

Aeration Tank:

Detention Time (DT)

$$\frac{\text{Capacity, MG (aeration tank)} \times 24 \text{ hours}}{\text{Flow, MGD}}$$

Use Monthly Average Flow

$$\frac{0.400 \text{ MG Cap} \times 24 \text{ hours}}{0.360 \text{ MGD}}$$

Based on DT what was the Mode of Operation for July 2020?

answers goes in the highlighted boxes

26.7 Hours Detention Time

Extended Aeration Mode

Organic Loading Rate (OLR)

$$\frac{\text{PPD of BOD}}{1,000 \text{ Ft}^3}$$

Use Monthly Average Flow

$$=$$

Calculate the Organic Loading Rate (OLR)

$$\frac{730 \text{ ppd BOD}}{53.5 (1,000 \text{ ft}^3)}$$

Note: Design Organic Loading Rate (OLR) is 15 ppd/ft³

Circle One

Conventional Nitrification Extended Aeration

Based on OLR what was the Mode of Operation for July 2020?

F/M Ratio

$$\frac{\text{PPD of BOD}}{\text{Pounds of MLVSS}}$$

Use Monthly Average Flow

Calculate F/M Ratio

Circle One

Conventional Nitrification Extended Aeration

Based on F/M Ratio what was the Mode of Operations for July 2020?

Mean Cell Resident Time (MCRT)

$$\frac{\text{MLSS, pounds under aeration} + \text{MLSS, pounds in Clarifier}}{\text{Pounds Wasted} + \text{Pounds over the Weir}}$$

Use Monthly Average Flows

$$\frac{(7,140 \text{ mg/L} \times 8.34 \times 0.01728 \text{ MGD}) + (26 \text{ mg/L} \times 8.34 \times 0.360 \text{ MGD})}{3,800 \text{ mg/L} \times 8.34 \times (0.400 \text{ MG} + 0.068 \text{ MG})}$$

$$\frac{1029 + 78}{14,832 \text{ pounds}} = \frac{1107}{14,832 \text{ pounds}}$$

MCRT

days

Process Review
 Case Study Hadleyville WWTP TSS Violations
 July 2020

Final Clarifier:

Surface Overflow Rate (SOR)
 Gallon Per Day
 Clarifier Square Footage

Use Peak Hourly Flow

$$\frac{720,000 \text{ gpd}}{34 \text{ Dia} \times 34 \text{ Dia} \times 0.785} = \frac{720,000 \text{ gpd}}{907.5 \text{ ft}^2}$$

Yes No
 Circle

Would you consider this a good Peak Rate SOR?

Use Peak Hourly Flow

$$\frac{3,800 \text{ mg/L MLSS} \times 8.34 \times (0.720 \text{ MGD} \times 2.2)}{34 \text{ Dia} \times 34 \text{ Dia} \times 0.785} = \frac{50,200 \text{ ppd}}{907.5 \text{ ft}^2}$$

Yes No
 Circle

Would you consider this a good Peak Rate SLR?

Sludge Quality and Alkalinity:

$$\frac{30 \text{ min Settled Solids, ml/L} \times 1,000 \text{ MLSS, mg/L}}{3800 \text{ MLSS, mg/L}} = \frac{600 \text{ Settled Solids, ml/L} \times 1,000}{3800 \text{ MLSS, mg/L}} = \frac{\text{SVI, mL/mg}}{\text{SVI, mL/mg}}$$

**Remember from class discussion:
 7.14 pounds of Alkalinity is required per pound of nitrogen oxidized**

Calculate the amount of Alkalinity required of Nitrify 105 ppd of ammonia?
 105 ppd is the July 2020 Monthly Average for ammonia.

Calculate the ppd of additional Alkalinity required:
 Don't forget you should add enough alkalinity to maintain
 a 70 to 80 mg/L buffer.

Calculate how many pounds of Alkalinity is required

105 ppd ammonia x 7.14 = _____ ppd

Influent Alkalinity = _____ ppd

How many ppd of additional Alkalinity would you recommend?

Findings and Recommendations:

Findings:

Use your student handouts to review Hadleyville WWTP July 2020 Effluent Violations.
Activated sludge Process Performance Standards
Presentation and your notes

As a group help each other complete calculations and answer questions.

Findings / Shortcomings:

What are the Violations?

Were there other close calls or almost Violations?

Any issues with the aeration tank?

What was the Mode of Operation?

Look at OLR, DT, F/M Ratio

Any Issues with the Clarifiers?

Look at SLR, SOR, and SWD

Comment on Mixed Liquor Quality and Settling Characteristics.

Review D.O., pH, readings.

Any thoughts as to why ammonia is very close to also being a violation?

What are your thoughts on contributing factors to the TSS Violations?

Recommendations: