

CHAPTER 7

TYPICAL MILITARY WASTEWATER TREATMENT SYSTEMS

7-1. Typical Systems.

Subsequent chapters provide design criteria for unit operations that may form an overall treatment train to meet a given effluent quality. Illustrations of wastewater treatment process trains that are generally used for Army and Air Force applications are represented by figures 7-1 through 7-4. Local conditions and practices may justify the design of treatment systems different from those illustrated but still consisting of unit processes presented in this manual. If this is the case, approval of the conceptual treatment system must be obtained from HQDA (DAEN-ECE-G) WASH DC 20314-1000 for Army projects and HQ USAF/LEEE WASH DC 20332 for Air Force projects before initiating any part of the final design.

7-2. Trickling filter process.

An example of a typical trickling filter treatment process appears in figure 7-1. Although not shown, dual or parallel trains are appropriate for all treatment systems having a design capacity rating equal to or greater than 0.5 million gallons per day. A discussion of trickling filter plants can be found in chapter 12.

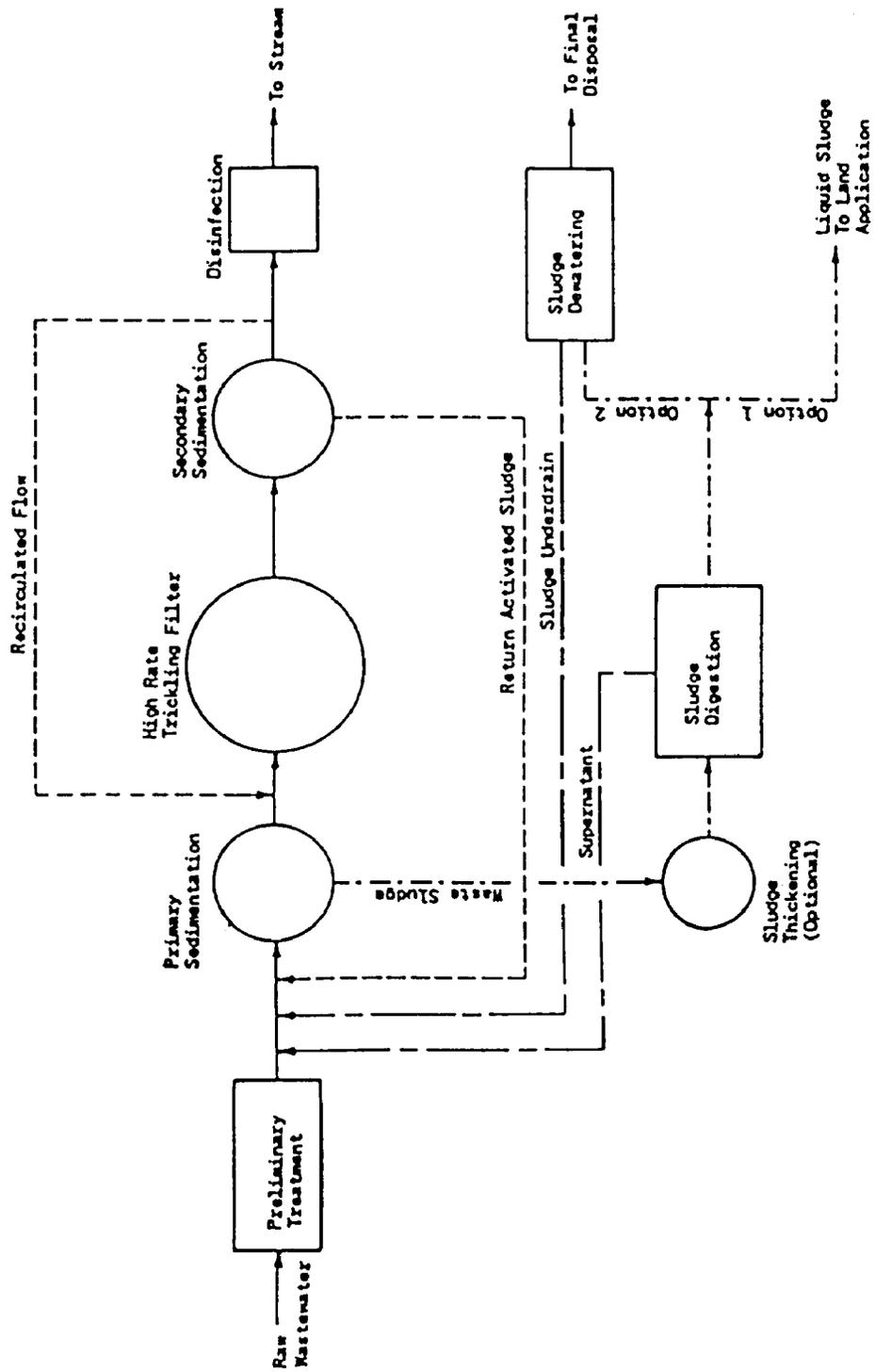


Figure 7-1. Typical trickling filter process treatment train.

7-3. Activated sludge process.

Figure 7-2 shows an activated sludge treatment process train which uses a closed-loop reactor. The reactor is operated in the extended aeration mode. Duplicate or parallel treatment process trains are also applicable for activated sludge treatment plants having design capacities equal to or greater than 0.1 million gallons per day. A discussion of activated sludge plants can be found in chapter 13.

