CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

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Project Number

J1113

Project Title

To Drink or Not to Drink: A Comparison of Arsenic Levels and Water Quality in Europe and the United States

Abstract

Objectives/Goals

The objective of this experiment was to compare the waters of Europe and United States to the World Health Organization standardized guidelines, and to determine which one is superior in quality and hence safer for consumption. The experiment will involve the testing of the waters of both areas for arsenic, bromine, free chlorine, total chlorine, pH, alkalinity, total hardness, nitrates and nitrites. The hypothesis was that the arsenic level in the United States water would be 3 times that of Europe. It was also predicted that the pH, nitrate and nitrite levels in Europe would be 30% closer to the lower bound of the WHO guidelines than the United States.

Methods/Materials

The Lovibond Arsenic Testing Kit, LaMotte Insta-Test 5 way and Nitrite and Nitrate test strips, collection bottles, timer, camera, tape, gloves, and data recording sheets were used to carry out the experiment. Three water sources were picked in each of the five European and two American cities and three samples were tested within each source. Photos were taken of the test strips after testing to document the color change and the results were logged in the data recording sheets.

Results

A total of 360 trials/ tests were conducted. Majority of the drinking water sources tested in the US and in Europe had similar chemical level profiles which were within the WHO guidelines. The tap water both regions tested negative for arsenic and had all the other parameters within the recommended ranges. The average arsenic level in Europe was 0.0051 mg/L while that in US was 0.0005 mg/L. However, the non-drinking sources, such as seas, oceans, lakes and rivers, contained higher levels of nitrates, nitrites, bromine, free and total chlorine.

Conclusions/Discussion

This experiment demonstrated that pH, nitrate, nitrite, free chlorine, total chlorine and bromine levels in the European waters were closer to the WHO guidelines than the United States#. The average arsenic level in Europe was found to be ten times higher than that of US. This led to the conclusion that although the water quality of Europe is better than that of the United States with regards to the WHO guidelines, the United States has less arsenic in its water than Europe.

Summary Statement

This project is a comparison of the average arsenic levels and water quality in the United States and Europe as compared to the World Health Organization Guidelines

Help Received

My mother guided in finding a mentor, in ordering supplies and in collection/testing of samples; My father planned the trip; My mentor, Ms. Patsy Schreiber answered any questions I had regarding my project