RENDEZVOUS ENGINEERING, P.C.
Civil Engineers and Planners in Wyoming and Idaho

Rendezvous Project No: 20-008.0

June 8, 2020

Nick Orsillo, President
River Meadows Water District
P.O. Box 491
Jackson, WY 83025

Re: Rivermeadows Water System
1) Total Coliform and E. Coli Bacteria Status
2) EPA Public Notice
3) Lead and Copper Testing

Dear Nick,

This letter addresses the following three public drinking water system concerns identified by the U.S. Environmental Protection Agency (EPA).

1. EPA – Notice of Noncompliance, Revised Total Coliform Rule, E. Coli Maximum Contaminant Level – We have been working with EPA to resolve coliform and E. Coli bacteria discovered issues in routine and repeat Rivermeadows water samples. Below is a brief timeline of events associated with this situation.

- 5/20/2021 (Thursday) – Discovered chlorine pump not operating. No chlorine residual in the water.

- 5/24/2021 (Monday) – Routine monthly water sample collected at 5445 Cottonwood Canyon Rd.
- 5/25/2021 (Tuesday) – Teton County Public Health reported water sample tested positive for coliform bacteria.
- 5/26/2021 (Wednesday) – Collected five repeat water samples, including neighboring homes, storage tank, and Well #1. No chlorine residual in the water.
- 5/27/2021 (Thursday) - Teton County Public Health reported four of the samples tested positive for coliform bacteria, and three samples (5445 Cottonwood Canyon, storage tank, and Well #1) tested positive for E. Coli bacteria. Collected five water samples from each of the three Rivermeadows wells. Issued Rivermeadows boil water order.
- 5/28/2021 (Friday) - Teton County Public Health reported Well #1 samples tested positive for coliform, but negative for E. Coli. Wells #2 and #3 tested negative for both coliform and E.Coli. Isolated Well #1 from the water system and switched to Well #2 for water supply. EPA Level 2 Assessment performed by EPA contractor to search of the source of E. coli contamination in the water system. No immediate issues identified. EPA issued Emergency Administrative Order. New chlorine pump delivered and installed. Drained half of water tank and began refilling with chlorinated water.
- 5/29/2021 (Saturday) – Storage tank still filling. Began flushing water mains from fire hydrants. Some chlorine residual detected throughout the water system. Acknowledged EPA Emergency Administrative Order. Issued Rivermeadows Drinking Water Update I. Residents informed to run faucets and hose bibs to recharge with chlorinated water.

- 5/30/2021 (Sunday) – Verified system running properly, including new chlorine pump.
- 5/31/2021 (Monday) – Collected water samples from 5445 Cottonwood Canyon, storage tank, and Well #2.
- 6/1/2021 (Tuesday) - Collected water samples from 5445 Cottonwood Canyon, storage tank, and Well #2.
- 6/2/20221 (Wednesday) - Collected water samples from 5445 Cottonwood Canyon, storage tank, and Well #2. Samples from both 5/31 and 6/1 tested negative for coliform and E. Coli. EPA authorized lifting the boil water order. Issued Rivermeadows Drinking Water Update II, rescinding the boil water order. Setup discharge hose for MPA (micro particulate analysis) on Well #1. EPA contractor began MPA sampling, running Well #1 all night with discharge to the ground surface. No wells could refill storage tank during MPA sampling.
- 6/3/2021 (Thursday) – Complete MPA sampling and send sample filter to testing lab in Colorado. Isolate Well #1 and switch back to Well #2 for supply. Begin refilling the tank. Send photos of new chlorine pump to EPA. Verify chlorine residual in water system.
- 6/4/2021 (Friday) – Verified tank water level and tested for chlorine residual.
- 6/5/2021 (Saturday) - Verified tank water level and tested for chlorine residual.

- 6/6/2021 (Sunday) – No activity to report.
- 6/7/2021 (Monday) - Collected water samples from 5445 Cottonwood Canyon, storage tank, Well #2, and Well #1. Verified tank water level and tested for chlorine residual. Requested EPA authorization to pull pump from Well #1 to inspect seals and piping components and to "shock treat" well with chlorine to kill bacteria.
- 6/8/2021 (Tuesday) - Samples from 6/7 tested negative for coliform and E. Coliform except for Well #1. Well #1 tested positive for coliform, but negative for E.Coli. Met with Wyoming Department of Environmental Quality District Engineer and Teton County Environmental Permitting Engineer to assess the site and potential sources of contamination. No specific concerns noted. Verified tank water level and tested for chlorine residual.
- 6/9/2021 (Wednesday) – Prepared log tracking bacterial test dates, locations, and results.

We are waiting for EPA authorization to inspect and disinfect Well #1. EPA may withhold authorization until results of the MPA sampling are available. The MPA testing is for analyzing whether there is a bacterial contamination source within the groundwater supplying the well.

We also plan to pull pump from Well #3 to inspect piping and intend to lower the pump deeper into the well. Last fall we noticed that this well was producing a significant quantity of entrained air with the water. EPA is continuing to require weekly sampling from the three locations where E. Coli had been previously detected.

