

SOLVING OUR WATER PROBLEMS—WATER RENOVATION AND REUSE*

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Aside from floods, the nation's water problems can be placed in two broad categories: water supply and water pollution. Water resource planning has, historically, been concerned with one or the other of these problems. In brief and very simplified form, the two problem categories are outlined below.

The Water Pollution Problem

Polluted water was first recognized by its unsightly appearance and disagreeable odors. The initial solution was the use of simple gravity clarification and/or screening, by which gross particulate matter was removed from raw waste water as sludge or skimmings. With this "primary" treatment, larger suspended solids could be removed, and the tendency of a stream to become anaerobic or septic could be somewhat reduced. However, lowered levels of dissolved oxygen downstream from waste outfalls remained as the major problem in water pollution.

Various types of filters, chemical additives, and even electrochemical techniques were then applied to municipal waste as second-stage or "secondary" treatment steps. When it became widely recognized that certain waste components accelerated the microbiological use of dissolved oxygen in streams, biological treatment itself became the accepted standard for secondary treatment. The biological treatment processes used today, such as oxidation ponds, trickling filters, and activated sludge, are simply deliberate attempts under controlled conditions to satisfy the biochemical oxygen demand (BOD) of a waste prior to its discharge to receiving waters.

Up to now, treatment of municipal wastes has been primarily designed to reduce the quantity of suspended, floating, and biochemically oxygen-demanding materials. Efficiently operated primary-secondary plants remove about 90 per cent of these materials and in addition, about 90 per cent of the bacteria, 50 per cent of the total nitrogen (organic plus inorganic), perhaps 20 to 40 per cent of the phosphorus, but only five per cent of the total dissolved matter.

However, as civilization changes, so does the nature of water pollution. Suspended solids and BOD are no longer the only measures of waste loads. Other pollutants are of increasing concern: persistent organics, radionuclides, nutrients, inorganic salts, even heat. Even if the real nature of water pollution did not change, our increased understanding of pollutional effects and mechanisms would still alter our *recognition* of "what is pollution?" It is

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