

Is There Something *Hiding* in My Water?

#4013

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Abstract can be found at the sefmd.org website

Category: EA
Division: Junior
Science Type Project

Introduction:

- In the past several years, many of our students have experimented with growing food to help their family. *Raphanus sativus* (Radishes) were useful and grew quickly so the plants made a good test subject for short term experimentation.
- **As I watched the older students work on their projects, I noticed that even though we all used the same city tap water for control variables, the growth results often were different.**
- The same seed brand, the same soil, the same type of container, and the same city water was used. Only the results were different. We all live in the same city, so why were these results different? What is *hiding* in this water that makes these results different?
- **This research seeks to answer this question, which is also the working hypothesis: Is there is a difference in the tap water from the same city source when the sample comes from a different location within the same city?**

Methods:

What is the experimental design?

- The purpose of this research is to discover if there is a difference in the tap water results when the tested water comes from the same city source, just a different location within the city.
- **Historical data, taken from previous student projects will be examined. Current samples taken from the same locations will also be tested using the same water quality protocols. The same water quality tests will be performed as the previous researchers used: LaMotte Water Monitoring test kits: pH, copper, lead, dissolved oxygen, nitrates and phosphates.**
- These test results will be uploaded into the data base for NASA and recorded in the logbook. I intend to discover if there is any difference in the water. The results will then will be analyzed to discover if the tap water is the same or different from the various locations.
- **If these results show that the water is different, that would show an effect on the plant samples grown in previous research projects. If there is no change, then no affect would have occurred.**

Methods:

What is the experimental design?

The data is expected to confirm or deny this hypothesis.

This researcher thinks there will be no difference between the different samples, but that the data will show perhaps some other cause brought about this difference in results.

It is possible that researcher error could happen, but not to every test performed, depending on which sample was used.

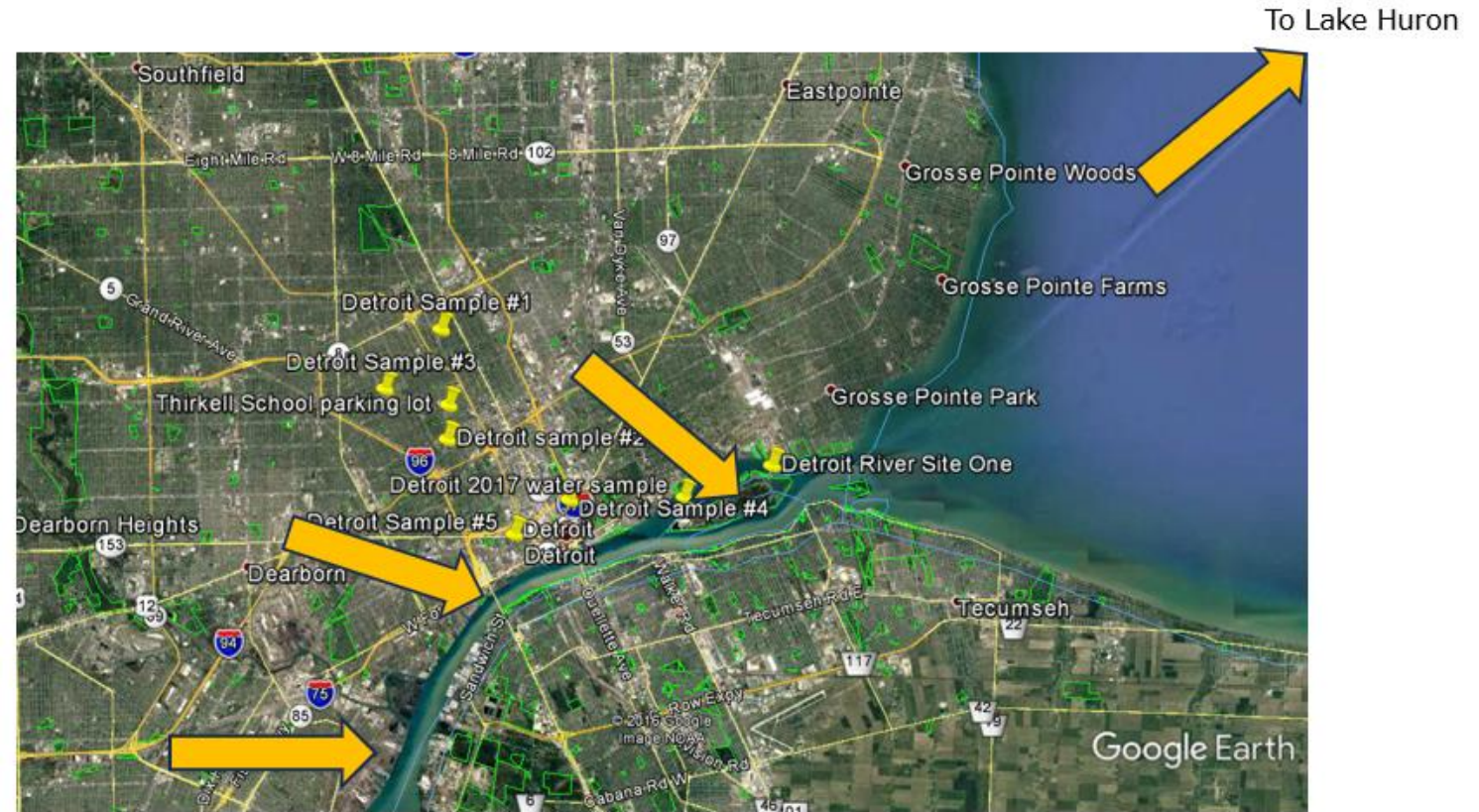
The differences in results happened every year that water in the city was tested by our students using the same equipment and chemical tests.

