AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING

SEWAGE TREATMENT PROCESS SELECTION

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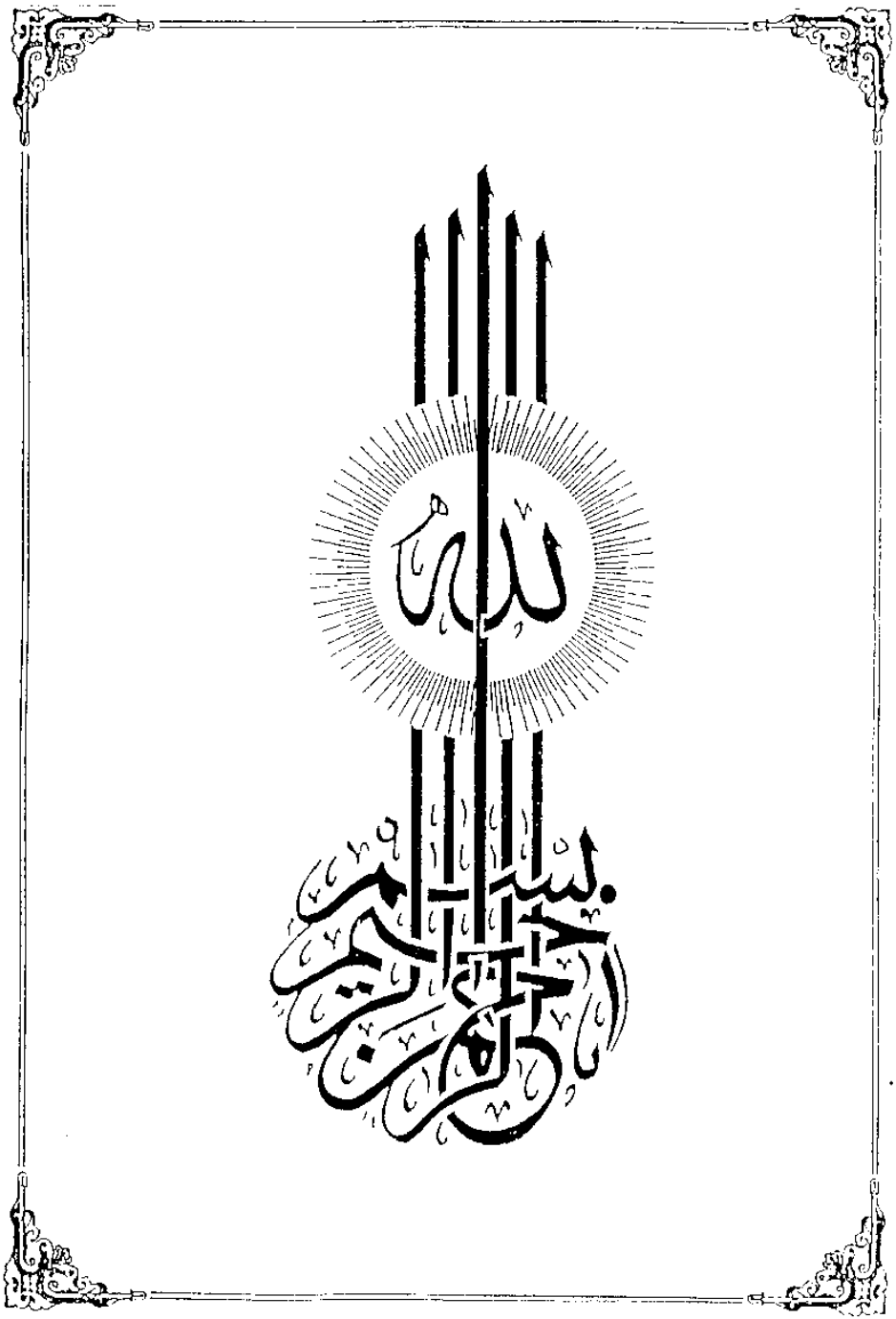

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ABSTRACT

One of the main problems faces the wastewater design engineer is the choice of the treatment process type. This work needs a big study to cover all the available types and apply all the technical and economic factors.

