CHAPTER III
EXPERIMENTAL INVESTIGATION

The experiment was performed at the Applied Scientific Research Corporation of Thailand (A S R C T) from June 1971 to September 1971. The raw water from Sam Sen Canal and the tap water with fine clay added in suspension were used as influent.

Design of Experimental Filter

The experiments were carried out with the pilot plant shown schematically in Figure 4. It has been empirically established that if the wall-to-wall distance in the model is at least 50 times the largest grain size, the boundary effects are negligible. The filter column in this performance, having internal dimension of 7.5x7.5 sq.cm cross section and the length of 260 cm.,was constructed from 0.64 cm. ($\frac{1}{4}$ in.) thick perspex sheet with details as shown in Figure 5. The bottom of the filtration part was covered with 3/8 in. PVC plate and placed upon by brass screen plate of 100 mesh, the removable flange fitted with bolts and nuts.

The upper part of the filter column was built as a constant head tank. The water steadily flowed downwards from this tank and the excess liquid, overflowed along the top edge of the filter, was fed back by gravity to the supply tank. The supply inlet to the filter was

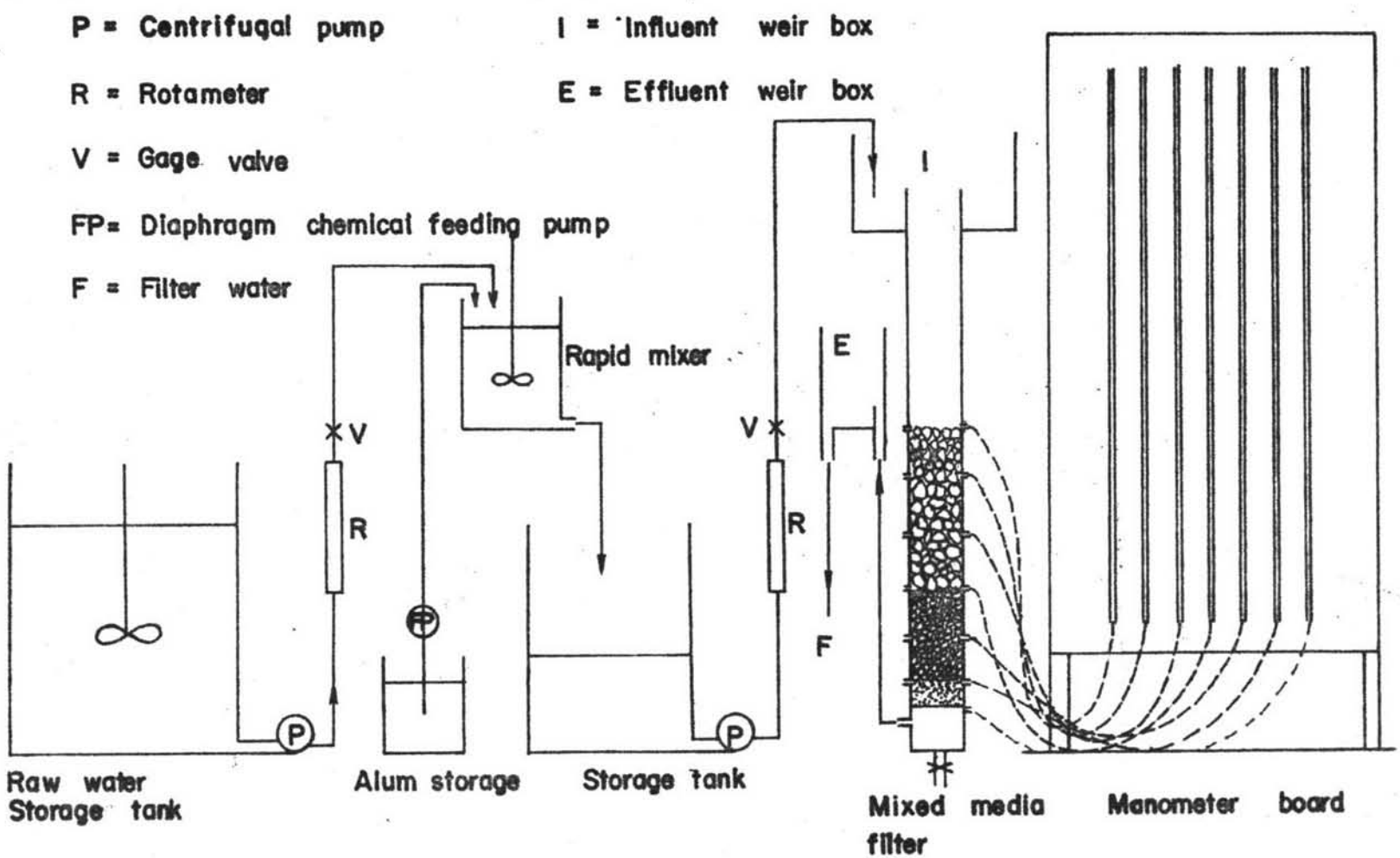
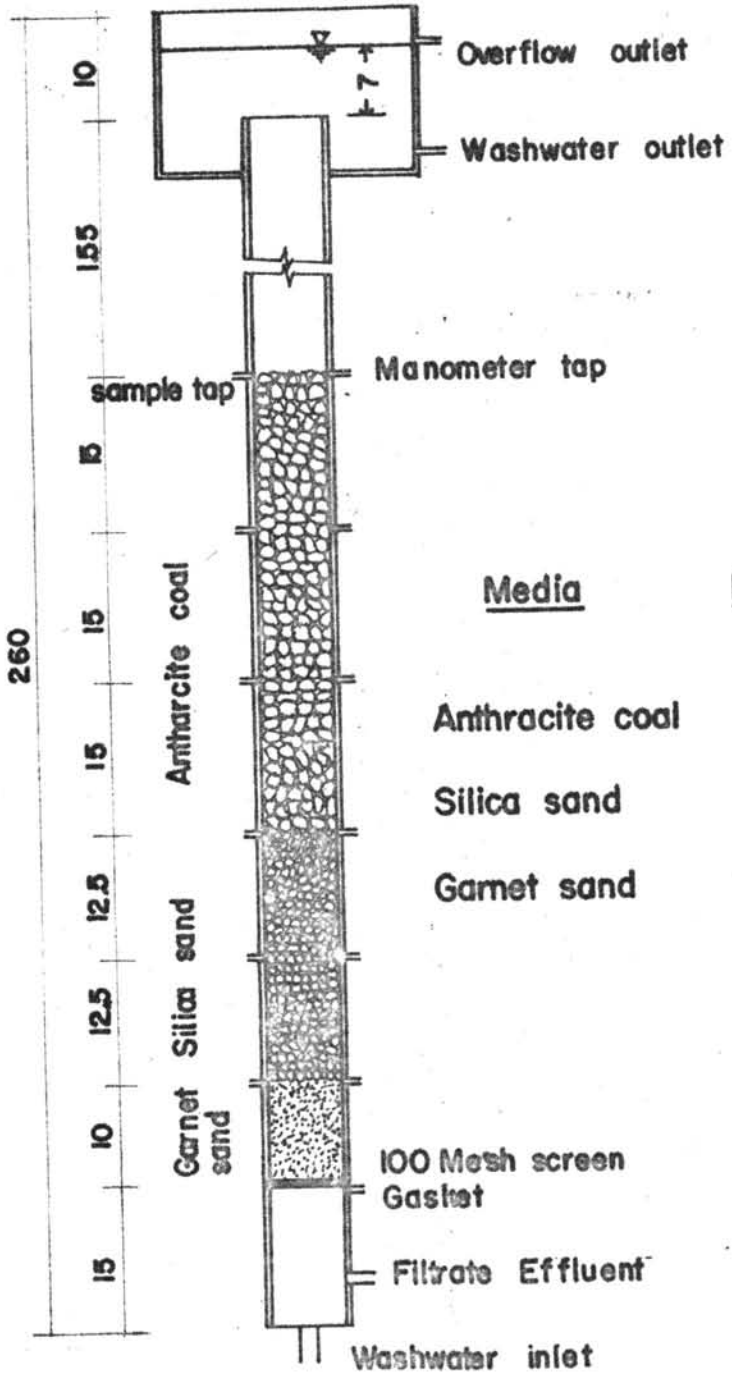


