls system is disconnected such that from the outside, one cannot take control of it.

Mr. Miller confirmed this and stated that no outside control is allowed, and that type of software is completely blocked.

Mr. O'Connell thanked Mr. Miller for his presentation.

Dr. Palmer thanked Mr. Miller for his presentation.

Mr. Miller stated the organization has always been a little paranoid and based on what is happening in the world right now, this is good posture, and they would continue to add protections as they can.

b. Presentation: Virginia Water Protection Permits Update; Director of Engineering and Maintenance, Jennifer Whitaker

Ms. Jennifer Whitaker, Director of Engineering and Maintenance for the Authority, would be providing a quick update on the water withdrawal permits currently being worked on. She stated that she would present a quick regulatory overview, then would speak specifically about the urban system as well as the Crozet system.

Ms. Whitaker stated that as a program overview, the withdrawal of service water in Virginia is regulated under the Surface Water Control Law and State Water Control Board, which is all set up under the authority of the Federal Clean Water Act. She stated that historically, water withdrawal in Charlottesville and in Virginia was governed by the Virginia Department of Health through the Waterworks Operations Permits. She stated that North Rivanna, Crozet, and Scottsville WTPs are still governed by this kind of permit, and there are several requirements to qualify for an exclusion from withdrawal permitting. Ms. Whitaker stated that those requirements are that the facility had to exist before 1989, can't have been abandoned at any point since then and does not require expansion. She stated this would come into the discussion about Crozet WTP in the presentation.

Ms. Whitaker stated surface water withdrawal permits are governed by a section of the Virginia Administrative Code and are generally administered by the Department of Environmental Quality (DEQ). She stated that an application is needed for each individual system to get a permit and is done through the joint permit application process. She stated that those who were around in the early 2000s may remember going through that process with RWSA.

Ms. Whitaker stated that the joint permit process is handled through the Virginia Marine Resources Commission at the state level. She stated they act as a clearing house and distribute to state agencies as well as to the U.S. Army Corp of Engineers. She stated that the Corp acts as a

clearing house for federal agencies as well as federally recognized Tribes. Ms. Whitaker continued saying there are two key permits: the Virginia Water Protection (VWP) permit, which is DEQ, typically issued for 15 years; and the U.S. Army Corp of Engineers permit, typically issued for a 10-year term. She noted that the permits, at the end of their term, require either an extension or a reissuance.

Ms. Whitaker referenced her presentation slide and numerous logos for other agencies, noting that was the minimum number of state boards and agencies involved. She stated that after developing her presentation, she realized she had failed to include organizations like the EPA and City and County government, and the number of stakeholders typically far exceeds the number of logos at the bottom of the page. She commented that this just gives an idea of the breadth and depth of these permits. She pointed out a recent addition of the logo for the Monacan Indian Nation, which has expressed an interest in the RWSA permits in both the urban system and Crozet going forward, and she thought there were at least seven other Tribes that have the right to review some of the permitting documents that may become involved.

Ms. Whitaker stated that as a quick reminder on the permit history, in 2001 and 2002, there was a drought of record; and from 2002-2012, the RWSA went through an extensive community water supply planning process. She stated that from that process came two sets of permits—the VWP permit with DEQ and the U.S. Army Corp of Engineers permit. She stated that all of the major and minor modifications are listed on the slide presentation. Ms. Whitaker stated that the major modifications to the permit were from when the switch was made from a concrete dam to an earthen dam at Ragged Mountain, so that was the major permit modification. She stated that the minor modifications were for a variety of administrative issues.

Ms. Whitaker stated both permits were issued in 2008. She stated the DEQ permit expires at 15 years in 2023, whereas the Corp permit expired in 2018, and RWSA was granted a five-year extension that would expire in 2023. She stated again that both permits expire in 2023.

Ms. Whitaker stated that the urban water system permit expires in 2023 and is part of the joint permit process. She stated the Authority is required to submit a new application at least 180 days prior to the expiration. She stated that currently, she’s hearing from both the state level and some member organizations that the state is taking anywhere from 12-24 months to process water supply permits. Ms. Whitaker stated that luckily, the RWSA submitted their permits for the urban system in May of 2021 and is working through the process. She stated that current plan elements that have been completed include the replacement of the Ragged Mountain Dam, regulated minimum instream flows at all pertinent urban reservoirs, currently upgrading the Observatory Water Treatment Plant, upgrading the South Rivanna Water Treatment Plant, and designing the raw water pipelines.

