MEMORANDUM

TO: DR. OTERO-DIAZ
FROM: ROGER TURLINGTON
SUBJECT: NUTRIENTS LAB
DATE: MARCH 3, 2018

Introduction

Nutrients are very important for sustaining life in a watershed, yet can also have an adverse effect on the health of the water system. Nitrogen in particular is a key building block in plant and animal proteins, but can also contribute to algal blooms when present in significant concentrations along with phosphorous. Algal blooms can greatly increase turbidity and contribute to BOD in the water. Measuring the concentrations of phosphorous, as well as two species of water-soluble nitrogen, ammonia and nitrate, is important to determine the health of the watershed.

Materials and Methods

A sample was taken from the Arcata Wastewater Treatment plant, at the post-enhancement wetlands part of the treatment train, on February 13, 2018. The sample was tested on February 13, 2018 for ammonia, nitrate, and phosphate. For ammonia, an ion selective electrode was used according to 4500-NH_3 D in *Standard Methods*. For nitrate, an ion selective electrode was used as well, according to 4500-NO_3^- D in *Standard Methods*. For total reactive phosphorous, a colorimetric test using the Ascorbic Acid method was used according to 4500-P E in *Standard Methods* (APHA 2005).

Results

The values calculated for the concentrations of ammonia (in nitrogen equivalent) are located in Table 1. The values for the concentration of nitrate (in nitrogen equivalent) are located in Table 2. The values for total reactive phosphorous (in phosphorous equivalent) are located in Table 3. For ammonia and nitrate, one measurement was taken, and is included along with another measurement for comparison. For phosphorous, two measurements were taken, and two others are included (Otero-Diaz et al, unpublished data, 2018).

Table 1: Calculated values of ammonia concentration

	Potential (mV)	Concentration (mg NH3-N/L)
Test 1	15.3	0.937108989
Test 2	15.2	0.938755351
Avg	15.25	0.93793217

Table 2: Calculated values of nitrate concentration

	Potential (mV)	Concentration (mg NO3-N/L)
Test 1	170	0.123006359
Test 2	171	0.105632579
Avg	170.5	0.114319469

Table 3: Calculated Values of total reactive phosphorous concentration

	Absorbance	Concentration (mg PO4-P/L)
Test 1	1.624	3.738428418
Test 2	1.425	3.202906351
Test 3	1.587	3.638858988
Test 4	1.541	3.515069968
Avg	1.54425	3.523815931

Discussion

The values that we found were very consistent with the other values given to us. These other values were also measured from samples that were taken from the post-enhancement wetlands part of the Arcata wastewater treatment plant, so that would indicate that our measurements are precise. For the calibration curves, other group's data was used, including for the reactive phosphorous calculations, since our data did not appear accurate. This may have been an error that occurred during operation of the spectrophotometer.

Conclusion

The values found are consistent with other data taken from the same samples. The only error seemed to be from the measurements taken to set up the phosphorous calibration curve, which was likely due to error in the operation of the spectrophotometer.

