



What's in your Water?

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Abstract: On a daily basis, over 11 million people rely on Lake Erie as their main water source. As a result of Lake Erie's close proximity to various industrial cities, the most prevalent example being Cleveland, Ohio, the concentrations of various elements have subsequently increased. Upon analyzing data from both a geological science professor's previous research as well as various online sources, we hope to provide a correlation between the increasing concentration of the contaminants, specifically, Chromium, Lead, and Aluminum, and their effect on water quality of Lake Erie.

Introduction

- Water is essential to life. Without water we could not function. Humans use water as a fundamental need and still neglect how often society pollutes water sources.
- Downtown Cleveland is home of Lake Erie, one of the five Great Lakes. A location of large industrial cities, near bodies of water leads to a variety of substances found in the water. Over time the effects can be harmful to humans from regular consumption.
- We will view how different levels of Chromium, Lead, and Aluminum affect our clean water sources. Including where this occurs and how we can filter the contaminates.

Elements Studied

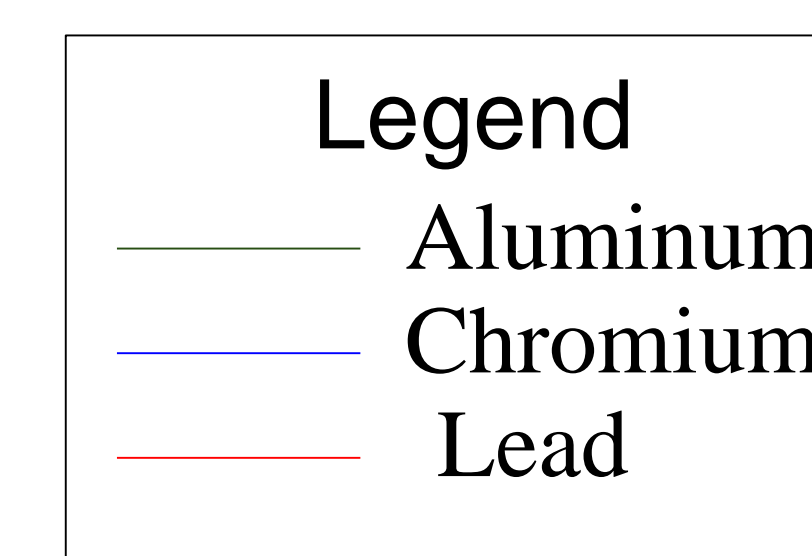
- **Aluminum:** (EPA) Levels must remain below 0.2 mg/L EPA. Found in most food products and in the treatment to purify water. If high aluminum levels are found in drinking water, it can cause dementia and effects on kidney and liver functions.
- **Chromium:** (EPA) Levels must not exceed 100 ppb. Comes from erosion of natural chromium deposits, industrial processes, hazardous wastes, and food. Hexavalent chromium can cause cancer, reproductive harm, asthma attacks, liver and kidney failure, ect.
- **Lead:** (EPA) Levels must not exceed 15 ppb. Comes from corrosion of household systems and erosion of natural deposits. High levels can cause mental and physical development problems in children. Pregnant women can have reduced growth in the fetus and premature birth. Adults can have reproductive problems, cardiovascular effects, decreased kidney and liver function, ect.

mid-Depth (cm)	Age (Year AD)	Al	Cr	Pb
0.5	2009.051567	28002.8933	56.07702388	45.38492526
4.5	1996.91763	23672	52.74509804	49.18137255
8.5	1984.301737	27359.73	60.5	55.095
12.5	1971.997698	23832.1165	61.30582524	60.50485437
16.5	1957.11378	32494.03398	60.60679612	48.18932039
20.5	1936.503097	25833.25183	36.52549699	27.19586223
24.5	1912.83058	24306.87129	31.65346535	18.04950495
28.5	1883.573049	16343.62376	23.23267327	10.48514851
32.5	1851.395436	18100.71078	24.76960784	8.794117647
36.5	1815.588982	22067.79	28.875	8.695
38.5	1798.60714	21173.12	28.045	8.555

Solutions & Steps Being Taken:

- There are several solutions and steps being taken to mitigate the issue of increasing concentrations of harmful elements in Lake Erie. The levels of aluminum, for example, are reduced through employment of ion exchange or coagulation and flocculation, which are processes used to treat and remove aluminum from water. While these treatment methods are practiced at most industrial plants, greater caution should be taken to ensure that these companies are held accountable for the waste produced from their firms, perhaps by means of more regular safety checks from EPA services. Industrial plants, while routinely treating the water used in manufacturing, should also take care to not let any untreated, contaminated water escape as run-off, as it will eventually enter a larger body of water as well. Whether the source of pollutants be agricultural, industrial, or urban, it is imperative that better care should be taken to reduce the increasing concentrations of these chemicals in our freshwater sources.

Year vs Amount of Aluminum



Results

- The results we were given show that over the years, the amounts of each element have increased and also have become more present closer to the surface of Lake Erie. This increase in amount and presence at shallower depths of the three elements all help to make the waters of Lake Erie polluted and feed the growth of harmful algae blooms.

Why should you care?

- The human population is continuously growing and expanding. It is important for there to always be available water supplies to support the world. Used for drinking water, keeping crops nourished, preserving local wildlife and the ecosystem, water is vital to life. Engineers have direct impacts on safety and development of society. Together we need to bring change for a cleaner environment for future generations to come.

Acknowledgments

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