Results: What did the data show?

The data were compiled and analyzed, then organized to help determine the results of this research. It was not what this researcher expected to find. The data showed differences in the results consistently, depending, not on the water, but where the water location came from.

Although the final product is shipped from one place, the city water is not actually drawn from one place. This was discovered in the literature, after finding that the results were varied.

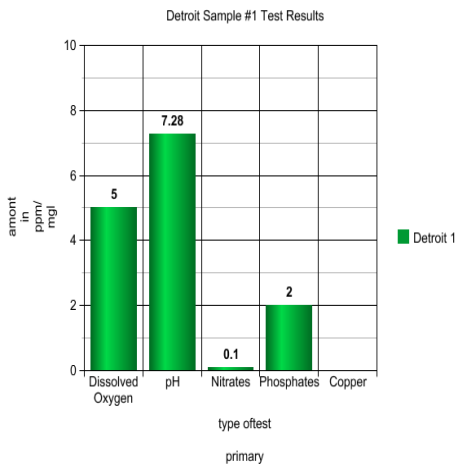
It is actually printed in the original city history of the Water Company.



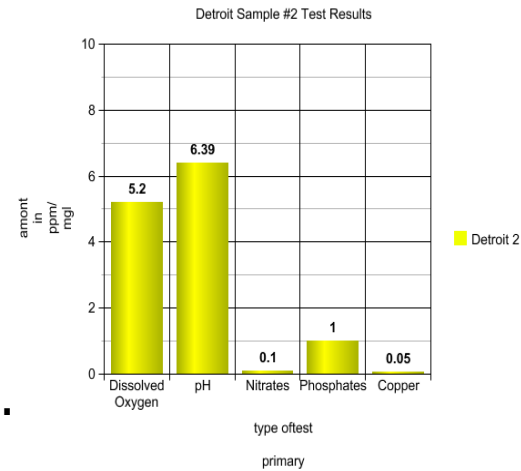
Each of these sites services a different part of the city. The arrows mark the location of the water intake for this metro area.

