

Included with the treatment systems must be one or more of a variety of ultimate disposal processes. These processes are methods for permanent, nonpollutional disposal of the inevitable sludges and waste concentrates generated by the separation processes. These disposal techniques include such possibilities as incineration, digestion, or wet oxidation of organics; conveyance of various sludges and solid residues to the ocean or remote dump sites; and deep-well injection of brines into porous strata. Possible beneficial uses of waste concentrates as soil conditioners, fertilizers, or chemical raw material should also be included in the ultimate disposal category.

Two general system configurations can be used. In the series-type system already described (FIGURE 8), the total flow passes through all processes in sequence. Each process contributes to quality improvement. In the system illustrated, the conventional primary treatment removes material that readily settles or floats. The secondary biological step removes the biologically degradable impurities. Coagulation-sedimentation, in the third position, eliminates suspended solids and colloids. Carbon adsorption removes residual dissolved organics. Electrodialysis reduces the dissolved minerals level to an acceptable value. Finally, chlorination disinfects the processed water.

The same result can be obtained with a parallel-flow system (FIGURE 9). Here, primary and secondary treatment, coagulation-sedimentation, adsorption, and chlorination function as described above. Demineralization is achieved

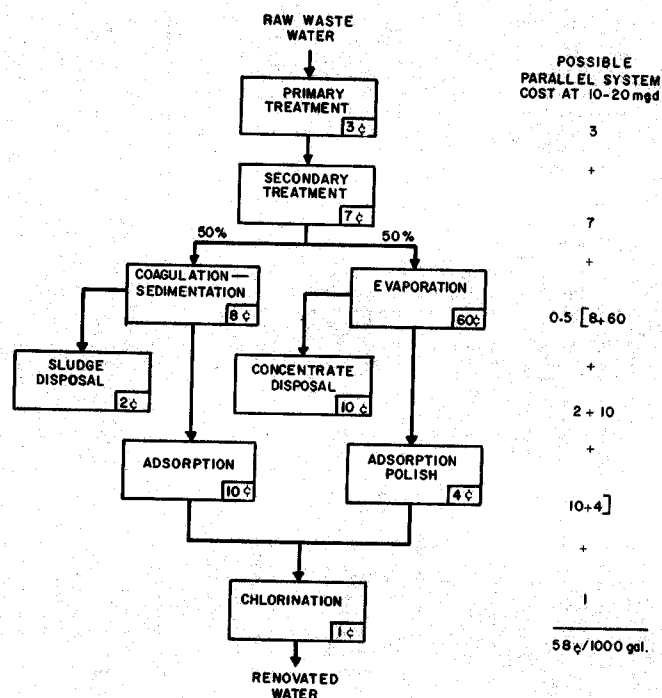


FIGURE 9. Generalized water renovation system, parallel flow.