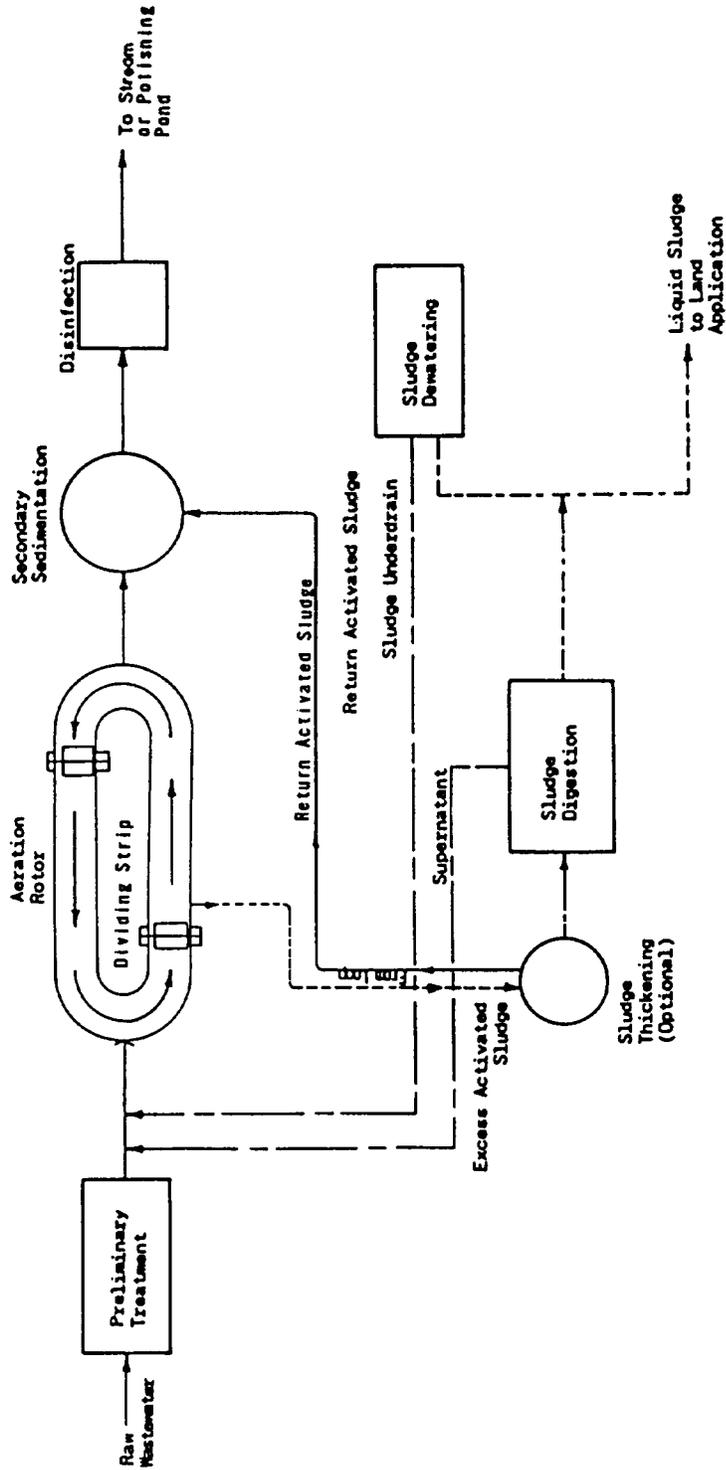


Figure 7-2. Activated sludge process treatment train using a closed-loop reactor.

7-4. Stabilization pond process.

Detailed discussions and design criteria related to various types of stabilization ponds are contained in chapter 14. The pond treatment process train illustrated in figure 7-3 demonstrates