

The Napa "Great Shake" Worksheet

Wastewater treatment plant operators have to make numerous calculations in order to make adjustments to treatment processes in order to produce well treated water that can be safely placed back into the environment. Two of those calculations are hydraulic detention time which is a measure of the average amount of time a volume of wastewater is in a treatment unit. Wastewater treatment plants use microorganisms in the treatment process. These microorganisms consume contaminants in the wastewater using that contamination as their food source. Operators must insure that there is the proper amount of microorganisms to remove the contaminants in the incoming wastewater. Therefore, wastewater operators must calculate the food to microorganism (F/M) ratio. F/M ratio is a calculation that compares pounds of contamination in volume of wastewater to the pounds of microorganisms in a wastewater treatment tank that are available to consume and remove that contamination.

The City of Napa Wastewater Treatment Plant operates well with a determined hydraulic detention time and organic loading rate (Food/Microorganism Ratio). As a result of the Napa Earthquake staff estimates that approximately 360,000 gallons of wine spilled and made its way into the wastewater treatment plant. This 360,000 gallons increased both the detention and organic loading (Food to Microorganisms ratio).

If we assume the following:

Normal Flow: 6 million gallons per day

Normal Flow BOD: 250 mg/l

Aeration Total Volume: 3 million gallons

Aeration Mixed Liquor Suspended Solids: 2500 mg/l

Volatile Content: 81% (% of material in the treatment unit that is organic. i.e. bacteria)

Normal Detention Time: 4.5 hours

Normal Food/Microorganism Ratio: 0.24

Refer to the warm-up exercise where the normal detention time and food to microorganism ratio was determined for the City of Napa's Wastewater Treatment Plant. August 24, 2014 the *South Napa Earthquake* resulted in a spill of 360,000 of wine making its way into the City of Napa's sewer and eventually that wine along with the normal wastewater flowed into the Napa Wastewater Treatment Plant.

If 360,000 gallons of wine with a BOD content of 11,500 mg/l flows into the treatment plant along with the normal wastewater flow:

1. What is the impact on treatment detention time in the aeration system? Normal Range is 4 to 8 hours.

2. What do you think the operator may have to do in order to adapt to this change?

3. What is the impact on treatment food to microorganism ratio? Normal Range is 0.2 to 0.5.

4. What do you suspect the operators at Napa needed to do in order to adapt to this change in food to microorganism ratio?