



Plants & Permits

Name: _____

A wastewater treatment plant needs to meet new stricter permit limits. In order to more effectively remove pollution and meet these new limits, the plant will need several upgrades. Below are three possible upgrade options.

- Three Upgrade Options and Cost
 - Option 1: This option will upgrade the bar screening to remove smaller particles and will increase the aerobic tank size to increase removal of organic matter. This will result in a **50% removal of salinity and turbidity, a DO concentration of 1.8 mg/L, and a pH of 5.0 SU**. Cost: \$150,000.00
 - Option 2: This option will upgrade bar screening to remove smaller particles and will use a series of aerobic tanks to increase removal of organic matter and increase DO concentration. This will result in a **70% removal of salinity and turbidity, a DO concentration of 2.0 mg/L, and a pH of 5.5 SU**. Cost: \$275,000.00
 - Option 3: This option will use the same screening as Option 1 but will use a series of aerobic tanks operating different processes to increase removal of organic matter and increase DO concentration. This will result in an **80% removal of salinity and turbidity, a DO concentration of 2.5 mg/L, and a pH of 6.0 SU**. Cost: \$400,000.00

- Calculate all the permit parameters for all 3 options using the equations provided. The influent wastewater has the following characteristics:

Influent: DO = 1.0 mg/L pH = 4.5 SU
 Salinity = 100 g/L Turbidity = 50 NTU

To calculate new parameter concentration, use the following equation:

$$[Influent] \times \frac{100 - \% \text{ Removal}}{100} = [NewConcentration]$$

- Option 1

- Option 2

- Option 3



Write the calculated parameters for all three options below. Use these to answer the following questions.

	New Limits	Option 1	Option 2	Option 3
DO	> 2.0 mg/L	_____	_____	_____
pH	> 5.0 SU	_____	_____	_____
Salinity	< 30 g/L	_____	_____	_____
Turbidity	< 15 NTU	_____	_____	_____
Upgrade Cost		<u>\$150,000</u>	<u>\$275,000</u>	<u>\$400,000</u>

Q1. Given the new permit limits, which option(s) will meet the new limitations?

Q2. What are the differences between the options you selected above?

Q3. With your knowledge of treatment processes, which of the options is the best solution? Please explain your decision and be prepared to discuss.
