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## Summary

This project is based in the city of Odessa, that is located in the Permian basin. The major problem that arises after the continuous fracking is the contamination of the ground water, the contamination in the soil, for the splits of the contaminated waters used in the process of Hydraulic Fracturing. Also, the water that come out of our plumbing is in someway contaminated because it smells like rotten egg and sometimes the color is in between light yellow and dark brown-orange. My investigation will be covering the process of fracking, the chemicals used in the water that they used after the drilling, the complaints in the last year and the Odessa Quality Reports of the Water. There are many investigations that said that the fracking doesn't has to do anything with this contamination but within the Permian basin limits, the complaints are more.

## Introduction

The purpose of this project is to make sure why our city has so much problem with the quality of the water. Many people in the city, think that all that bad smell that is coming out of the plumbing, and the Water with a yellow color, are the consequences of the hydraulic fracturing, but many studies says that it is not related. I will find the Root of the problem so we can know for sure if this has a solution or if is something bigger.

## Background

The department of Water annually, needs to give reports to the federal Government about the Quality of our water. Those reports are always within the standards that the government requires, in spite that the whole year the residents are complaining about the water. I want to do this investigation, because I want to seek for the real cause of why the water is coming out in this condition. I want to see if there are any variables that affect this process or if the treatment that they are using is not enough.

## Problem

The main problem of this project is about the bad quality of the water of the city. We don't have a good source of water. There have been complaints, the city "fix them" but the problem keeps coming. The schools have reported that their water is practically color brown. When we go to the parks, the water fountain most of the time have something on that says that please, don't drink the water because they are "fixing" some issues. In the houses, some times the cloth, after being washed come out with a really bad smell and this is something that we don't have control. We don't know when the water is coming fine or not. With this project I will find the cause of why this is a persistent problem.

## Methodology

The objective of my research is to evidence why is the water coming polluted, even though the city is taking the necessary steps to provide us clean water. The other objective is to present other option of water purification, besides de reverse osmosis. How I said, the City of Odessa, offers a Quality Report of the water each year, from the City. In the year 2016, they announce on their report that they initiated a project that could potentially provide RO water to all, citywide. That was because the quality of water was not good enough the past's years. The RO water means: better quality water, longer lasting appliances and equipment & cost savings. RO water is Reverse Osmosis.

The system of Reverse Osmosis consists of a required pretreatment and post treatment systems. Successful operation of these process systems is highly dependent on feed water quality. The life of the membrane will depend of this quality of water. To choose the type of membrane that will be used, the water must be tested first, in order to select the membrane.

In the year 2019, came out a notice of the CBS7 (news in Odessa) that there were about 200 quality complaints only in that year. In those complains was established that the water was dirty, yellow and it smell like rotten egg.

If we see the date when the city starts the Reverse Osmosis project (2016) and the year of the complaints (2019) there are 3 years in between. In the lectures I found that the membrane of the Reverse Osmosis life was 2 to 3 years. Having said that, it is a possibility that the city didn't do the required maintenance to the membrane, or didn't took the samples of the water correctly to pick the correct membrane for the reverse osmosis treatment.

In the lectures said that the bad smell in the plumbing is because of the accumulation of the H<sub>2</sub>S. The continuous flow of water with chemicals corrodes the pipes and that porosity causes all those chemical wastes to accumulate (specially the lead, and the H<sub>2</sub>S). How we can remove H<sub>2</sub>S from the water? Using an iron sponge process, that treats digester gas by passing it through a permeable bed of iron sponge.

Here are the important points of my research, because they will drive us to a conclusion:

- ✓ The city buys water from different counties (are also contaminated) when our own water it's not enough and also, use the same city underground water.
- ✓ In the process of flow up the chemicals may spills to the ground.
- ✓ The department can provide an efficient quality of water to us, but if the plumbing of the city is corroded and contaminate the water that the department is providing us, they don't have nothing to do with that.
- ✓ The reverse osmosis is an effective treatment because they measure the water contamination before buying the membrane of the RO. They measure to have an estimation of the pollution and chemicals.
- ✓ The membrane of the RO has a life of 2 to 3 years.
- ✓ The new project of RO of the Department of Water vs the massive complaints for the quality of the water are 3 years apart.

## Results

I initiated this investigation because I thought that the water department wasn't offering us the correct treatment for the water we were consuming. It had terrible smell, besides the color was in between yellow and brown. At the end of my investigation I have learn some points that shows me that the treatment that the water is receiving is the correct one. I learned about the process of fracking and the consequences, later on, I learn that the inform of the Quality Report that the city reports, the Federal Government require the city, to monitor exactly those substances because in more quantities are harmful to life. In the investigation of the Reverse Osmosis treatment, I can conclude that is effective because we can see in the reading that to pick a process of purification, they need to do water testing before the city invest in a treatment. They will not invest in a treatment that will not gave results and also they need to report those samples to the Federal Government. In relation of the water report of 2019 and the starting the project of RO in 2016, it is a huge coincidence that since the 2016, when they start the project of RO, to 2019, it were over 200 complaints, only in 2019. That is 3 years apart, the total life of the membrane of RO. I got to the conclusion that they didn't make the correct maintenance of the membrane. After this situation the city increment the portions of the chemicals that clean the water, to have faster results and also, gave the right maintenance to the membrane.

This investigation will not go forward with the Water Department, instead I'm encourage to keep investigating about the maintenance of the plumbing of the city. If the plumbing is affected by those chemicals, the water will be contaminated

## Conclusion

It is important to investigate things, before we make an assumption. There are many complaints about the quality of water, the smell, the color. It is very disappointing living in a place that economically you can be stable, but when it comes to the use of water in a daily basis and we perceived the smell, we get mad. We don't have other choice than to invest on a water purification system of a very high quality and install it on the sewer that will go connected to the house, so we have fresh and clean water for cleaning the cloth or washing the dishes and cooking. Meanwhile, we could not reach a concrete conclusion about the water treatment, because we cannot rule out the possibility that it is not the pipes that affect the quality of the water. In the meantime, we will settle for knowing that we corroborate that the department is working efficiently and in the meantime, the investigation of the state's pipelines will be carried out.

## Future Work

My future work will go toward the Department of Plumbing Inspection, The City Inspection Decision, and the International Plumbing Code of the City of Odessa as the results of my project are not clear, until I can discard the possibility that are the plumbing that is causing this problem to the water, and that the treatment of the water is failing.

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