

Best Practice – Zero Liquid Discharge (ZLD) System in Textile Processing units’ CETP in Tamil Nadu

Zero Liquid Discharge (ZLD) is a ultimate cutting-edge wastewater treatment process developed to completely eliminate all liquid discharge from a system. The goal of a zero liquid discharge system is to reduce the volume of wastewater that requires further treatment, economically process wastewater and produce a clean stream suitable for reuse.

The ZLD System removes dissolved solids (mainly salt) from the wastewater and returns pure water to the process. Reverse osmosis (membrane filtration) is used to concentrate pre treated waste stream and return the clean permeate to the process, funnel the reject to an evaporator, and send the evaporator concentrate to a crystallizer or spray dryer. The condensate from evaporator also returned to the process.

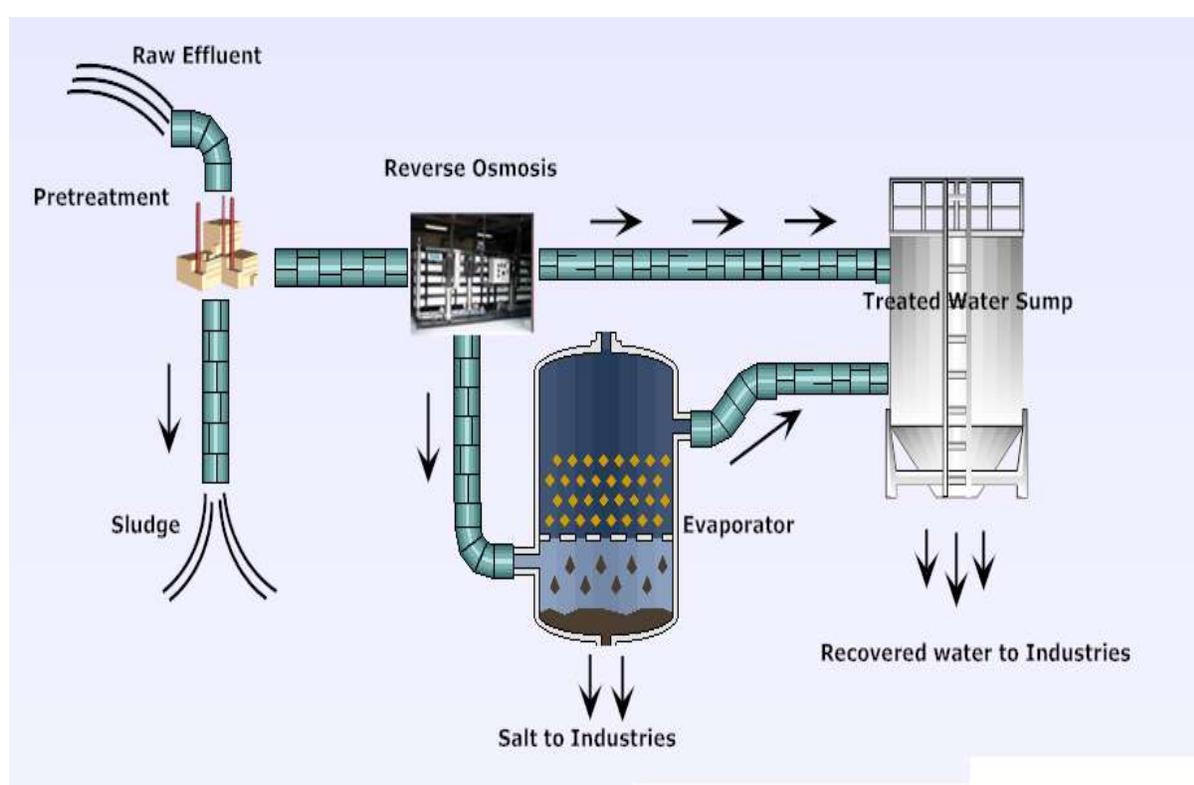


Fig.1 Typical ZLD Flow Diagram

In order to prevent pollution of River water and ground water TNPCB has made the ZLD system mandatory for all the highly polluting industries including Textile Dyeing and Bleaching industries, Tanneries etc which uses considerable amount of salt in the process and consumes huge quantity of water. The ZLD system ensures recovery of water & salt from the waste water thus preventing pollution of River / ground water.