The study proposed a new procedure to ease the engineer work, save his time and optimize the best solution for the choice problem covering most of technical and economical aspects. The study covers 14 types of treatment processes and use 7 main factors and 13 minor factors to design the new procedure proposed.

The study result is generating a table which community data application on it should result the process selection. The use of this system achieves:-

1- Saving the time of the designer to select treatment type.
2- Covering most of the well known treatment processes. So, increase the area of choice.
3- Guarantee the covering of all the main factors.
4- Facilitation of the work of the designer.
5- Achieving the optimum selection of the treatment process.

The author suggests for further work to prepare a computer program for the system and study to add minor factors by creating a ranges for it.

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CHAPTER (1)

INTRODUCTION

Wastewater treatment is considered one of the main important items in the wastewater works. Its necessity increased with the concentration on the pollution of environment and its control.

The wastewater treatment has several types of treatment processes depending on the used technique.

We can divide the treatment processes to three main categories as folllows:

- *Ponds (Natural or Aerated)*
- *Activated sludge processes.*
- *Biological Filter process.*

All the three types depend on the bacteriological activity in the sewage to remove the organic components from wastewater before its disposal preventing any biological growth at the disposal body.

One of the main problems which faces the designer of the wastewater works is the choice of the type of the wastewater treatment process.

This happens to the big number of known types of treatment processes and the big number of factors that affect the choice. This also means big effort required and long time is needed to do the job well. Or choice of the famous wellknown type to the designer without applying the engineering phenomena.

This study aims to put a system easy to be used, covers most of the technical points and economic factors and also achieves the best choice for the treatment type due to the case study and its circumstances.

The study will cover the served area properties, the influent and effluent quality, the disposal body, the initial and running costs, the level of services required and the land area, location and soil characteristics.

CHAPTER (2)

LITERATURE REVIEW

2-1 Introduction:-

There are many researches discussed the choice bases of sewage treatment processes. The importance of this subject is due to its direct effect on the economy and the operating effeciency of these processes.

There are many important factors governing the process design of the treatment facility. The effluent limitation is one of the most important factors which is taken into consideration. The specified function or level of treatment of the facility to be designed is determined by the ability of the receiving waters to accept residual wastes or by allocation set up by regulatory agency.

The standards must be designed to prevent an increase in pollution. The level of wastewater treatment and method of effluent discharge are established to protect the receiving body of water or water table and its usages, either present or projected.

The foundation of unit process design is based on the initial and future amounts and characteristics of the wastewater, anticipated variations and the statutory requirements of regulatory agencies.

The plant process design is generally a function of peak and minimum loading conditions and not average or medium conditions. Many of the standard design application rates used reflect average conditions, whereby acceptable effluent quality may or may not be attained during peak loading conditions.

For these reasons, the design engineer must be aware of the variations in wastewater flow and characteristics and should provide flexibility in the design for both the variation in loading and the maximum loading which corresponds to the frequency of acceptable operation desired.

The available area for the construction of the plant affects the choice of the treatment process. The land price must be taken into consideration when the construction costs are evaluated.

Energy requirements for operation of the treatment units and the required equipments for the process units are another factors which affect the choice of the treatment process. These factors govern the evaluation of the costs.

The ultimate selection of unit processes is based on an economic evaluation.

2-2 Factors affecting the choice of sewage treatment processes:-

A joint committee of the water pollution control federation and the American Society of Civil Engineers (1) has studied many factors which affect direct or indirect on this choice.

They had considered that the effluent limitations, the location of the treatment plant and the capital costs have great effect on the choice of processes.

S.J.Arceivala (2) stated that the major factors which affect the choice of treatment processes are capital and operating costs, performance capability, operating characteristics, equipment availability, manpower availability.

Tin-Y-K (3) presented his experience in the design and operation of number of sewage treatment plants for the private sector in Hong Kong. When he chose the method of treatment process, he took into consideration the effect of capital and maintenance costs, timing, location and area, noise and odour.

But, he considered that the financial costs is the most important factor because Hong Kong is a highly commercialized area and private projects are developed for profits.

It became clear that the costs of construction and operation of the treatment plant is considered the most important factor because it has actual effect on the choice of the process.