

Filaments and Clarifier Bulking #2

Activated Sludge Plant that was close to having high flow washouts due to filamentous bacteria infestation.

Plant Layout

- Two Plants with the same layout
 - Headworks that serve both plants
 - Plug Flow Activated Sludge
 - Clarification
 - RAS pumped with air lift pump
- Aerobic Digestion

Can-Tex Style Plant



Thick Clarifier Blanket

- Very fluffy blanket
- Hydraulic surge resulted in solids washout
- High SVI (above 200), filaments suspected
- Settleometer, $SSV_{30} = 700$
- Filament positively identified
- Chlorination was chosen as treatment

How much Chlorine

- *The Manual on Causes and Control of Activated Sludge Foaming and Bulking and Other Solids Separation Problems*, Jenkins, et. al.
- Maintenance dose, 2 lbs Cl₂/ 1000 lbs solids in the system.
- This is the combination of aerator and clarifier solids.

Calculations

- Aerator had 3947 lbs of solids
- Clarifier had 1795 lbs of solids
- $$\frac{5.7 \text{ (1000lbs solids)} * 2 \text{ lbs Cl}_2}{.125 \text{ (% Cl}_2 \text{ in Bleach as decimal)} * 10 \text{ lbs/gal Bleach}} = 9.12 \text{ gal}$$
- 10 gallons per day of 12.5% Bleach is chosen

Another Feeding Detail

- Dr Jenkins recommends that the Cl_2 be dosed in such a way that the mixed liquor receive three doses of Chlorine per day.
- In this plant the return sludge flow was not sufficient to achieve this so an alternative feed location was chosen.
- Bleach is to be feed into the clarifier stilling well

Chlorination System



Operational Data

Date	MLSS, mg/L	SSV 30min	SVI
13-May	2940	680	321
16-May	3180	770	242
18-May	2980	640	215
20-May	3290	700	213
23-May	3530	680	193
25-May	3120	600	192
27-May	2990	570	190
30-May	3260	650	199
1-Jun	3010	480	159
3-Jun	2450	330	135
6-Jun	2830	410	144
8-Jun	2680	340	127
10-Jun	2810	310	110
13-Jun	2630	250	95
15-Jun	2640	250	95

SVI Graph

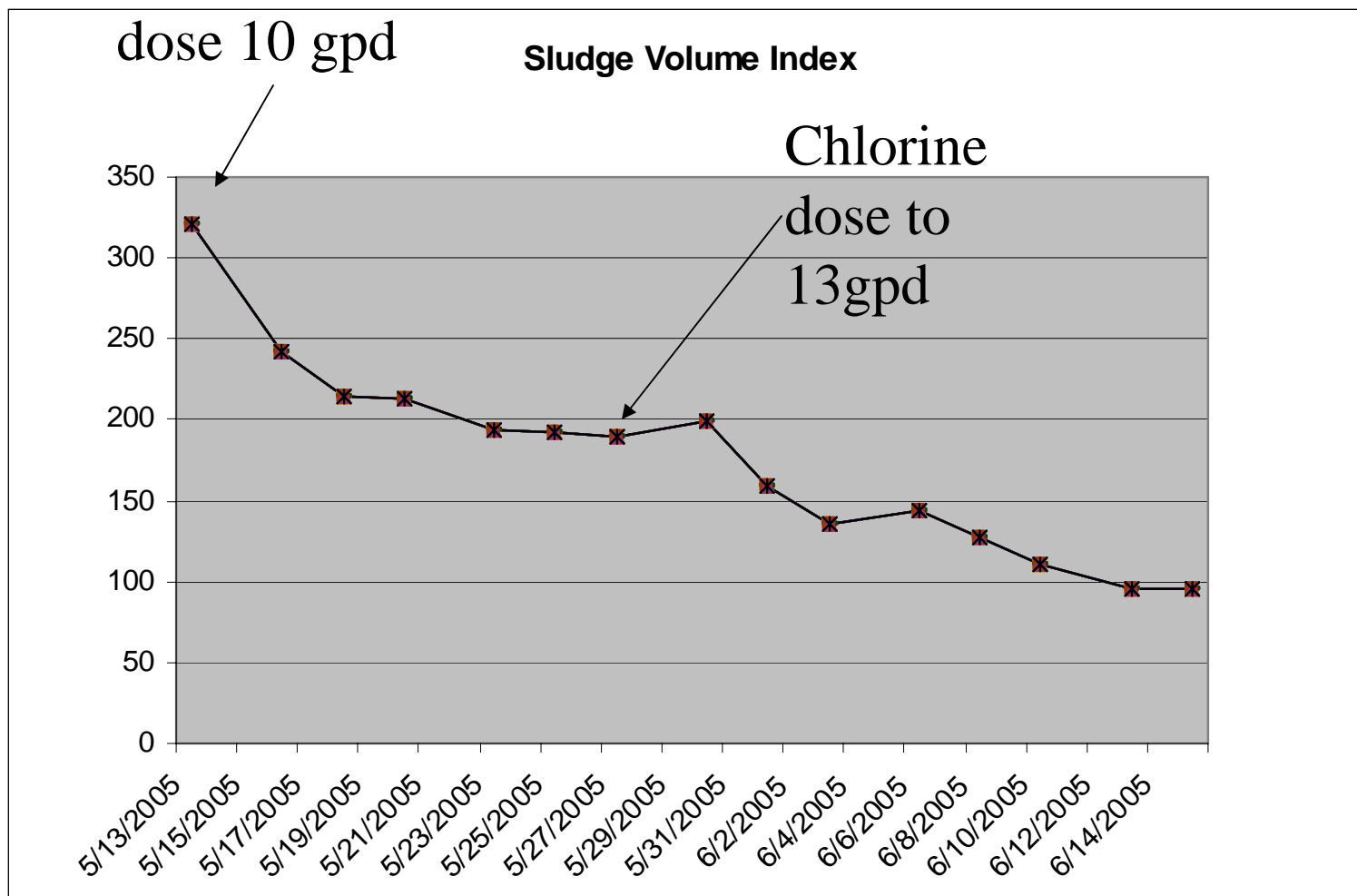
Chlorine

dose 10 gpd

Sludge Volume Index

Chlorine

dose to
13gpd



Success in One Month

- The SVI declined rapidly at first then slowed.
- A higher dose was chosen 13 gpd.
- SVI dropped to 100 in 30 days.
- The threat of blanket washout was gone.
 - Settleometer values in 30 min., 250

Settling Much Improved



Four Months Latter

- SVI and Settleometer values remain low
- Chlorination system has been dismantled and is now being used for effluent chlorination replacing the gas chlorinators
- Effluent quality is very high.
- Wastewater effluent that looks like a clear mountain stream.

Summary

- Plant operator wanted to prevent a future problem, washouts. He determined the root cause, filaments. Then took careful steps to correct the root cause while closely watching the process control indicator, SVI.