the requirement of a minimum of two stabilization ponds and a fill and draw pond to be used during periods when the suspended solids concentration in the effluent from the second pond exceeds NPDES permit limitations.

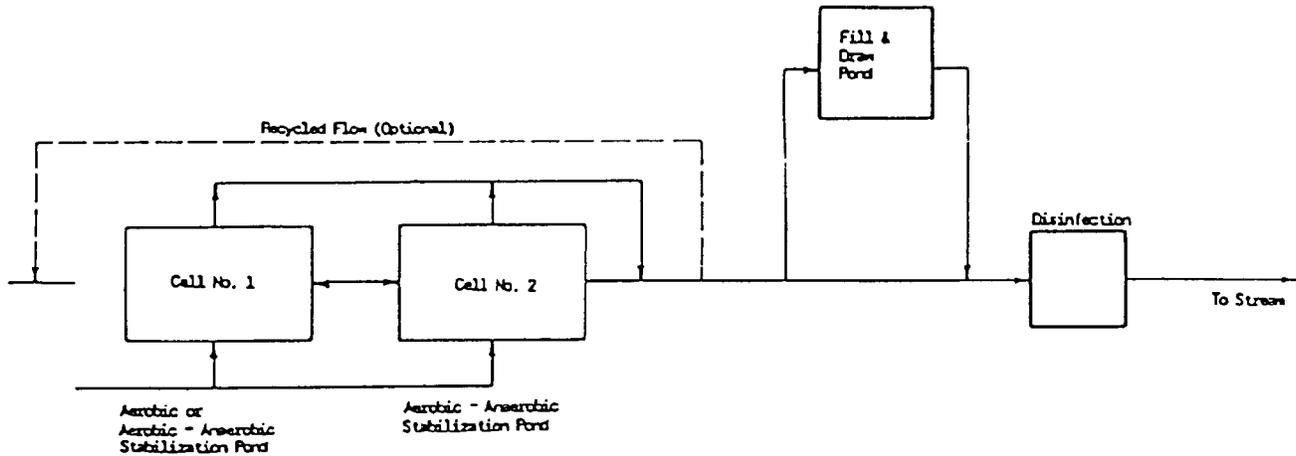


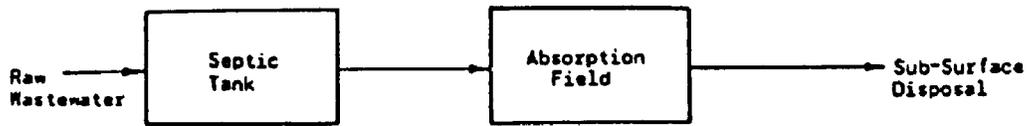
Figure 7-3. Stabilization pond treatment train.

