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

Rendezvous Project No: 20-008.0

June 29, 2022

Nick Orsillo, President
River Meadows Water District
P.O. Box 1042
Jackson, WY 83025

Re: Rivermeadows Water System / Lead and Copper Testing

Dear Nick,

Standard (overnight hold) lead and copper water samples were collected on 5/25/2022 from five Rivermeadows homes for the first half of this year. These samples included two homes that exceeded the EPA copper action level in the past. The copper concentrations ranged from 0.33 to 1.45 mg/liter. One current test exceeded the 1.3 mg/liter copper action level. The copper concentrations ranged from 0.33 to 1.45 mg/liter.

Four of the standard (overnight hold) water samples tested had lead concentrations well below the 0.015 mg/liter EPA action level. However, one sample exceeded the action level with a concentration of 0.019 mg/L. We will be coordinating with EPA and expect to run a second test to verify this high test value.

The water system controls currently rotate each of the three Rivermeadows wells for filling the water tank. The current water tests should represent a composite water sample from all three wells. Two separate flowing water samples at the entry point of the water system did not detect lead or copper in the water supply. This is consistent with past testing efforts, suggesting that the well water is slightly corrosive, causing copper to leach from the home copper water service lines and copper piping within the homes.

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	SP01- 5072 Beavertail	5/25/2022	ND	ND			
2	SP01- 5072 Beavertail	5/24/2022	ND	ND			
1	5480 Cottonwood Canyon	8/2/2021	ND	0.27			
2	SP01- 5072 Beavertail	8/2/2021	ND	ND			
3	5480 Cottonwood Canyon	8/3/2021	ND	0.24			
4	SP01- 5072 Beavertail	8/3/2021	ND	ND			
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		

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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
	Standard Overnight Hold Water Samples						
1	5480 Cottonwood Canyon	5/25/2022	ND	**1.45**			
2	5445 Cottonwood Canyon	5/25/2022	0.002	0.33			
3	2930 Osprey Court	5/25/2022	ND	1.25			
4	4945 Bald Eagle Road	5/25/2022	0.002	0.59			
5	5020 Beavertail Road	5/25/2022	**0.019**	0.57			
1	5480 Cottonwood Canyon	8/3/2021	ND	1.24			
2	5445 Cottonwood Canyon	8/4/2021	ND	0.57			
3	2930 Osprey Court	8/3/2021	ND	0.19			
4	2800 Sparrow Hawk	8/3/2021	ND	0.39			
5	4945 Bald Eagle Road	8/3/2021	0.002	0.30			
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

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.

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, based on the April 2021 test results Rendezvous Engineering submitted an "Optimal Corrosion Control Treatment (OCCT) Recommendation" and a "Source Water Treatment Recommendation" that EPA has approved.

Again, based on the testing performed to that 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. Although test samples from five houses performed in August 2021, were all less than the 1.3 mg/L EPA Copper Action Level, EPA continues to require biannual lead and copper testing. We are pursuing further water chemical analysis from each well in order to select the type of Orthophosphate corrosion control inhibitor to use and associated injection rate to reduce copper corrosion. This is

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

information is necessary for the system design. The EPA deadline for having the orthophosphate system installed and operational is Mach 31, 2023.

Please contact me with any questions.
Sincerely,

Matthew F. Ostdiek, P.E.
President

Enc.

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.