In summary, EPA has required more frequent testing of Rivermeadows water, until further notice. We have been monitoring chlorine residual and tests on the water supply have been negative for coliform and E.Coli bacteria since the new chlorine pump was installed. To date, the source of the E.Coli bacteria has not been identified.

2. **EPA Public Notice –** The attached public notice needs to be emailed to each Rivermeadows property owner at this time. This public notice addresses the District's failure to correct water system deficiencies as determined by EPA and within EPA's required time frame. The notice describes the components deemed deficient and the District's approach and schedule for resolution. EPA requires follow up notices to be sent out on a quarterly basis until EPA verifies the District's corrective measures are acceptable.

3. **Lead and Copper Testing –** In response to EPA concerns regarding Copper Action Level Exceedance, additional water sampling and laboratory testing was performed on flowing water both at one homeowner's house and at the entry point to the water distribution system per EPA instructions. Copper concentrations in the flowing water samples on 4/7 and 4/8/2021 ranged from non-detectible to 0.27 mg/liter, well below the 1.3 mg/liter EPA *action level.* However, copper concentrations have exceeded the action level at several homes after allowing water to set in the pipes overnight. The low copper concentrations from flowing water samples indicate the copper is not coming from the Rivermeadows water supply wells. However, they do suggest the water from the wells is slightly corrosive, causing copper to leach from the copper water service lines and copper piping within the homes.

Standard (overnight hold) lead and copper sample testing have also been performed at five homes for the first half of this year. These homes included three homes that have exceeded the copper action level in the past. Three of the five home samples exceeded the 1.3 mg/liter copper action level. For information regarding health effects related to copper, please reference the attached *Copper: Health Information Summary – Environmental Fact Sheet*, published by the New Hampshire Department of Environmental Services.

All testing to date indicates that lead concentrations, are well below the 0.015 mg/liter EPA action level. The current water sampling test data is summarized in Table 1.

Table 1 - Rivermeadows Water Test Results			Current Test Data		9/30/2020	6/24/2020	9/18/2019
	Sample Name	Date	Lead mg/L	Copper mg/L	Copper mg/L	Copper mg/L	Copper mg/L
	Flowing Water Samples						
1	5450 Cottonwood Canyon	4/7/2021	ND	0.07	0.07		
2	SP01- 5072 Beavertail	4/7/2021	ND	0.01	ND		
3	5450 Cottonwood Canyon	4/8/2021	ND	0.27	0.06		
4	SP01- 5072 Beavertail	4/8/2021	ND	ND	ND		
	Rivermeadows Well1 (WL03)	10/1/2020			0.03		
	Rivermeadows Well2 (WL05)	10/1/2020			ND		
	Rivermeadows Well3 (WL04)	10/1/2020			ND		
	Standard Overnight Hold Water Samples						
1	5450 Cottonwood Canyon	4/8/2021	ND	**2.23**	**1.69**	**2.62**	**1.43**
2	5480 Cottonwood Canyon	4/8/2021	ND	**1.67**	**1.73**	**1.97**	**2.17**
3	5445 Cottonwood Canyon	4/8/2021	ND	1.26	1.04		
4	5255 Cottonwood Canyon	4/8/2021	0.001	1.06			
5	2930 Osprey Court	4/8/2021	ND	**1.66**	**2.12**	**1.61**	**1.57**
	2800 Sparrowhawk	4/8/2021	0.002		**1.73**		
	4945 Bald Eagle Road	4/8/2021	0.001		0.53		
	2755 Sparrow Hawk					0.37	0.34
	2760 Sparrow Hawk					0.56	0.88

Lead MCL: 0.015 mg/L
Copper MCLG: 1.3 mg/L
ND = Non-Detectable

As defined by EPA, "An *action level* exceedance is not a violation but can trigger other requirements that include water quality parameter (WQP) monitoring, corrosion control treatment (CCT), source water

monitoring treatment, public education, and lead service line replacement (LSLR)."[1] On behalf of the District, Rendezvous Engineering has submitted an "Optimal Corrosion Control Treatment (OCCT) Recommendation" and a "Source Water Treatment Recommendation" for EPA review. Based on the testing performed to date, the wells are not a significant source of copper. The copper concentrations appear to be caused by water corrosion within the copper water service lines and interior home plumbing. From analysis of the water testing data, Orthophosphate corrosion control inhibitor will likely need to be added to the water to reduce copper corrosion. We are working with EPA to establish an implementation schedule.

Please contact me with any questions.
Sincerely,

Matthew F. Ostdiek, P.E.
President

Enc.

[1] *Lead and Copper Rule: A Quick Reference Guide*, United State Environmental Protection Agency, EPA816-F-08-018, June 2008.

ENVIRONMENTAL
Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

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ARD-EHP-9 2013

Copper: Health Information Summary

Copper is a naturally-occurring metallic element that occurs in soil at an average concentration of about 50 parts per million (ppm). It is present in all animals and plants and is an essential nutrient for humans and animals in small amounts.

