

# The Slippery Rock Water Project

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## Abstract

The tap water in Slippery Rock has an objectionable taste and odor. The unfavorable taste and odor cause many residents to filter their drinking water or purchase bottled water. These methods can become costly and produce a large amount of unnecessary waste. The aim of this research is to determine why Slippery Rock's water has an objectionable taste and to educate the community. Another goal is to provide alternative solutions for better tasting drinking water that will not negatively impact the environment. The tap water in Slippery Rock is derived from an underground aquifer in well fields situated around the region. An aquifer is an underground water-bearing rock layer that has characteristics conducive to storing large amounts of water. These characteristics control how water can easily flow through a rock layer. Water treatment by the Slippery Rock Municipal Authority reduces most of the constituents present in the ground water and the objectionable taste and odor are a result of this treatment. Gas chlorination is one method used to reduce levels of harmful microbes. However, some chlorine remains in the water after this process contributing to the odor and bad taste. The average taste threshold concentration for free residual chlorine in water ranges from 0.0075-0.450 mg/L and the lowest concentration of chlorine found in Slippery Rock water in the last 5 years was 0.79 mg/L in 2019, and has ranged as high as 1.46 mg/L. The water also contains high levels of sodium, around 144 mg/L. The range for taste thresholds of this compound is 30-140 mg/L, leading the salinity to also add to the water's objectionable taste. Sodium is a naturally derived constituent, just like the others found in Slippery Rock water. Since it is difficult to remove the bad taste and odor from the drinking water supplied to the community it is recommended that community members use charcoal filtered pitchers, consider whole home water purification systems instead of purchasing bottled water.

## Location of study area Include map here



On the left side are multiple wells in the Slippery Rock Borough area  
On the right is the aquifer with a pin point showing Slippery Rock's location

