Name _____ Student ID _____ Date _____

Is it too salty?

Background: Now that you know a bit more about water pollution, you will measure a variety of water samples to determine the levels of conductivity and/or chloride. Since you can't see this kind of pollution, you will be collecting water samples and bringing them back to the lab for testing. You will be testing surface water and tap water, depending on your class.

Before you begin: List the kinds of things that you think may impact the concentration of salt in the water:

- *How much rainfall there was*
- *How much salt is naturally occurring in the water*
- *How much road salt was spread in the surrounding watershed*
- *Whether there is hydrofracking nearby*
- *What the local roads are treated with in the winter*

Using the "Salt Pollution Reference Table", what level do you expect your local aquatic ecosystem to have (safe, harmful to living things, harmful to human health, lethal)?
Answers will vary.

Why? *Answers will vary.*

Materials:

- Sample bottles
- Tape & marker to label your bottles
- Gloves
- Conductivity or chloride meter

Procedure:

1. Collect samples from home and bring them back to the classroom the next day. Label your bottle and write down where you collected your sample.
2. When you return to the classroom, measure the conductivity levels of your samples.
3. Complete the data table below for your class data. Use the equation provided by your teacher to convert between conductivity and chloride levels.
   Write the equation here: ***Equations can vary, but for the purposes of this lesson we recommend that schools use the "stock" equation we used for the Salt Pollution Reference Table:***

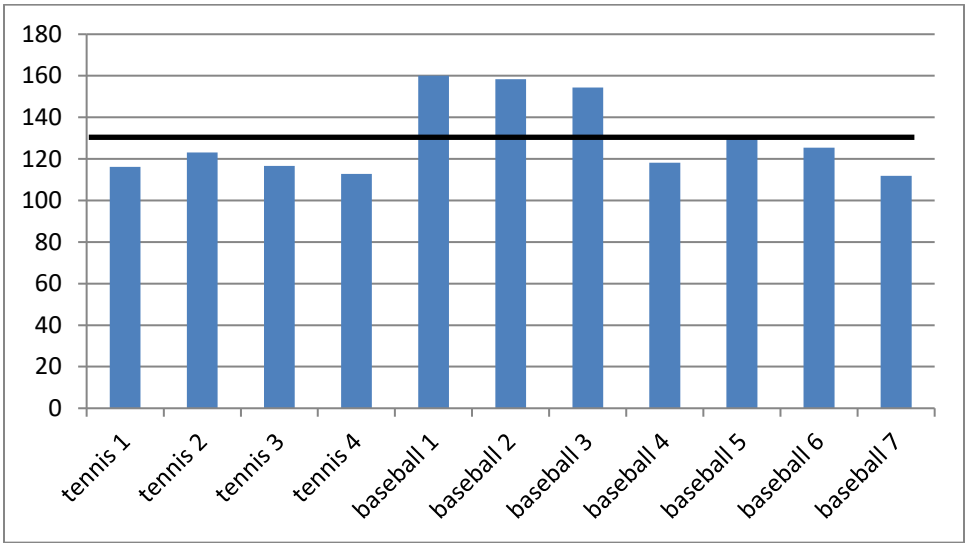
   Chloride = (conductivity + 20)/5.2

4. Complete the chart by adding in the benchmark levels from the Reference Table. The data below are from Pearl River, and have a different equation but are provided as an example.

Pearl River HS	Period 9		Period 1			
Site	Conductivity	Chloride	Conductivity	Chloride	Average chloride	Level
tennis 1	794	113.48	807	118.94	116.21	Harmful to living things
tennis 2	824	126.08	810	120.2	123.14	
tennis 3	797	114.74	806	118.52	116.63	
tennis 4	775	105.5	810	120.2	112.85	
baseball 1	915	164.3	895	155.9	160.1	
baseball 2	972	188.24	830	128.6	158.42	
baseball 3	908	161.36	875	147.5	154.43	
baseball 4	900	158	710	78.2	118.1	
baseball 5	840	132.8	830	128.6	130.7	
baseball 6	875	147.5	770	103.4	125.45	
baseball 7	781	108.02	799	115.58	111.8	
				Average	129.80	

Discussion Questions

1. Create a graph of your data. *Shown below are the average data from Pearl River.*



2. You calculated an average for your class. How do all of your data compare with this average (this is called *variability)*? In other words, are your data close to the average or do they vary greatly from one another? Why or why not? *There is variability within the dataset – not all of the tennis court samples are the same, nor are all of the baseball field samples the same. Students could suggest both human (induced) or real reasons to explain the variability.*

3. If you wanted to repeat this experiment, explain what you would do to improve your confidence in the results. *Students might suggest taking more replicates, sampling at different times of the year, or comparing their data with expert data.*

4. Using the Salt Pollution Reference Table, decide whether the level of salt in your school district is a problem for other living things, or for human health?
The salt pollution levels in Pearl River are potentially harmful to some living things, but not to human health.

5. Think back to the first graph you saw of the scientists' chloride data from the flowback water. It is also provided below. How does your class average compare with data from the scientists? In other words, are your data similar to the results found by the scientists who were investigating the flowback water? Why or why not? *Our class average is not similar to the chloride data from the experiment. At its peak, the mg/kg of chloride was 1180, which is much higher than our values. The control plot values are more similar to our values; they ranged between 12-46 mg/kg.*

6. The local town council needs to decide whether to allow the application of flowback water on roads in your area. Would you allow this to take place? Why or why not? Which data set do you feel is more useful for making a recommendation? Why? *Students will likely want to use the scientists' data, but encouraging them to think about their data as an extension of the scientists work is helpful for having them trust their own data. Students should also think about the other types of data that they have in the flowback data set but didn't test in the classroom.*