Ms. Whitaker stated that what still remains to be completed with the plan elements of the urban water system includes finishing the South Rivanna to Ragged Mountain pipeline, constructing the Ragged Mountain to Observatory pipeline, constructing pump stations at either end of those water lines, raising the Ragged Mountain Reservoir, and then ultimately decommissioning the North Rivanna Water Treatment Plant.

Ms. Whitaker stated that the Crozet water system is a separate system from the urban water system, and it serves the community of Crozet entirely. She stated the existing system largely was built in the 1960s and included a water treatment plant, a dam, reservoir, pump station, and eventually also included the Buck's Elbow storage tank and some distribution piping. She stated that Crozet is designated as a growth area for Albemarle County and as such, the population and water demand are rising—and fairly quickly at this point.

Ms. Whitaker stated that in 2018 and 2019, RWSA completed the Crozet Drinking Water Infrastructure Plan. She stated this was in response to what they were seeing in both population and demand going up year over year, month over month. She stated the projections of the plan were updated in 2019 and again in 2020 and are showing higher demand based on just those changes in 2019 and 2020.

Ms. Whitaker stated that as part of the Crozet water system master plan, RWSA has completed an expansion of the water treatment plant, and a future expansion is also planned to replace the finished water pump station coming out of the plant, which was completed several years ago. She stated the plan also includes looking at some future distribution system improvements, and RWSA has evaluated the available water supply. Ms. Whitaker stated what was found in that evaluation was that there was enough water in the 2018/2019 timeframe to supply Crozet for a 50-year population projection, but the infrastructure needed to transport and treat that water was not completely in place. She stated that they are looking at upgrading Beaver Creek Dam as well for safety regulations, and that is being done concurrently with some of the other water treatment and distribution system work.

Ms. Whitaker stated that today, the Crozet Water Treatment Plant is exempt from VWP permitting. She stated there are no requirements to obtain a VWP permit, and there are no requirements for minimum instream flows (MIF). She stated that there are protocols used to set all of those things, but they are not required. Ms. Whitaker reminded the group that if you expand a water system, you lose the exemption or exclusion, and then it would roll into the VDEQ withdrawal system. She stated that is the case now, and RWSA is applying to expand the withdrawal rate and do the dam upgrade, and as such it is necessary to apply for the VWP permit as well as the Corp permit. She stated with that would come a new MIF requirement.

Ms. Whitaker stated the next step is to finalize selection of the raw water pump station site, and they are hoping to have that done this coming fall. She stated the current joint permit application is about 75% complete, with plans to submit that application in late 2021. She stated with the 12-24-month timeframe, the goal is to have the permit finalized in 2023 and begin construction of the dam pump station and the MIF Infrastructure from 2023-2027.

Dr. Palmer asked Ms. Whitaker to explain the process to establish the minimum instream flows below Beaver Creek Reservoir.

Ms. Whitaker stated that a lot of the work to establish a proposal to DEQ has been completed. She stated that RWSA spent close to a year looking at demand projections for the region, and over time looked at the bathymetry for Beaver Creek Reservoir, inflow profiles, hydraulics, and hydrology in the region, the Mechums River stream gauge, and how that combines with Beaver

Creek and the tributaries that come out of Lake Albemarle and join Mechums River. She stated they then looked at what kind of withdrawals would be needed and what flows would be remaining, and they did some extensive modeling when comparing to an "unregulated/no dam present" option; similar to the urban system, RWSA looked at percentages and of "natural stream flow."

Ms. Whitaker stated that they reviewed multiple options for balance between the natural system and human population needs, and then looked at during the drought of record—how often and how deeply RWSA would need to cut back to make it through the drought of record. Ms. Whitaker stated all of that information has been compiled and provided to DEQ as part of the permit support document. She stated there have been some early conversations about how VDEQ wants to see that presented, what they would like to see, and for what timeframe they're willing to give RWSA a permit. She stated that there would likely be many negotiations beyond that.

Dr. Palmer asked if the support document is on the website and accessible to the public.

Ms. Whitaker stated it is not complete yet, but when it is submitted to DEQ, it would be made available.

Dr. Palmer thanked Ms. Whitaker and stated that there is a section on the website to follow this project.