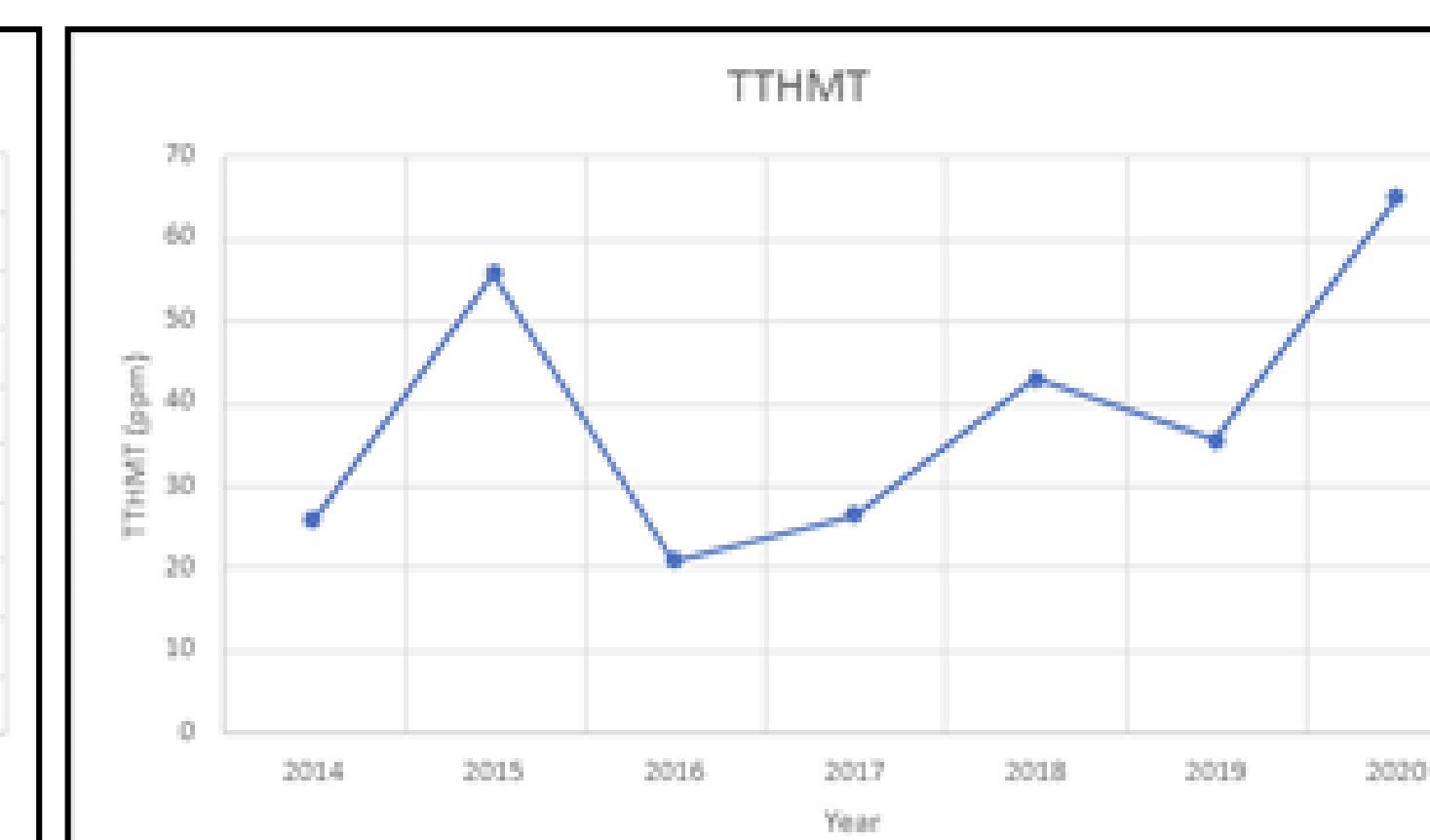
