

Chapter V

DISCUSSION

From the experimental results shown before the following can be concluded:

5.1 Effect of Varying Amount of Sludge Concentration

From Fig. 4.1, 4.2 and 4.3 sludge concentrations held between 15 to 25 per cent gave effluent turbidity of 1.7 to 3.5 JTU. Sludge concentration over 30% gave a higher effluent turbidity. To increase the efficiency of filter, the sludge concentration should be maintained between 15 to 25%. This agrees with the report of Annen of Winthrop-Stearus Corp., Klinger of the Consolidated Water Power & Paper Co. (Committee Report 1951). It was found that the suspended solids contact clarifier ineffective when sludge concentration was too low and floc carrying over when the sludge concentration was too high. Eller of Junction City, Kan., stated "the optimum results are afforded by a 20-30 per cent concentration by volume following 5 minutes' settling" (Committee Report 1951).

5.2 Effect of Sludge Blanket Depth

Increased sludge blanket depth to the optimum depth was found to improve the floc carry over. From Fig. 4.4 with upflow velocity of 1.125 gal/min/ft², blanket depth between 1.5 to 1.85 m. for turbine speed 3 and

4 rpm gave the effluent turbidity 1.75-2.75 JTU while speed of turbine 3.5 rpm gave the same values at blanket depth 1.75-2.1 meters. Fig. 4.5 with speed of turbine 3 rpm the optimum value of effluent turbidity was held at depth 1.5 meters. Fig. 4.6 and 4.7, blanket depth 1.50-1.85 meters gave effluent turbidity 2-3 JTU, depth 1.0-1.25 meters and over 1.90 meters gave a higher effluent turbidity. It could be concluded that the optimum blanket depth should be held between 1.50-1.85 meters below the surface water.

5.3 Effect of Speed of Turbine

The graphs showing the effect of speed of turbine on the clarifier effluent are shown in Fig. 4.8 and 4.9. From the curves it was concluded that the effluent turbidity increased as the speed of turbine was increased. However, from Fig. 4.8 and 4.9, the speed 3 to 4 rpm with upflow velocity 1.125 and 1.605 gal/min/ft² appear to be the optimum condition of operation.

5.4 Upflow Velocity

Upflow velocity in the range 1.125 to 1.730 gal/min/ft² was used in the investigation. Fig. 4.10 and 4.11 present the data obtained with an initial upflow velocity of 1.125 gal/min/ft², speed of turbine was kept at 3 and 4 rpm respectively, and various initial effluent turbidity of 1.5, 2, 2.5, 2.5, 2.6 and 2.7 JTU. It could be seen that when upflow velocity was increased to 1.730 gal/min/ft², the turbidity readings were increased to 3.5, 3.7, 3.7, 3.5, 3.75 and 5 JTU respectively.

Sudden increases of the influent rate of raw water to sludge blanket clarifier will breakdown sludge blanket and increase the effluent turbidity.

The maximum capacity of the plant was 2000 lit/sec or 1800m³/hr for each accelator clarifier which provided a maximum upflow velocity of 1.568 gal/min/ft² but the experiment was carried out with flow rate of 1990m³/hr which provided upflow velocity of 1.730 gal/min/ft². Though the experiment was over the maximum value, the effluent turbidity was not greater than 5 JTU which would present no difficulty in filtration.