Results: What did the data show?

- Often, they were close, but some areas had some large differences in pH, and in phosphates. I learned that phosphates are used to block pipes so lead cannot enter the water. Lead is already there but it cannot stick to the pipe because phosphates are supposed to block it.



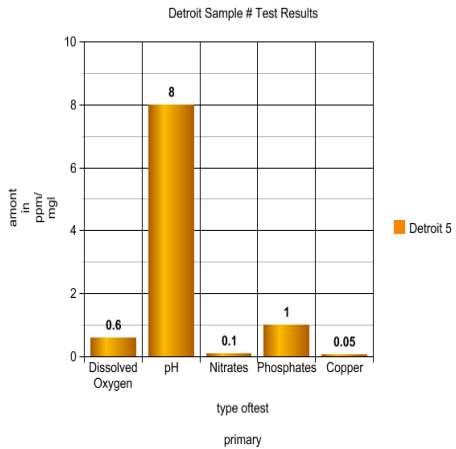
This sample is taken from the Wayne State University area. It shows double the phosphates level than every other sample performed in this batch. It had a great pH level but you can bet it has lead in it. Usually WSU never has a good pH.



This sample came from another area of the city. It still has phosphates but now there is copper present, which indicates there are also other heavy minerals in the water. This pH is also much more acidic. Better start checking your teeth!

These were from the same year of historical data.

Results: What did the data show?



Now this sample came from further out of the main city, almost the last customer on the city line. The phosphates are lower, but there is still copper and nitrates present in the water. Lead was also confirmed via a different test. Look at the pH level. It is basic, which is another type of corrosion. Basic leaves corroded 'stuff' behind, in your water, while acidic 'eats it away'. This sample came from Newport area.

Test	Results
pH	6.07
Phosphates	2 ppm
Nitrates	1 ppm
Copper	1.5 ppm
Lead*	YES Danger
* results show either above or below the danger zone of 15 ppb	

These data were from the same areas, but protocols were performed by a different researcher. All the same materials were used. This is the previous year's Detroit sample 1. You can see the phosphates remained the same but the heavy metals were more present. Heavy metals create a more acidic pH level. This family has dangerous levels of lead in their water.

These were from the same year of historical data. The following year shows even more interesting data.

Discussion: What does the data mean?

Test	Results
pH	6.02
Phosphates	1 ppm
Nitrates	5 ppm
Copper	0 ppm
Lead*	YES Danger
*results show either above or below the danger zone of 15 ppb	

Test	Results
pH	7
Phosphates	3ppm
Nitrates	0.5 ppm
Copper	0 ppm
Lead*	NO
*results show either above or below the danger zone of 15 ppb	