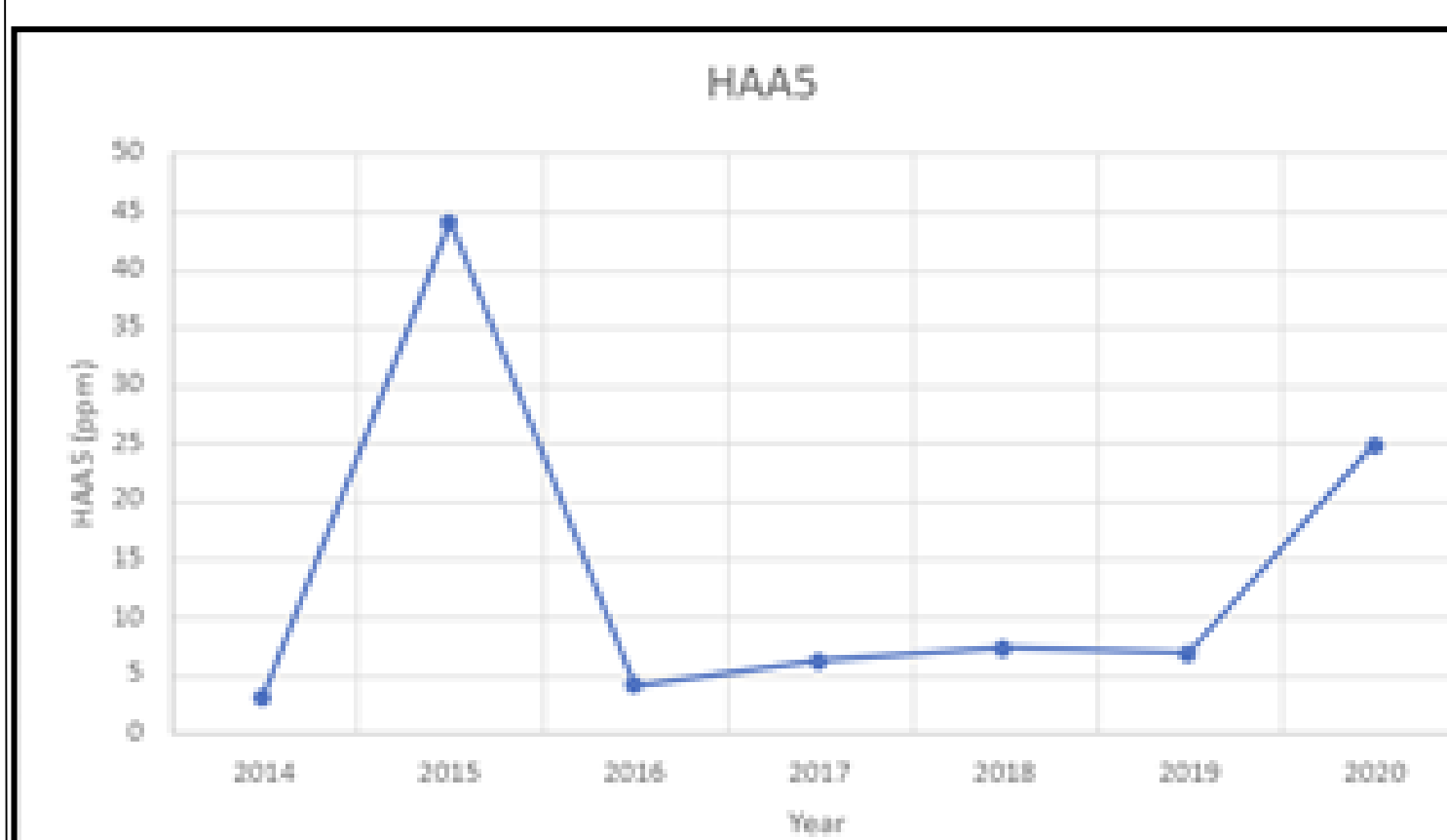
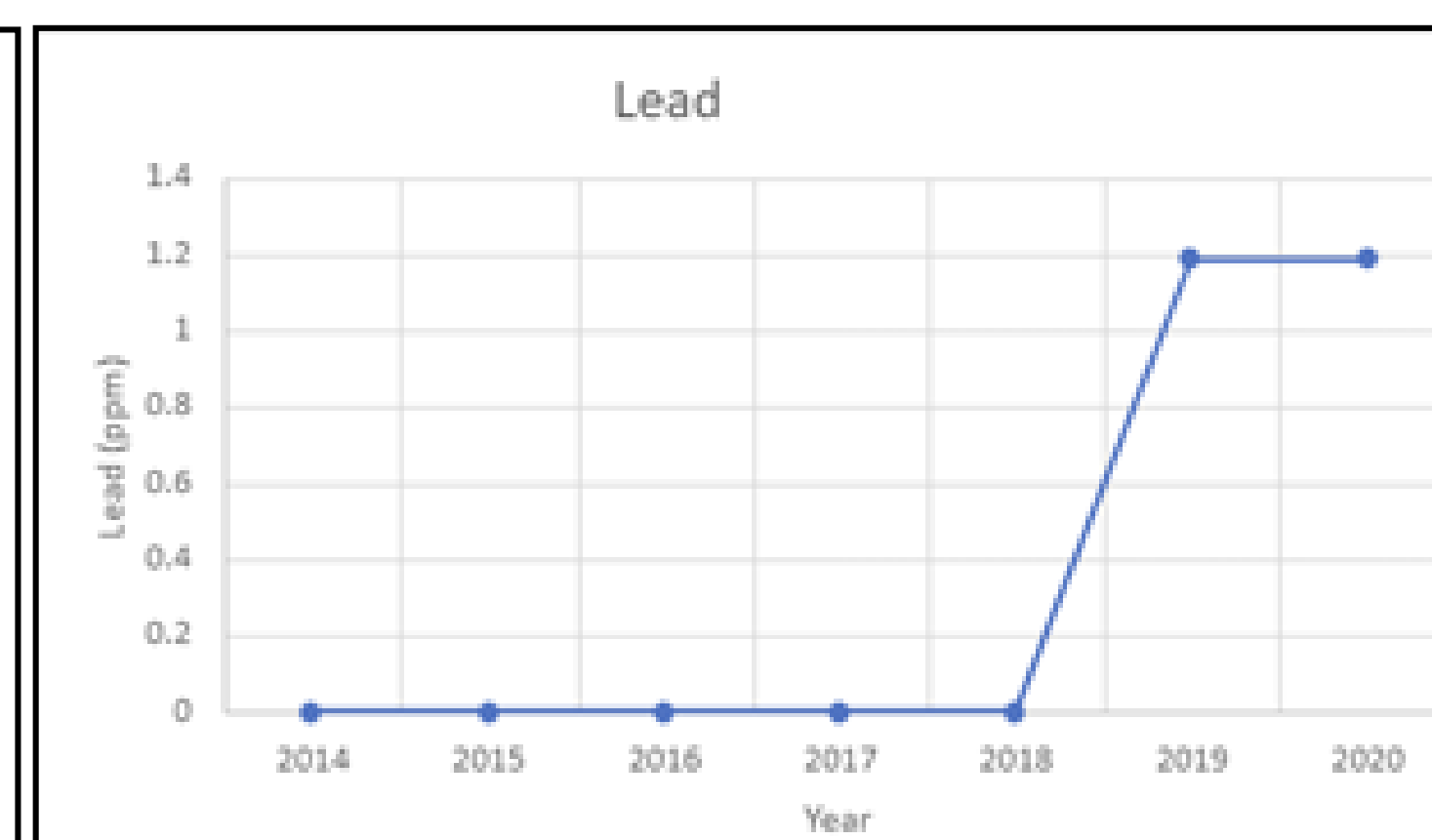
