Environmental Quality Assessment of the Neches River, Cherokee County: Ernest Anderson Crossing

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Background Information
The focus of this assessment was to determine environmental quality of a site known as Ernest Anderson Crossing. Anderson Crossing is a small bridge spanning the Neches River with multiple small rural towns in the surrounding areas. The bridge is located in Cherokee County. This particular part of the Neches River is a known recreational site for much of the surrounding towns’ residents. Numerous activities take place at Anderson Crossing such as swimming, fishing, consumption of alcohol, and other illicit happenings. Through a thorough investigation of the site history, conclusions were reached that in the past there has been dumping of decommissioned vehicles as well as construction and demolition debris. Possible sources of pollution on the banks may include trash dumping, clothing and other recreational items abandoned on site, fuel and oil leakage, and human foot traffic. The river has experienced several possible pollutions as discovered by many witnesses. Such pollutants consist of individuals jumping off of the bridge and injuring themselves on metal and concrete located directly under the bridge occurring from the bridge being burned down once before.

This experiment focuses on the pollutants and any possible contamination found at Anderson Crossing. Soil and water samples were taken and analyzed for the following constituents: arsenic, iron, total chlorine, ammonia, D.O., turbidity, and pH.

Sampling Location and Map

Data Obtained from Ernest Anderson Crossing Sampling

Procedures

The following measurements were conducted using the colorimeter:

- Measurement of Total Chlorine in Water
- Determination of Iron in Water Using the Phenanthroline Method

The following parameters were tested using the Arsenic Testing Kit:
- Determination of Arsenic in Water (0-500 ppb)
- Using an EZ Arsenic Test Kit

The following parameters were tested using the spectrophotometer:
- Determination of Ammonia in Water Using a Spectrophotometer
- Determination of pH in Water & Soil Samples

Water samples were tested using a HACH HQ40d Multi-parameter instrument. pH was measured and recorded. After each use of the pH probe attachment, it was rinsed with distilled water. After fully rinsed, the pH probe was inserted into the sample and the stabilized value was read and recorded.

In the laboratory, 2 drops of Reagent No. 697-27 Triplex Indicator was added to a cavity of the test plate. Just enough soil to absorb the indicator was added to the cavity. The solution was mixed thoroughly and covered with a layer of soil reaction powder. After a timer of 2 minutes was complete, the color of the solution was compared to the standard color chart, and the results were recorded. This was repeated for all twelve soil samples.

Determination of D.O. in Water Samples:

Using a HACH HQ40d Multi-parameter instrument, D.O. was measured and recorded. After each use of the D.O. probe attachment, it was rinsed with distilled water. When fully rinsed, the D.O. probe was inserted into the sample and the stabilized value was read and recorded.

Data Analysis

Iron:
According to TCEQ, acceptable levels of Iron for all public water systems is 0.3 mg/L. The levels obtained fell below TCEQ’s specified level. Therefore, iron levels for this site were found to be safe.

Chlorine:
The results for total chlorine in water were found to be undetectable and are therefore inconclusive. For soil the average concentration of chlorine was 0.7 ± 0.8 mg/L. The maximum level of chlorine detected in the soil samples was 2.7 mg/L. The maximum residual disinfectant level goal (MRLG) and maximum contamination level (MCL) is 4.0 mg/L according to the EPA’s standards for safe drinking water.

Ammonia:
Concentrations of ammonia in soil and water were detected after analysis. The concentrations were found to be 0.032 ± 0.0006 mg/L in water and 1.2 ± 0.491 mg/L in soil. The maximum ammonia concentration in water was 0.041 mg/L and 1.98 mg/L in soil. According to Oregon State’s Public Health Department, long-term ingestion of water with concentrations of ammonia greater than 1.00 mg/L may be damaging to internal organs.

Arsenic:
Concentrations of arsenic were discovered to be non-detectable in both the soil and water series. EPA’s standards for safe drinking water insist that levels of arsenic must be lower than 0.01 mg/L to be classified safe.

Dissolved Oxygen:
Concentrations of D.O. were discovered to be 9.025 ± 0.155 mg/L in water. The maximum level of D.O. detected was 9.26 mg/L in the water samples.

pH:
Levels of pH were found to be normal. In the water samples, pH was 7.37 ± 0.127 and 6.21 ± 1.07 in soil.

Turbidity:
Turbidity was measured on site and found to be 18 ± 4.95 cm for the sample locations.

Methods

This experiment was subdivided into two separate methods; the sampling done in the field at Anderson Crossing and the sample analysis done in the laboratory. These two parameters were subdivided into either soil or water. The soil and water parameters were then segmented into each of the four measured constituents. This was done to promote organization and consistency so that results may be duplicated in the future.

QA/QC

In order to remain unbiased, proper QA/QC was implemented throughout the duration of this experiment. QA/QC was conducted for all samples and averaged into a single correction factor for each parameter measured. Rinsate blanks were created for arsenic, ammonia, total chlorine, and ferrous iron for every container and calculated in the average correction factor.

Correction Factors from QA/QC

Chlorine Rinsate 0.1 mg/L
Iron Rinsate 0.1 mg/L
Ammonia Rinsates 0.0 mg/L
Arsenic Rinsates 0.0 ppb

Conclusions

The initial hypothesis stated for the experiment was not met. However, it was not the intention of this experiment to prove the hypothesis. In fact, because the hypothesis was not confirmed, the Neches River, Anderson Crossing can be established as a healthy site for recreational purposes. This was the actual goal that was sought and obtained.

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