Ms. Whitaker confirmed that there is a section on the website for Beaver Creek Dam and Pump Station Project. She stated there are documents on that website, and the permitting documents would be added as well.

c. Presentation: Emerging Regulations in Water & Wastewater, Lab Manager, Dr. Bill Morris

Dr. Morris stated he wanted to speak to the Board about potential contaminant issues that need to be watched and treated. Referring to his slide presentation, he stated that the Cuyahoga River near Cleveland, Ohio, reportedly caught fire 13 times from 1868 - 1969, caused from excessive amounts of pollution.

Dr. Morris stated that in the early 1970s, as part of growing public concern over the environment and public health, the Environmental Protection Agency (EPA) was established by President Richard Nixon. He stated that the Clean Water Act and the Safe Drinking Water Act followed shortly thereafter.

Dr. Morris stated the Clean Water Act established the basic structure for regulating pollutant discharges into waters of the U.S., and it gave the EPA the authority to implement pollution control programs, such as setting wastewater standards for industry and treatment plants. He stated it also funded the construction of sewage treatment plants under a construction grants program.

Dr. Morris stated the Safe Drinking Water Act of 1974 authorized EPA to set national standards

for drinking water to protect against health effects from exposure to both naturally occurring and manmade contaminants. He stated the standards apply to all public water systems that have at least 15 water service connections or serve at least 25 people at least 60 days a year. He stated there are over 150,000 water systems in the U.S. that serve over 300 million people.

Dr. Morris offered the question of how the EPA sets the standards and how they pick which contaminants to regulate. He stated the EPA runs a program called the Unregulated Contaminant Monitoring Rule (UCMR). He stated that the EPA collects data from contaminants that are suspected to be present in drinking water but do not yet have health-based standards, according to the Safe Drinking Water Act. Dr. Morris stated this is done in conjunction with drinking water systems, so all large systems serving greater than 10,000 people are required to complete these tests at their own expense. He stated they also choose a random sampling of smaller water systems to sample, with results then stored in a national database.

Dr. Morris stated the most recent iteration of this was UCMR 4, which took place between 2018 and 2020 and RWSA had participated. He stated they tested for three brominated halo acetic acid (HAA) groups, or byproducts of disinfection in the distribution system; 10 cyanotoxins; two metals (germanium and manganese); eight pesticides and one pesticide manufacturing byproduct; three alcohols; and three semi-volatile organic compounds. He clarified that RWSA did not do all of this testing themselves. He stated that the EPA would certify certain laboratories to test for these types of contaminants, as they are not common contaminants for RWSA to be certified for since they are not regulated.

He stated that every time the EPA goes through this cycle, labs would obtain certification. RWSA sent their tests to Babcock Labs in California, which had the certifications to complete the testing. Dr. Morris stated of all the tests, RWSA received non-detects except for the HAAs, which was expected as it is a disinfection byproduct. He stated that the levels were relatively low—less than 40 parts per billion—and some manganese was detected in the raw water in the Observatory and South Rivanna reservoirs, but these were also very low levels.

Dr. Morris stated usually after the UCMR 4, EPA would come up with the Contaminant Candidate List (CCL), a list of all the contaminants under consideration for regulation, based on the data collected. He stated the list currently being utilized is CCL 4. Dr. Morris stated that as of February 22, 2021, EPA reissued final regulatory determinations for CCL 4 contaminants, and currently final determinations are being made to regulate two contaminants on that list.

Dr. Morris shared the entire list from 2016, which has been whittled down to just two compounds on which the EPA is currently making determinations. He stated there is no limit set for them yet, but they are expected to be coming and are two per- and polyfluoroalkyl substances (PFAS) chemicals.

Dr. Morris stated that once the EPA chooses which contaminants they are going to regulate, they set the maximum contaminant level, which is a legally enforceable standard that applies to public drinking water systems. He stated there are 87 chemical contaminants thus far that have limits the EPA says can adversely affect public health when exceeded.

Dr. Morris stated chief among the potential contaminants of concern are the PFAS, since those are the two that have been selected from the CCL. He stated still of concern could be cyanotoxins that are produced by harmful algal blooms, and microplastics could also be seen further in the future and are certainly a topic of public concern.