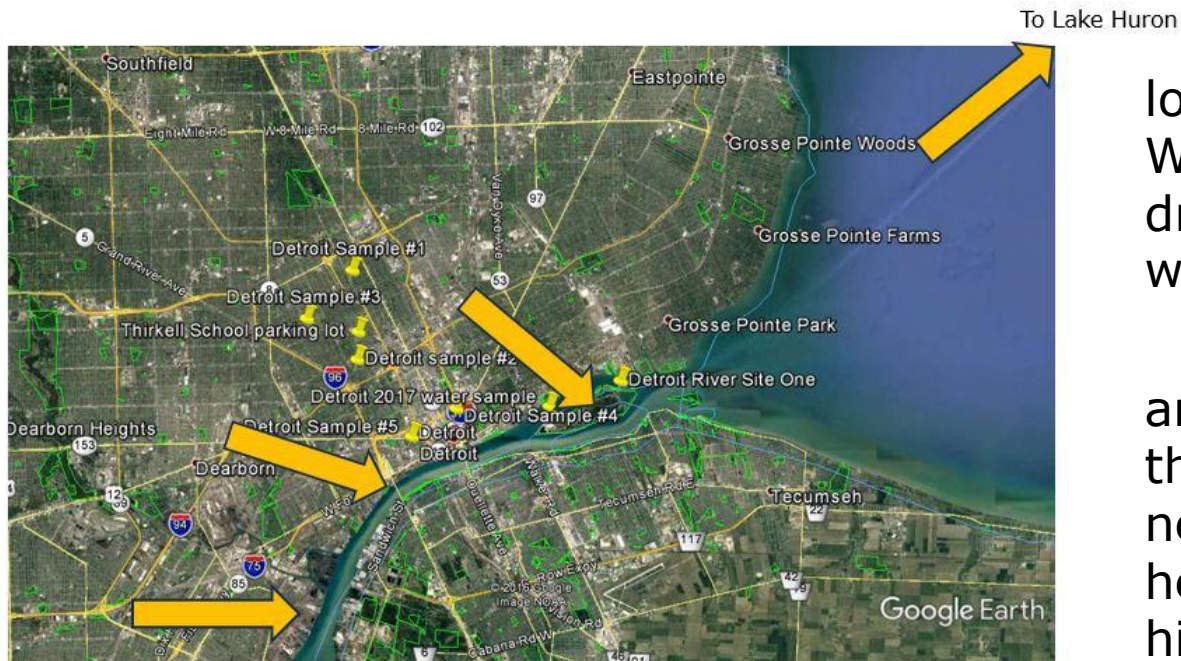
This is Detroit sample #5. It is the last on the southern line and is from Newport. It is also a very new home and has lead in the water. The pH level also dropped with the presence of lead in the water.

This last one is represented as Detroit and is the only one without lead present. It is also the only one that has a pH it is supposed to have. It is on the outer edge going a different direction.

Water begins the pH scale. It is supposed to be neutral, which is 7, and everything else is either acidic (lower) or basic (higher). Battery acid is #1 which we obviously do not want to drink!

For the rest of the years tested, and the current data, the results were consistent. The closer the location was to the center of Detroit, the lower the quality of water became. The further out from the center, the water became cleaner and healthier on the WQI (Water Quality Index).

Discussion: What does the data mean?



Take another look at the map again. Most of the locations are visible on this map of the city area. What is also visible are the locations where water is drawn for purification for drinking. These are marked with the arrows.

There are three intake valves in the Detroit River and the newest one is in Lake Huron. It is deep in the very center of the lake. Lake Huron services the newer parts of the Metro Detroit area and has the healthier WQI rating. This can be discovered in historical literature published by the Detroit Water Company itself but is now rather hard to locate on the Internet.

The Detroit River is historically more polluted and requires much more purification methods to remove the toxins and heavy metals. There are lots of other 'stuff' in there as well.

Conclusion:

- In conclusion, the data supported the discovery that there were differences in the results obtained from the different samples based on their location within the Metro city area.
- The original hypothesis asked if there was a difference in the water based on the location within the city. Was that the reason the results were different each year? The original thought was that other causes for responsible for the difference in the results obtained rather than the city location.
- This data did not support that thought. The data suggests that the differences are indeed related to the location of the residence in the city. The literature stated that the locations in the city received water from different sources and that is most likely the reason for the difference in the test results.
- This is something that appears to be an ongoing issue and needs to have further research. It should be brought to the attention of community members so that it can be properly solved. It is also easy to see that this is a very complicated situation and there will not be an easy answer to the problem. However, that should not be a reason to ignore the situation.

Conclusion:

- Next steps should be to conduct further research with a much larger sample from around the city. It should be samples that are taken through the entire year so that seasonal weather patterns do not account for any change in the water.
- Other community members and those who are experts in the field should also get involved. These are also people who would be interested in this project. We all need this water. No one wants to drink the water and die from doing so. I do not want to! The children of tomorrow would like clean water as well.
- I would think the entire planet would be interested in this research and possibly want to continue work on this.
- We all need clean, healthy water.

References / Works Cited:

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