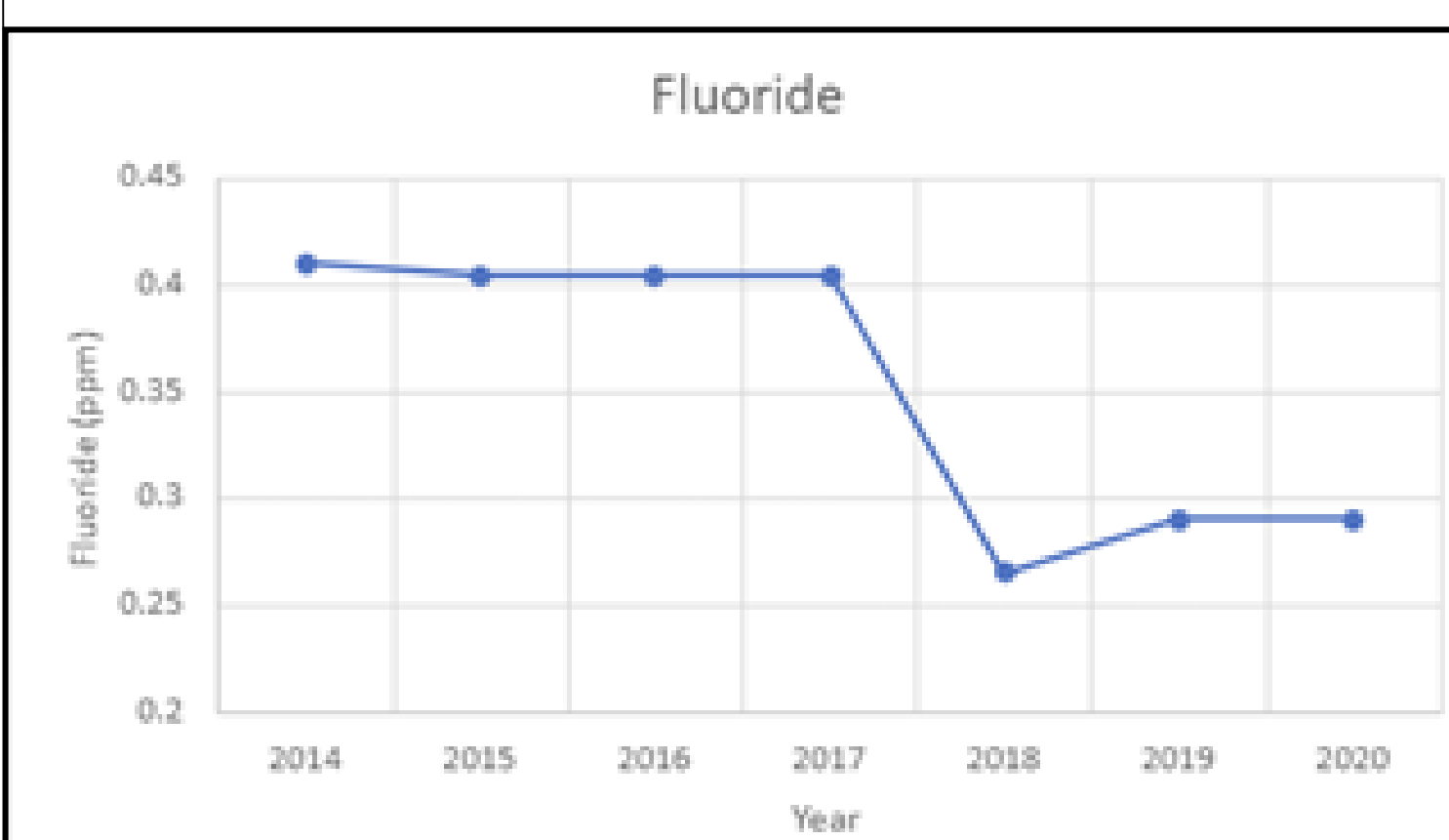