In Tamilnadu, 90% of textile dyeing units are located in Tiruppur, Erode, Karur, Namakkal and Salem districts and they are mainly in Cauvery and its tributaries River basin. These bleaching and dyeing industries are highly water intensive processes; generates a huge quantity of effluent.

The conventional activated sludge process and other chemical treatment methods will not bring the effluent to the desired discharge standards. Mainly in TDS

and it should be less than 2100mg/l. Hence ZLD concept was introduced in TN in the year 2003.

In Tiruppur District 18 CETPs covering 355 member dyeing and bleaching industries and 95 individual dyeing and bleaching industries have provided the ZLD system and operates the same.

About 95% of permeate water is recovered from the RO plant in ZLD system for textile processing industries. Also salt and condensate is recovered from MVRE / MEE and remaining final reject of 0.5 to 1% is discharged through solar evaporation pan. Presently advanced treatment component like Agitated Thin Film Drier (ATFD) is provided to treat the final reject.

Typical ZLD process flow diagram adopted in CETP for textile processing units and water balance diagram is furnished below.

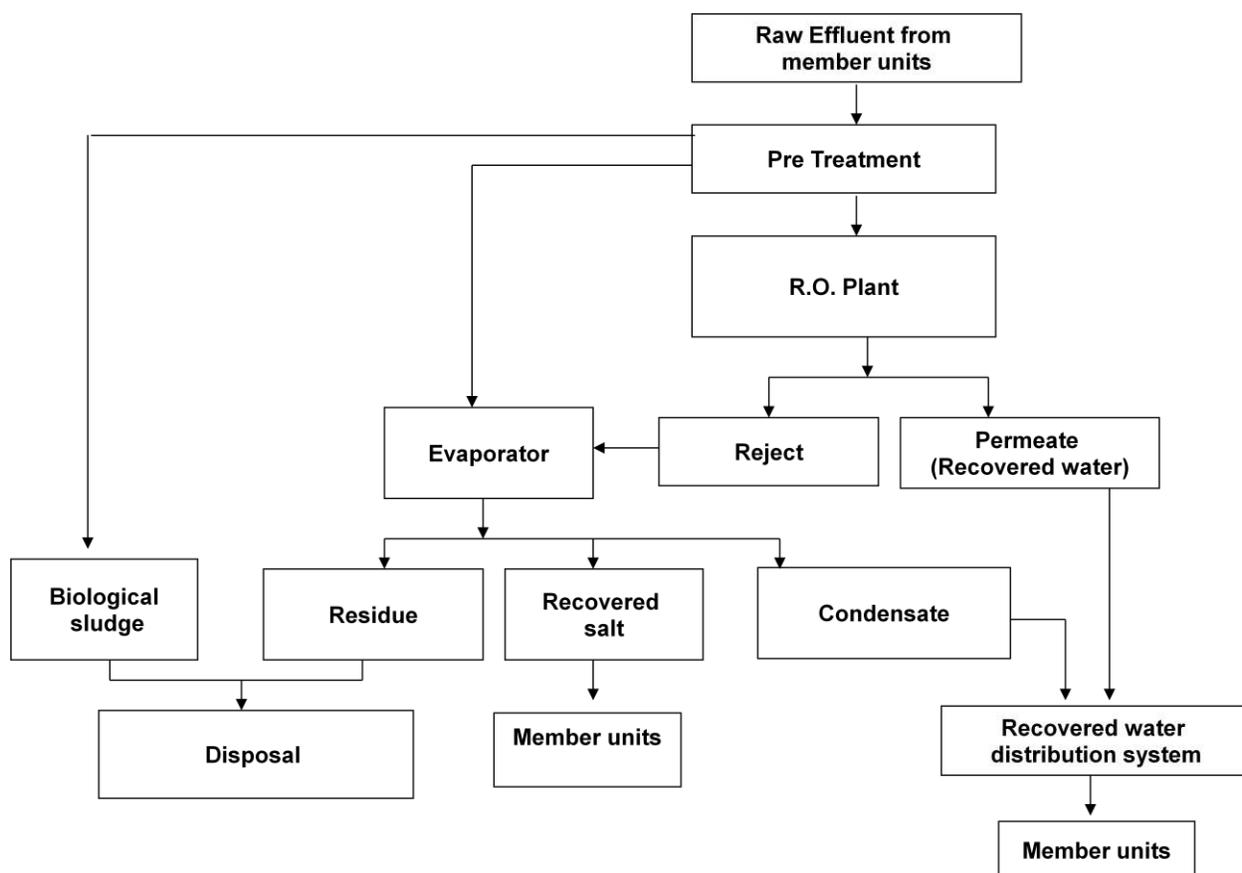
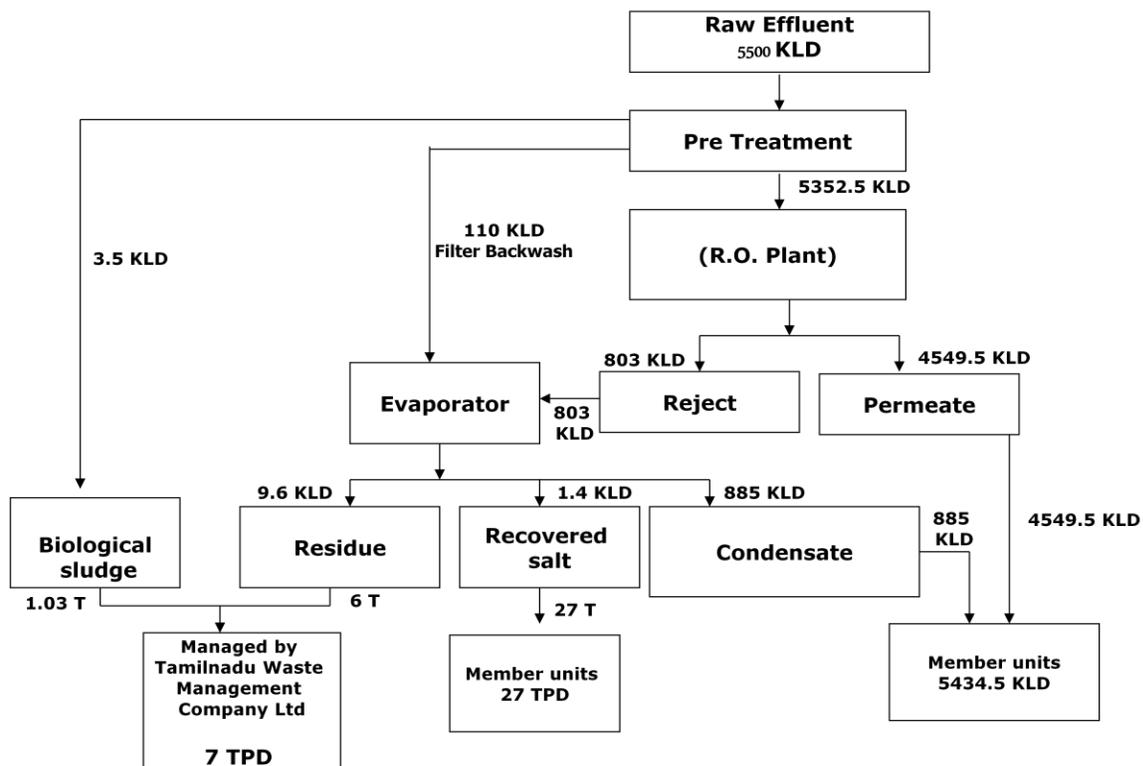


Fig.2 ZLD Process Flow Diagram (in a CETP)

Water Balance Diagram (for 5500 KLD)



(>95% water will be recovered)

Fig. 3 Water Balance Diagram for 5500 KLD



Fig. 4 Pre-treatment Unit (Storage and Homogenization Tank)



Fig.5 Pre-treatment Unit (Biological Oxidation Tank)



Fig. 6 Pre-treatment Unit (Secondary Clarifier Tank)



Fig. 7 Pre-treatment Unit (Filtration Section)



Fig. 8 Reverse Osmosis (RO) Plant



Fig. 9 Mechanical Vapour Recompression Evaporator Unit



Fig. 10 Mechanical Evaporator Ancillary Unit



Fig. 11 View of Multiple Effect Evaporators



Fig. 12 Salt collected from Crystallizer



Fig. 13 Salt collected from Crystallizer



Fig. 14 Mixed salt collected from Solar Evaporation pan



Fig. 15 Mixed salt collected from Solar Evaporation pan