1 Scientific Inquiry

- How do you determine the quality of water and if it is drinkable?
- What are some ways that the quality of water can be improved?

2 General Hypothesis

In terms of the first question, there are several ways to determine the quality of water. However, there are two main approaches: 1) observation and 2) instrumentation. For the observation approach, it includes simply taking a water sample and noting specific characteristics it has, such as color and clarity. In addition, the odor of water as well as its taste can be an indication of its quality. These observations coincide with the common idea that clean or pure water should be odorless, tasteless and transparent. In regards to the instrumental approach, this would include measuring the chemical properties of a water sample, such as temperature, conductivity, and pH.

The second question is closely related to the first, in that to improve the quality of water it should most likely meet the conditions stated above of being odorless, tasteless and transparent. There are several ways the quality of water can be improved both on a small scale and a large scale. These improvement methods include, but are not limited to, chlorination, filtration and purification.

2.1 Key Terms

1. water quality - the physical, chemical and biological characteristics of water
2. potable – drinkable; whether the water is safe for human consumption
3. surface water – water collecting on the ground or in a stream, river, lake, wetland, or ocean
3 Data Acquisition

The purpose of the project is to investigate more about our scientific inquiries as it relates to the water quality in New Zealand, as well as the United States. In order to achieve this outcome, one of the projects objectives is to determine if there is a correlation between the water quality in New Zealand, as rated by the Institute of Environmental Science and Research (ESR), and what we find through observation and instrumentation. In order to test our initial hypotheses, observation and instrumentation will be essential, along with literature review. The literature review would include a comparison and contrasting of the physical water supply infrastructure of New Zealand to the water systems in the United States; specifically, that of Pennsylvania state. On the other hand, the observation and instrumentation component would be more involved.

This part would include taste testing of the tap water in the various locations that we visit in New Zealand. The taste testing would be evaluated using a “Water Tasters Scorecard” and a “Water Tasting Wheel” (see appended pages). These documents will be borrowed from the resources provided by the Portland Water Bureau. We can also measure different properties of the tap water including: temperature, pH and conductivity.

3.1 Sites

In terms of the trip, we will mostly likely have taste testing at the following locations:

1. Auckland
2. Matata (Bay of Plenty Region)
3. Christchurch
4. Akaroa
5. Westport
6. Franz Josef
7. Queenstown

At these 7 locations, we will give class participants, who are willing to volunteer, a copy of the Water Tasters Scorecard to fill out, along with Water Tasting Wheel (see attachments). Once we have collected all the scorecards for each of the locations, we will compare the results to the grading and water determinants provided by the ESR. By doing this, we will be able to verify or refute the findings of the ESR. For example, if the scorecards from Auckland results in a large percentage having a bitter taste; there may be a high concentration of a determinant that has a bitter taste. In summary, the variable in the project will the different types of tap water based on location and the tasting group will remain constant.

3.2 Student Participation

There are many opportunities for our group to interact with the third-grade students and even give them hands-on experience while we are in New Zealand. For instance, we can have them conduct taste testing of their own using bottled water, the tap water in their homes, or even filtered tap water. From conducting a taste test, students would be able to identify and become familiar with the different characteristics that are important to water quality. We might also ask the students to locate the water tower nearest their homes, or investigate where the tap water in their homes comes from, whether it be a well, public system, or some other means. Lastly, we could have the students evaluate their families’ water usage and explore ways that they could be more efficient. All of this would give us a great opportunity to connect with the students, while acquainting them with the real issues associated with water usage.

4 Outcome

The benefit of the knowing the outcome to this project is that we will be able to qualitatively assess the quality of the water in New Zealand; if it is high or low, as per the ESR. Moreover, we will be able to see if the water quality reflects how well the water tastes. For instance, water with a high quality may or may not have an agreeable taste.
WATER TASTERS SCORECARD

Rate the water samples provided for taste on a scale of 1 – 5, where 1 is unpleasant and 5 is very tasty (advanced groups may want to include color and odor in this tasting exercise). Circle the score you give to each sample. Make notes about each water sample that you taste in the space provided.

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<th>SAMPLE ID</th>
<th>SYMBOL</th>
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<th>CLASS AVERAGE</th>
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Which sample do you think is fresh tap water? (write SAMPLE ID here) ___________

Do you ever buy bottled water? Y N

If, “YES” to the above question, how often? Daily Weekly Monthly Rarely

If you buy bottled water, what brand(s) do you prefer / buy most often? ________________________
_____________________________________________________________________________________

Write 3-5 sentences about what you learned from this activity:
The water tasting wheel is used by water-tasting professionals to help describe the odors and tastes associated with different water samples.