it should only be regarded as an "early model" of future versions that will be more efficient and more economical. A whole range of new techniques are now being studied, not only by the federal government, but by state and local governments, by universities, and by industry.

One process, bio-denitrification, uses specially acclimated microorganisms to reduce nitrates to elemental nitrogen under certain process conditions. Another, foam separation, takes advantage of surface adsorption phenomena to make beneficial use, under controlled treatment conditions, of the hitherto unwanted billowy foam so common in many waste waters. Chemical oxidation of complex and unknown organic contaminants with hydrogen peroxide, ozone, or even hydroxyl free radicals generated by corona discharge is being considered. Phase separations such as distillation, freezing, and gas hydration are under study, as is reverse osmosis, which is perhaps the best "dark horse" candidate for total waste water purification.

The long-range objective in this research is to provide the necessary treatment systems for attaining *any* degree of waste treatment that may be required at minimum cost. Significantly, the word "systems" is used. Rarely will an advanced waste treatment process stand alone. Instead, systems of individual processes in series or in parallel will be required to meet particular needs.

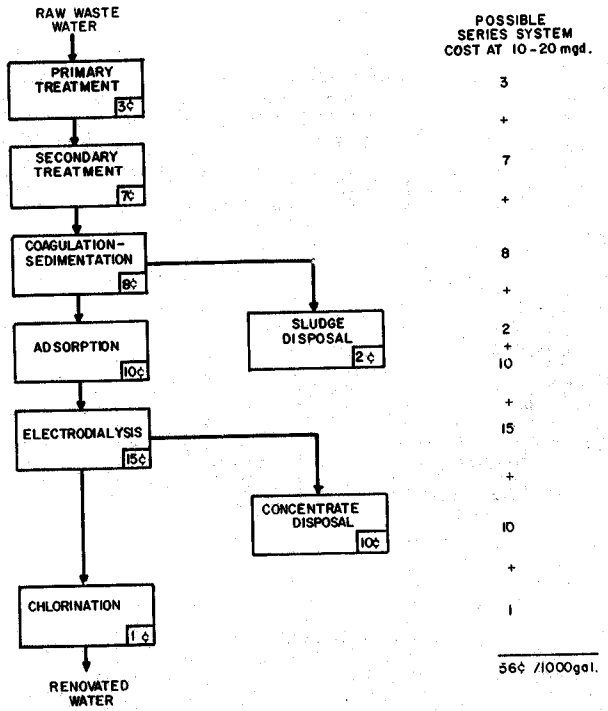

FIGURE 8. Generalized water renovation system, series flow.