The major sources of environmental copper releases include the mining, smelting and refining of copper, industries producing products from copper such as wire, pipes and sheet metal, and fossil fuel combustion. Water pipes are often made of copper and bath fixtures may be made from brass and bronze alloys that contain copper. The principal source of copper in drinking water results from the leaching of copper from pipes and bath fixtures due to acidic water. Blue-green stains left in bath fixtures are a sign of the presence of copper in water.

Other releases of copper to the environment include agricultural use against plant diseases and treatments applied to water bodies to eliminate algae.

Health Effects

Absorption/Metabolism

Studies investigating oral absorption of copper have found the percentage absorbed ranging from 24-60 percent. Factors affecting the amount absorbed include the amount of copper in the diet and competition with other metals found in food such as iron and zinc. There are no studies examining inhalation exposure to copper. The amount of dermal absorption is also not known, but a few studies indicate that it is very low.

Beneficial Effects

Copper is a component of several enzymes necessary for normal metabolic functions in humans. The Recommended Daily Allowance (RDA) of copper for adults is 0.9 milligrams (mg). The median intake of copper from the typical U.S. diet ranges from 1 to 1.6 mg/day. The safe highest level of intake for an extended period of time (chronic exposure) is 10 mg/day. Food sources rich in copper include shellfish, organ meats, nuts, beans and cocoa.

Effects of copper deficiency can include anemia, low numbers of white blood cells, osteoporosis in infants and children, and defects in connective tissue leading to skeletal problems.

Short-Term (Acute) Effects

Acute poisoning from ingestion of excessive copper can cause temporary gastrointestinal distress with symptoms such as nausea, vomiting, and abdominal pain. Liver toxicity was seen in doses high enough that resulted in death. High levels of exposure to copper can cause destruction of red blood cells, possibly resulting in anemia.

Long Term (Chronic) Effects

Mammals have efficient mechanisms to regulate copper stores in the body such that they are generally protected from excess dietary copper levels. However, at high enough levels, chronic overexposure to copper can damage the liver and kidneys.

Wilson's disease is an inherited (genetic) disorder in which copper builds up in the liver. Symptoms of liver toxicity (jaundice, swelling, pain) usually do not appear until adolescence.

Carcinogenicity (ability to cause cancer)

Although some studies of workers exposed to copper have shown increased cancer risks, they were also exposed in the workplace to other chemicals with carcinogenic potential. Increased cancer risk has not been found in animal studies. Copper is currently categorized by the EPA as a Group D carcinogen (inadequate evidence to classify) and has not yet been reviewed for placement into one of the new cancer classification categories.

Reproductive/Developmental Effects

There are no reports of developmental effects occurring in humans exposed to elevated levels of copper. Developmental effects have been observed in a few studies of animals given high doses of copper, including delayed growth and development, delayed bone formation, and decreased litter size and body weights.

Health Standards and Criteria

The EPA has established a Maximum Contaminant Level Goal (MCLG) for copper in public drinking water systems at 1,300 parts per billion (ppb). MCLGs are non-enforceable health standards for drinking water. MCLGs are set at a level at which no adverse health effects would be expected to result from the consumption of two liters (0.53 gallons) of contaminated water per day by a 70 kg (154 lb) adult. The MCLG is based on the ability of copper to produce gastrointestinal disturbances from acute exposure.

The EPA has also established a Maximum Contaminant Level (MCL) for copper in public drinking water systems. MCLs are enforceable drinking water standards determined by balancing the adverse health effects of a particular chemical against the feasibility and cost of treating contaminated water. The MCL is an "action level." The action level is defined as the level, which when exceeded, requires the installation of corrosion control technologies. These technologies attempt to reduce the level of copper that enters the drinking water because of leaching of copper from pipes and other plumbing fixtures. Corrosion control technologies employ methods such as the addition of chemicals to either lower the acidity of the water or which coat the inside of the pipes, forming a barrier to reduce leaching. The action level for copper in drinking water is set at 1,300 ppb.

A Secondary Maximum Contaminant Level (SMCL) for copper has been established at 1,000 ppb based upon taste and staining of bath fixtures. SMCLs are guidelines for the protection of the aesthetic qualities of water such as taste, odor and color.

Since excess copper in drinking water is usually due to its slow leaching from the plumbing system into water that has been sitting for several hours in the pipes, running the water for 30 to 60 seconds before using it for drinking or cooking will often significantly reduce copper levels.

The Occupational Safety and Health Administration (OSHA) enforceable standard (permissible exposure limit or PEL) for copper in workplace air is 0.1 milligram per cubic meter (mg/m3) as a fume and 1.0 mg/m^3 as a dust or mist averaged over eight hours.

Suggested Reading and References

Casarett and Doull's Toxicology: The Basic Science of Poisons, Seventh Edition. Klaassen, C.D., ed. McGraw-Hill Publishing Co., Inc., New York, 2008.

Toxicological information on Copper. Integrated Risk Information System (IRIS). U.S. EPA, Office of Health and Environmental Assessment. Last significant revision September, 1988

Toxicological Profile for Copper (Update). Agency for Toxic Substances and Disease Registry (ATSDR). Atlanta, GA. September, 2004.