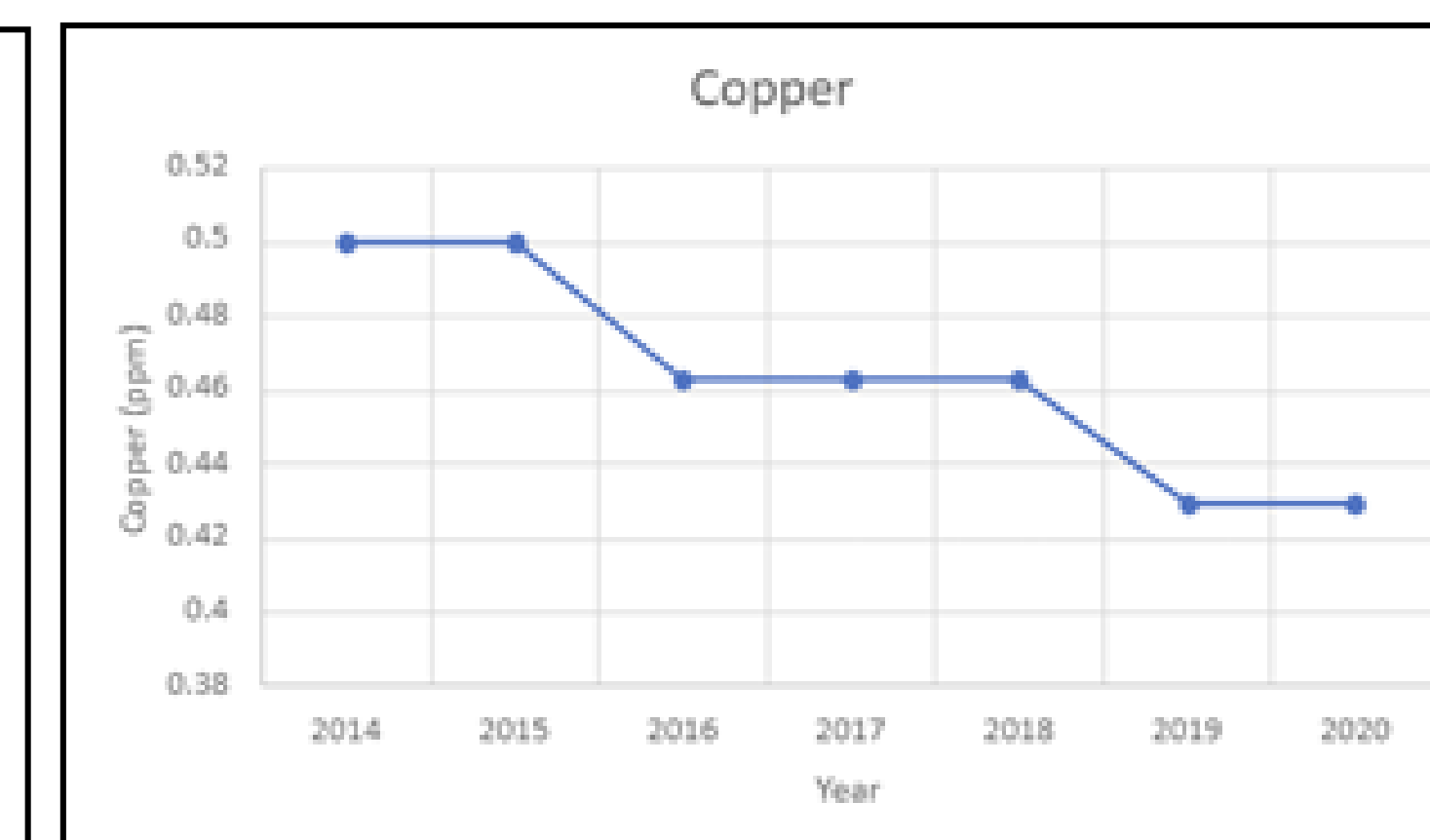