7-5. Advanced wastewater treatment processes.

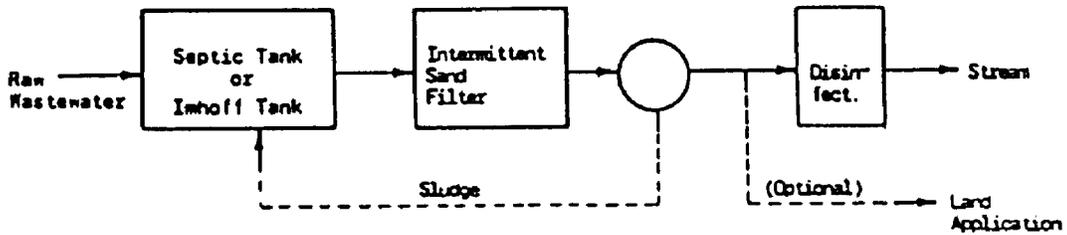
There are no advanced wastewater treatment process trains that can be considered typical or most applicable to a military installation. Effluent quality standards exceeding established secondary treatment level standards will dictate the advanced treatment unit processes and their combinations that will provide the necessary degree of treatment. A discussion of advanced wastewater treatment processes can be found in chapter 15. Examples of advanced wastewater treatment process trains and their expected effluent qualities are given in TM 5-814-8.

7-6. Small installations.

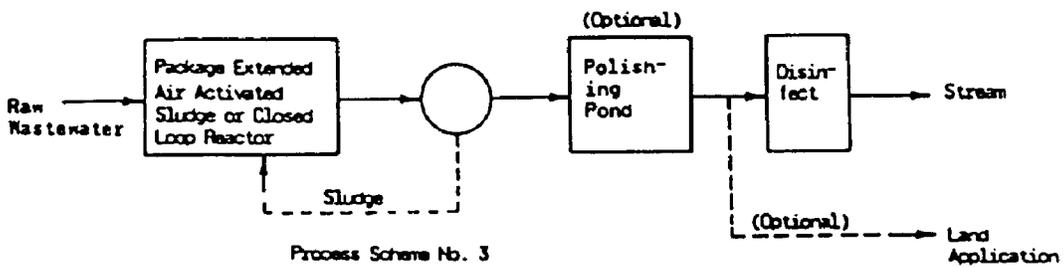
Septic tanks, biological package treatment plants, and stabilization ponds are cost effective and require less operational and maintenance attention than other treatment options. Therefore, these treatment methods are especially applicable to military installations having design capacities of less than 0.1 million gallons per day. Four treatment schemes typically used for low-flow installations are presented in figure 7-4. (See also the studies of the Office of Appropriate Technology.)



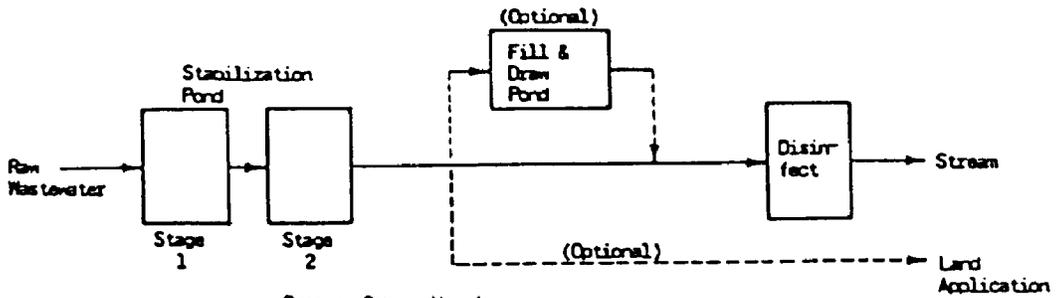
Process Scheme No. 1



Process Scheme No. 2



Process Scheme No. 3



Process Scheme No. 4

Figure 7-4. Process treatment trains applicable to small military installations.