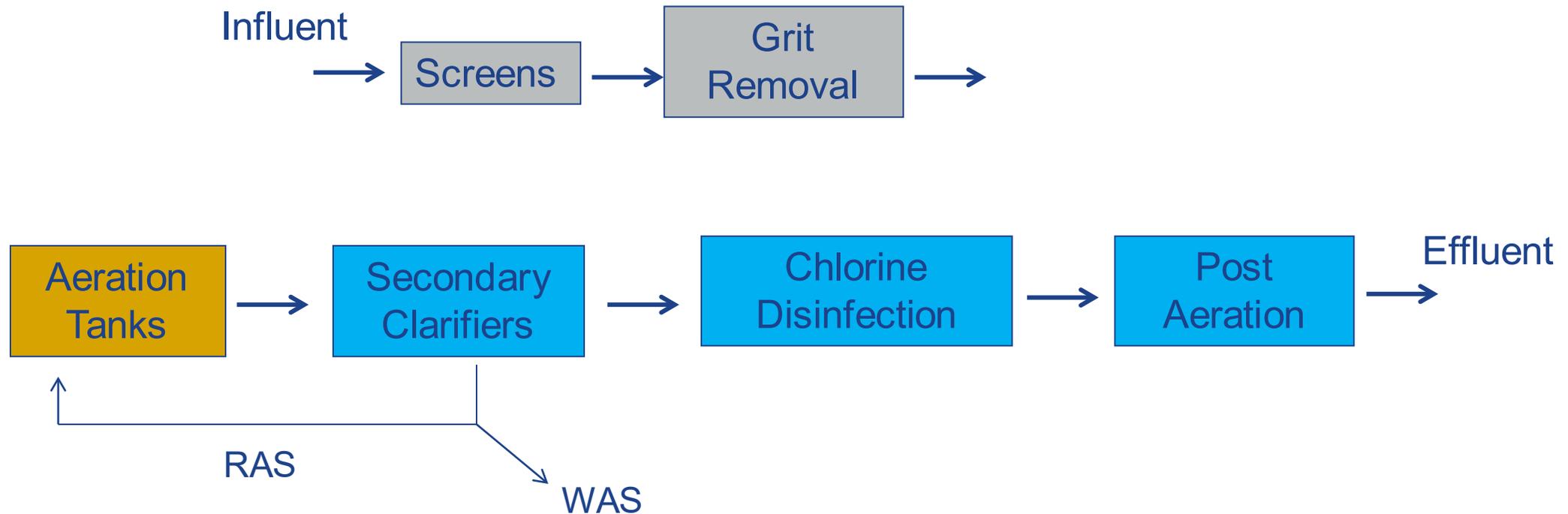




# Biological Wastewater Treatment Training Series Presentation #15: Using the Bio- Tiger Model in DOE MEASUR – Case Study #2

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# Case Study #2: Municipal WWTP



\*Each of two aeration basins has six 75-HP high-speed surface aerators.

# ***Design Parameters for Municipal WWTP: Extended Aeration Activated Sludge Design***

**Flow rate = 4.5 mgd (ave. daily)**

**CBOD<sub>5</sub> = 200 mg/L (ave)**

**TSS = 200 mg/L (ave)**

**TKN = 35 mg/L (ave)**

**Ammonia-N = 20 mg/L (ave)**

# NPDES Limits for Municipal WWTP

**CBOD<sub>5</sub> = 25 mg/L (mo. ave)**

**TSS = 30 mg/L (mo. ave)**

**Ammonia-N = 10 mg/L (mo. ave)**

# Existing Conditions: Municipal WWTP

Total average daily flow rate	1.5 mgd (half to each aeration tank)
Aeration volume in service	6.8 mil gal (3.4 mil gal each)
Influent BOD <sub>5</sub> concentration	150 mg/L
Influent BOD <sub>5</sub> mass loading	1,880 lb/day
Influent TSS mass loading	2,500 lb/day (200 mg/L)
Type of activated sludge process	Extended aeration

# Existing Conditions: Municipal WWTP

Type of aeration system	High-speed mechanical aerators
Number of aerators	Twelve (75 HP each)
Total aeration horsepower	900 HP (450 HP in each reactor)
MLSS	3,000 mg/L
MLVSS	2,000 mg/L

# Aerial View of Municipal WWTP



# Existing Conditions: Municipal WWTP

**340 HP of aeration runs 16 hrs/day; some aerators are running at all times**

TSS in activated sludge effluent                      100 lb/day (8 mg/L)

RAS flow rate    1.8 mgd (120%)

WAS flow rate    0.024 mgd

RAS TSS concentration                                      5,500 mg/L

Anoxic time    0 hours per day

# Existing Energy Use: Municipal WWTP

<b>Total Energy Use</b>	<b>213,000 kWh/mo</b>
<b>Total Energy Use</b>	<b>4,700 kWh/mil gal</b>
Typical extended aeration energy use	2,700 kWh/mil gal
Energy use vs. typical	74% more
Potential for energy savings	Excellent

# Existing Conditions: Municipal WWTP

<b>Total Oxygen Supplied by surface aerators</b>	<b>4,200 lb/day</b>
Mixing intensity in aeration tanks with 340 HP aeration and four 40-HP mixers	74 HP/mil gal
DO in aeration basins (average)	4.6 mg/L
Field O <sub>2</sub> transfer rate of aerators	0.76 lb/(HP-hr)

# Existing Conditions: Effluent Quality

CBOD <sub>5</sub> concentration	3 mg/L
TSS concentration	8 mg/L
Ammonia-N concentration	0.05 mg/L
NO <sub>x</sub> concentration	10 mg/L (125 lb/day)
TKN concentration	1 mg/L
Total Nitrogen concentration	11 mg/L

# Energy Conservation Measure #1: Use Only One Aeration Basin and Run 150 HP of Aeration 18 Hours/Day

Total average daily flow rate	1.5 mgd (all to one aeration tank)
Aeration volume in service	3.4 mil gal (one basin)
Sec. influent BOD <sub>5</sub> concentration	150 mg/L
Sec. influent BOD <sub>5</sub> mass loading	1,880 lb/day (total)
Anoxic time	6 hours per day

# Energy Conservation Measure #2: Use Only One Aeration Basin; Run 150 HP 18 Hours/Day; Reduce MLSS to 2,100 mg/L

Total average daily flow rate	1.5 mgd (all to one aeration tank)
Aeration volume in service	3.4 mil gal (one basin)
Sec. influent BOD <sub>5</sub> concentration	150 mg/L
Sec. influent BOD <sub>5</sub> mass loading	1,880 lb/day (total)
Anoxic time	6 hours per day

# Thank you!

For Questions or Comments please reach out to the following:

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