Dr. Morris pointed out an illustration of the PFAS chemical compound on his slide. He explained that it is a basic hydrocarbon structure except that all of the hydrogens have been replaced with fluorine, and the fluorine-carbon bond is extremely strong—sometimes referred to the strongest bond in organic chemistry. He noted that this makes the compounds extremely resilient and gives them properties that are considered desirable for manufacturing and consumer goods, such as water repellency, stain resistance, grease-proofing (used inside popcorn bags and hotdog liners), and friction reduction/non-stick use on pans and other cookware. He stated this is also a primary component found in firefighting foam. Dr. Morris stated that in high concentrations, they can cause adverse health effects in humans and also have long half-lives in humans of three to five years.

Dr. Morris stated that RWSA has been monitoring for PFAS since 2014 as part of UCMR 3, but in 2018 decided to continue monitoring on a regular basis. He stated that instead of just monitoring the finished water, they also monitor the raw water to see if there is anything incoming. He stated the only detections were at North Rivanna and Scottsville WTPs in August 2020, and there have been no detections since. He stated this is not something that has not been detected in our raw water, so it is fortunate that RWSA is not exposed to these chemicals much in its water supply but would continue to test as the technology improves and could potentially catch compounds that currently might be missed.

Dr. Morris stated that while the PFAS compounds are ubiquitous, they're present in any number of consumer goods and industrial processes, and it's a fair assumption that every wastewater treatment plant in the U.S.—and even the world—is going to have PFAS in both its influent and effluent. He stated there are no regulations on this yet, and the limit shown on the graph in the presentation is the EPA health advisory level for drinking water. Dr. Morris felt that if regulations come for wastewater, it would be a good deal higher than the 70 parts per billion recommended for drinking water. Dr. Morris confirmed that there is PFAS in the wastewater stream and pointed out that the effluent leaving the plant is higher than what is coming into the plant, which could be for several reasons. He explained that RWSA does have addition of waste from haulers and leachate from Ivy that makes its way to Moores Creek, but this is also true at Glenmore, Scottsville, and Stone Robinson wastewater treatment plants which do not receive septage or leachate.

Dr. Morris stated he has done some research and it seems that there are large PFAS compounds that are complex that aren't tested for yet. He stated that during the treatment process, those would get broken down into smaller compounds that are currently being tested for and that would cause the discrepancy seen. Dr. Morris stated this testing method is still relatively new and new compounds are being added all the time, and currently most labs are capable of testing for 36 different compounds; in the next month or so, most contracted labs would be capable of testing for 76 different compounds. He stated that RWSA does keep up with that and always completes the most comprehensive testing they possibly can.

Dr. Morris stated cyanotoxins are produced by cyanobacteria, or more commonly called blue-green algae, and are often found in freshwater. He stated that like green algae, they can bloom and cause dense mats that cause odor problems and oxygen depletion, which is harmful to humans and aquatic life. He stated that unlike green algae, however, cyanobacteria can produce harmful toxins that can be released into the raw water.

Dr. Morris stated that effects from exposure to cyanotoxins can range from a mild skin rash to serious illnesses, and consuming drinking water containing certain levels of cyanotoxins could cause liver and kidney damage. He noted that short-term acute exposure during recreational activities can lead to hay fever-like symptoms, skin rashes, respiratory ailments, and gastrointestinal distress.

Dr. Morris stated that RWSA does test for cyanotoxins and regularly monitors for algae and blue-green algae in all the source waters, and if the threshold of over 50,000 cells per milliliter (cells/mL) of blue-green algae, they would not only treat, but would also collect samples to test for cyanobacteria. He stated the last time this happened, testing in the South Rivanna Reservoir in August of 2019 showed no cyanotoxins present. He stated that additionally, as part of UCMR 4 in 2020, all reservoirs were tested for cyanotoxins and none were detected.

Dr. Morris stated that microplastics are used in many industries and can enter water sources through runoff from land, and can also be introduced through mechanical oxidative or biological degradation of larger plastic materials. He stated this seems to be a bigger problem for bottled water than it is for drinking water. Dr. Morris stated a 2018 study at Penn State revealed an average of 325 particles/liter in most brands of bottled water. He stated some brands contained as much as 10,000 particles/liter.

Dr. Morris stated that testing methods for microplastics are still being developed, which is why regulation is still likely a ways off. He stated there's been no standard method developed yet, and there's also no conclusive toxicity data related to ingesting microplastics. He stated workers that have been exposed to airborne microplastics have been found to have lung damage and other such complications. Dr. Morris stated it's a very labor-intensive process to test for microplastics, as samples need to be filtered, stained with fluorescent dye, then all particles manually counted with microscopy. He stated once the amount of particles is quantified, they need to be identified using something like infrared spectroscopy and then compared to a library of known plastics. He stated this is a very labor-intensive process, and there is no standard method yet.