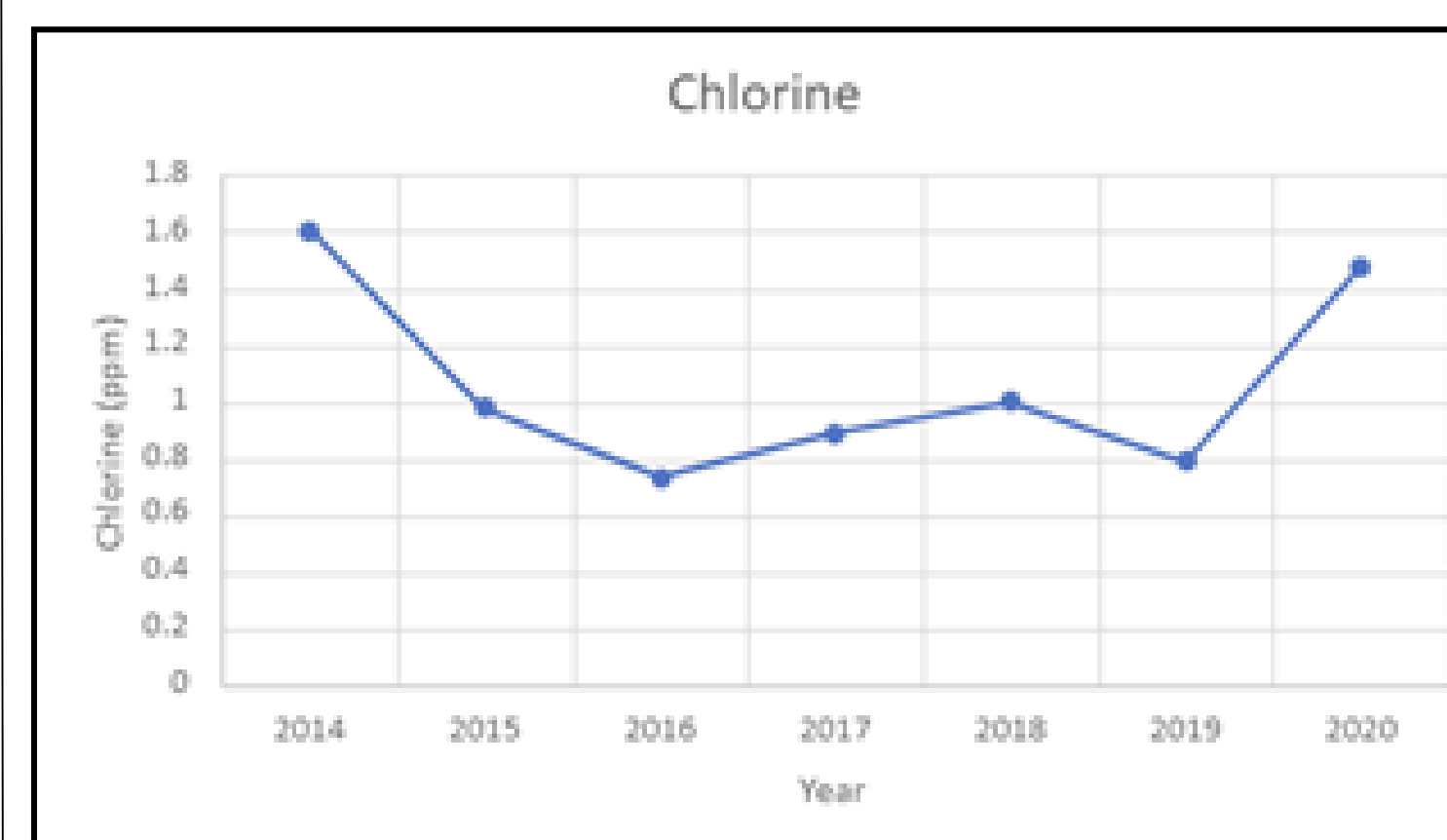
## Geology

