PART - A

STUDIES ON AERATION
STUDIES ON AERATION:

For the efficient operation of extended-aeration treatment plants it is very essential to continuously replenish the oxygen economically and in sufficient amounts, at the rate at which it gets utilised by the biomass. There are many commercially available aerators and the latest developments are the venturi and sudden expansion devices. As there are very little data that indicate the efficiency of venturi aerator and the study of sudden expansion aerator has been reported in literature only once; these two types of aeration methods have been further investigated. Performance evaluation of five sudden expansion and six venturi aerators of different sizes have been made. These studies have been utilised to:

i) Compare the performance of sudden expansion and venturi aerators;

ii) Study the effect of different expansion ratios on the performance of sudden expansion aerator;

iii) Investigate the effect of increasing the outlet angle of the venturi aerator; and

iv) Attempt the scale-up of sudden expansion and venturi aerators.

† For the sake of convenience, investigations under the thesis have been reported in two parts: PART-A deals with the "Studies on Aeration" and PART-B deals with the "Studies on Operational problems of Extended-Aeration plants".
The extended-aeration process has found its application for treating the wastes resulting from small concentrations of population. The advantage of the process can be attributed in large measure to the relatively low cost of installation and operation as well as to the high degree of treatment potentiality. However, operational problems, such as hydraulic shock loadings, inadequate control of air supply, foam formation, denitrification and sludge floatation in the clarifier etc., have been found to adversely effect the efficiency of extended-aeration plants. These problems have necessitated regular daily control besides entailing the use of automatic mechanical and electrical equipment.

There exists, therefore, a need to solve these operational problems without usage of automatic mechanical and electrical devices so that such plants work satisfactorily with the least possible manual operation and control. With this objective, an improved model extended-aeration plant has been designed and operated successfully to eliminate or alleviate the operational problems of extended-aeration plants by simple hydraulic controls which have been made possible by, use of sudden expansion aerator, arrangement for hydraulic flow routing through a two-compartment aeration tank, addition of a 'denitrification tank' and provision of a double chambered clarifier.

Use of such an improved extended-aeration plant is recommended for sewage disposal from isolated communities like educational and medical institutions hospitals, churches, motels, military establishments, restaurants, trailer parks, schools and sub-divisions etc., which are not connected with the municipal waste water treatment and disposal plants.