Dr. Morris stated that availability of studies on removal from drinking water sources is limited but is unlikely that microplastics between 300 and 500 micrometers would pass through a water treatment plant utilizing conventional filtration. He stated that beyond that, GAC filtration can remove particles that are 1-5 micrometers in size. As a reference, Dr. Morris stated that a human hair is usually about 50 micrometers in diameter.

Dr. Morris stated the Cuyahoga River in 2021 is much healthier and supporting recreational activities, proving that regulations do work, and they produce desired outcomes for both the environment and public health.

Dr. Palmer asked Dr. Morris to go back to the UCMR 4 slide and asked if RWSA chose this list, or was it given to them, or did everyone do the same thing for testing. She asked where this list came from.

Dr. Morris replied that the identified list is what they are required to test for. He stated the EPA dictates what the samples must be tested for. He stated RWSA worked with a contract lab, which has the schedule for testing, and then send out the testing kits based on that schedule; then collection is made and submitted for testing.

Dr. Palmer then asked if different geographic areas are required to test for different things or are these tests across the board for the whole country.

Dr. Morris replied that the only difference that might occur would be if a location utilized groundwater or surface water. He stated RWSA's water is surface water (except for Red Hill). He stated that he thinks large groundwater facilities may have to do different testing, but he is not 100% sure.

Dr. Palmer then asked about the acids and asked for clarification about why those were expected to be there.

Dr. Morris stated that there were three different kinds of HAAs normally tested for, but RWSA tests for HAAs quarterly because they are disinfection byproducts, and there are already limits set on HAAs. He stated these were three additional HAAs that they are considering adding to the regulated list, but based on the determinations he's seeing now, it doesn't seem like these are coming soon.

Dr. Palmer asked where Dr. Morris thinks the disinfection products are coming from.

Dr. Morris stated they come from chlorine residual in the distribution system reacting with organic matter. He stated the best way for RWSA to manage that is with the GAC. He stated if looking back at the disinfection by-product data, it is easy to tell when the GAC was installed because the disinfection by-product levels went way, way down because the GAC was removing that available organic carbon.

Dr. Palmer then asked for clarification about the size of the particles of microplastic being so small that they are not to be worried about.

Dr. Morris stated that conventional treatment, in addition to GAC, can remove quite a bit of microplastics. He stated that the smaller they are, the harder they are to remove, so the bigger ones are easier to deal with. Dr. Morris stated conventional filtration can remove microplastics between 300 and 500 micrometers, but with the addition of GAC filtration, there is the capability to remove things as small as one micrometer. He confirmed that our current water treatment process already does a good job of getting rid of small plastics.

Dr. Palmer asked about the size range of the particles that come from a bottled-water bottle.

Dr. Palmer stated that in the presentation, Dr. Morris stated that there was more microplastic in bottled water than in the treated water because of the bottle.

Dr. Morris stated he looked into the quantity and not really the size, but he felt that the number would vary a lot. He added that he wasn't entirely sure though.

Mr. O'Connell stated it just concludes that the GAC is state of the art and ahead of most utilities in the country.

Mr. Mawyer stated that there are loads of benefits from the GAC filtration system, even more than what Rivanna had planned.

Mr. Gaffney stated that if these and other contaminants get added, RWSA is already filtering enough to not have to make changes to the current process.

Dr. Morris agreed and stated the biggest change he's anticipating is having to run more water through the GAC system.

10. OTHER ITEMS FROM BOARD/STAFF NOT ON AGENDA

Dr. Palmer asked if Mr. Mawyer could have these three presentations put on the website if they are not already. She stated she would like to be able to send links to those presentations to a few people individually.

Mr. Mawyer agreed to make sure this was done.

11. CLOSED MEETING

There was no closed meeting.

12. ADJOURNMENT

At 3:19 p.m., Mr. O'Connell moved to adjourn the meeting of the Rivanna Water and Sewer Authority. The motion was seconded by Dr. Palmer and passed unanimously (5-0). Mr. Snook and Mr. Boyles were absent.

Respectfully submitted,

Mr. Chip Boyles
Secretary - Treasurer