FIG. 4 SCHEMATIC DIAGRAM OF MIXED-MEDIA FILTRATION .



Media	Effective Size (mm.)	Sp.Gr.
Anthracite coal	10.00	1.6
Silica sand	0.45	2.6
Garnet sand	0.20	4.2

Note : All dimensions are in centimetres

FIG. 5 FILTER COLUMN

7 cm. below the overflow level.

The lowest media bed was 10 cm. garnet sand having an effective size of 0.2 mm with sp.gr. of 4.2 placed upon 100 mesh brass screen plate. The upper bed was 25 cm thick silica sand of 0.45 mm. effective size and sp.gr. 2.6. The top bed on the sand was made of 45 cm. anthracite coal having 1.0 cm. effective size and sp.gr.of 1.6, so the filter media were graded from coarse and low density to fine and heavy density from top to bottom as required.

Connections to a manometer for noting the losses of head were located at different depth of the filter column as shown in Figure 5. They penetrated the perspex wall about 0.5 cm. The tubes had their ends capped by using injector needle No.13 to prevent the media form entering into the tube. Sampling points were located exactly at the same level as these points, and each had their own valve by using laboratory clips. For measuring headlosses, the plastic tubes of 3/16 in. inside diameter were connected to the injector needle and were then fastened to a manometer board 290 cm. in height. Manometers were used to measure the headlosses at various depths of filter media and samples were at the same time taken from sample taps for turbidity measurement during the filter runs.

Experimental Procedure

The influent used in the study were prepared by adding clay in suspension to tap water to the reguired turbidity , and the raw water from Sam Sen Canel was also used. The influent were kept constantly agitated by a motor driven stirrer inside the tank . The rate of flow was measured accurately by passing the discharge through a rotameter . Turbid water was pumped at constant rate of flow , controlling by rotameter , to a flash-mixer where alum was also added at the required rate by a diaphragm pump The proper amount of alum was based on the results of standard jar tests. After rapid mixing , the water flowed to the storage tank and was immediately pumped at the same rate as before through another rotameter to the constant head tank at the top of the filter column . The water then, flowed downwards passing the voids of the media bed . Samples from all sampling points were collected their tubidities were checked at one hour intervals during each run . Simultaneously, the loss of head at various depths were also recorded. All turbidities were read from Hach Turbidimeter model 1860 . Each filter run was terminated when either the headloss reached 210 cm . or the effluent turbidity exceeded 0.5 J T U . Then, the length of filter run was also known.