Appendix

Table 4: Raw data for ammonia calibration curve

	AMMONIA	
	Group A	Group B
-1	118.2	133.3
0	63.9	72.3
1	12.2	10.3
2	-47.7	-48.5

Table 5: Raw data for nitrate calibration curve

	NITRATE	
	Group A	Group B
-1	202*	207*
-0.301029996	188	196
0	177	175
1	122	120

	PHOSPHOROUS
	Group A
0.01	0.121
0.1	0.191
1	0.868
4	1.658

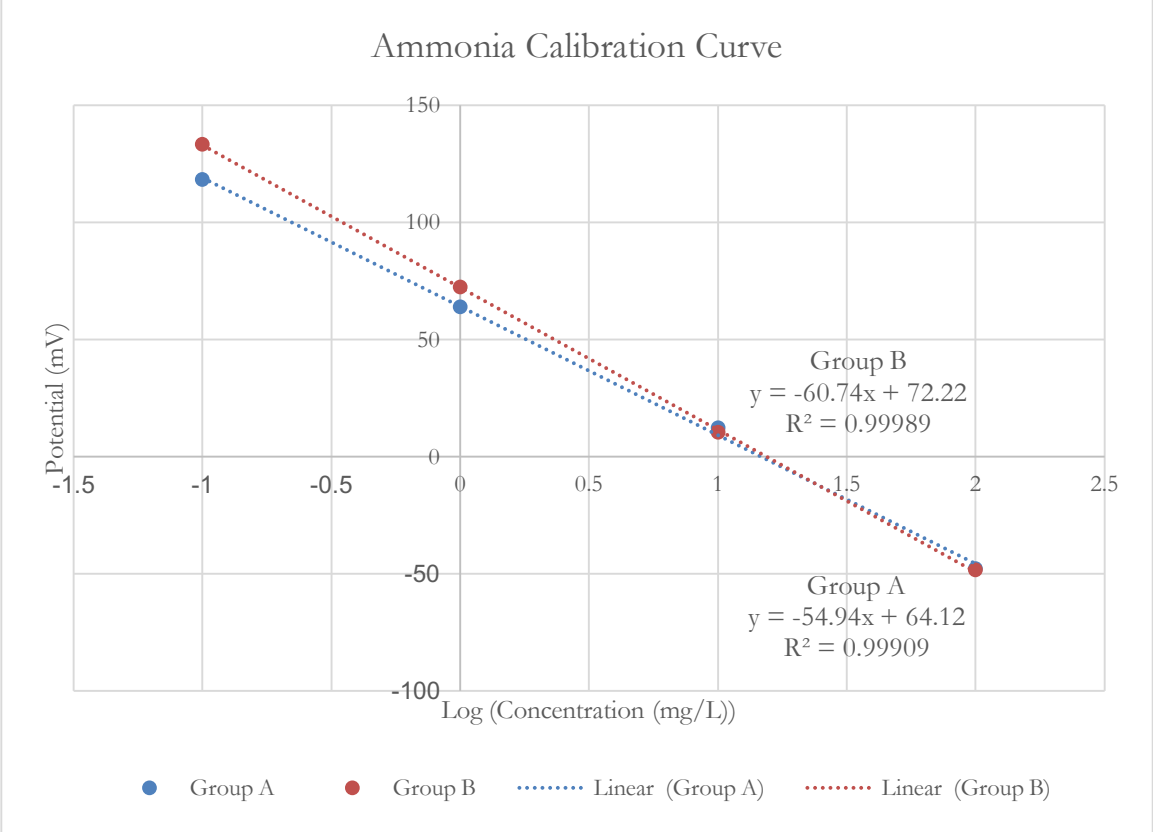

Figure 1: Ammonia calibration curve

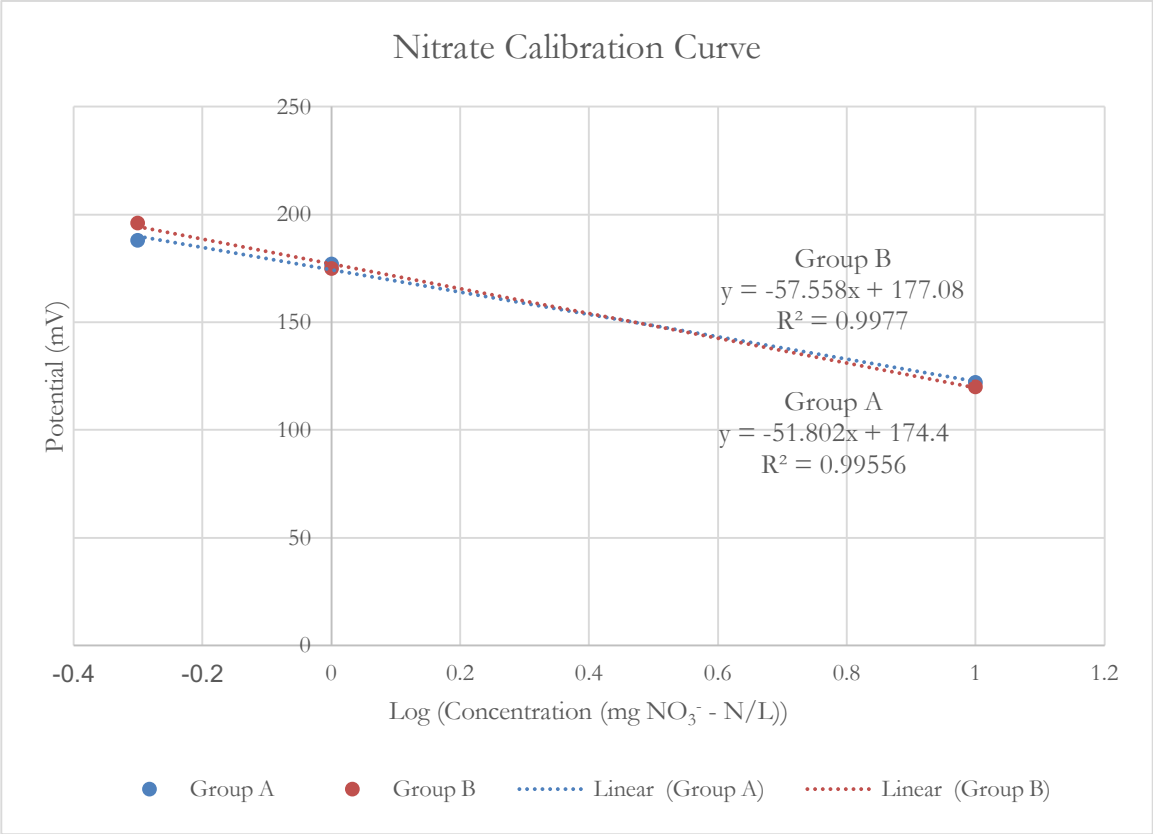

Figure 2: Nitrate Calibration curve

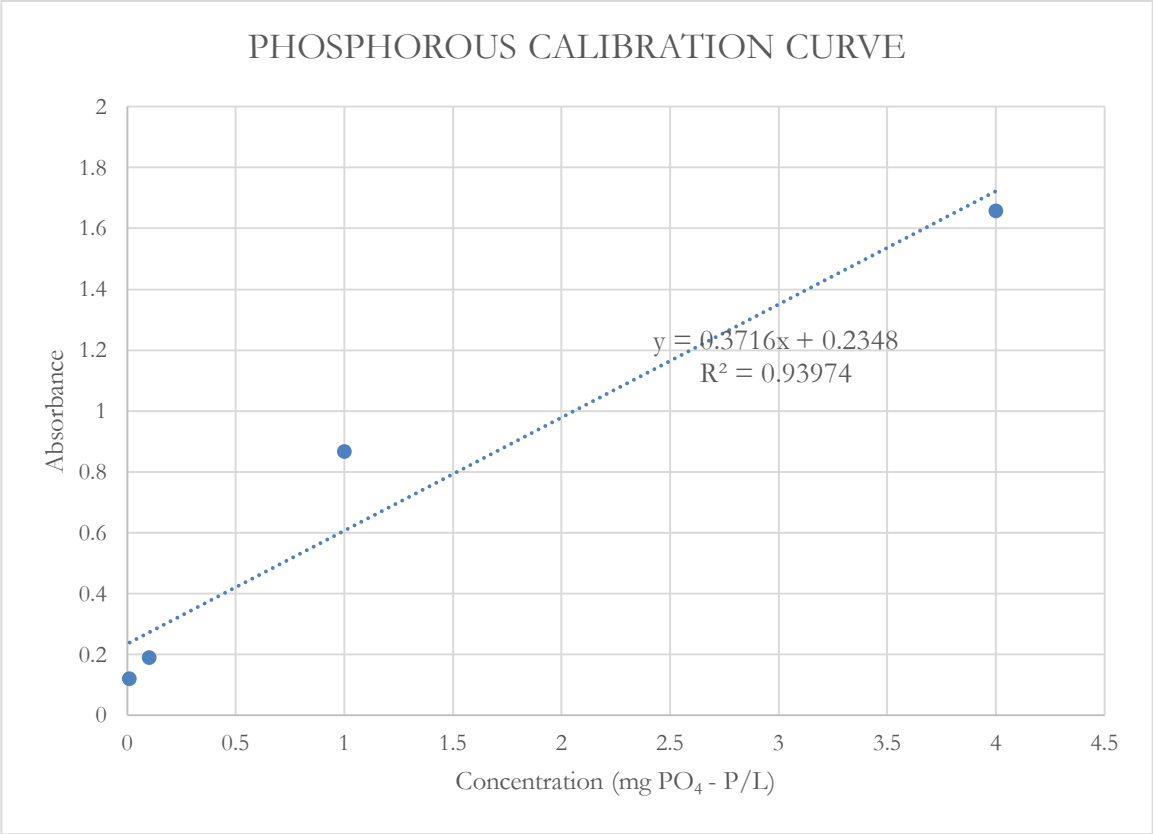

Figure 3: Phosphorous calibration curve