The rocks that underlay the Slippery Rock area are sedimentary in origin and consist of sandstones, coal, shale and limestones deposited approximately 350 – 380 million years ago. Groundwater is stored in these layers and serve as the region's drinking water aquifer. The composition of these sedimentary units contribute to the natural dissolved constituents present in the groundwater. Dissolved solids such as iron, manganese, potassium, copper, calcium, sodium all contribute to the taste and odor of the water.

## Why Water Tastes Bad

- Water quality in aquifer, water treatment, and an individual's saliva all determine why water can taste bad.
- To determine if water quality is good, by DEP standards, minerals and constituents must not pass a certain threshold.
- All water standards pass for the Slippery Rock water municipality, but the water does not necessarily have to taste "good".
- The DEP water standards have not changed in 20 years and AWWA taste and odor committee have addressed the difficulty in setting standards for taste and odor.
- Copper levels 1mg/L or less and Iron levels 1mg/L can give the water a metallic taste. Specifically with Copper, people can detect it in the water with levels as low as 0.1mg/L.

## Chemistry



## Differences with Individual Taste

- Studies show that taste and quality of water depends upon the person.
- Some people are sensitive to tastes in water while others are unbothered.
- This depends on the individual's saliva, the make-up of their tongue, and the sensation of the constituent make up water has with the individual's mouth.
- Flavor, odor, and taste also play a factor. Flavor is associated with how "weak" or "strong" or the sweetness or mustiness.
- Odor is associated with the taste and holds a negative or positive connotation.
- Taste is the description of the water such as sour, salty, bitter, sweet and even "meaty".
- The best drinking water has balanced minerals, neutral pH, and a chilled temperature.
- A healthy balance of sodium, chloride, potassium, and sulfate are all minerals that make up quality drinking water and have healthy effects on the human body, such as strong bones, sends electrical impulses, build muscle, lower blood pressure, and digest food.

## Alternatives

- Alternatives that could benefit the people of Slippery Rock's drinking water would be to raise money for a communal water filtration system.
- Install a reverse osmosis system or install a simple filter for the sinks, showers etc. Reverse Osmosis can be expensive but will filtrate water more efficiently than any other filtration system.
- Installing a simple filter will allow some constituents to be filtrated out so that it will not affect the taste of the water as much.
- Find a local water source to fill water jugs. There are local water stations that you can fill water jugs with the natural spring water from the area. The only issue with this is not regulated or tested and therefore may contain harmful bacteria.

## References

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"Eau de Paris (EDP) Was Created to Improve the City's Municipal Water Service, Which before 2010 Was Fragmented and Expensive. Benefiting from Strong Political Will, the City of Paris Has Made Water Management a Major Democratic Issue, Ensuring Better Managed and Cheaper Water Supplies, as Well as an Unparalleled Environmental Strategy." Transformative Cities, 2019, [transformativecities.org/atlas-atlas-022](https://transformativecities.org/atlas-atlas-022).