

DESIGN AND CONTROL OF A LARGE BIOLOGICAL REACTOR  
FOR MUNICIPAL WASTEWATER TREATMENT

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ABSTRACT

The Dan Region Wastewater Project is the largest of the wastewater treatment and reuse schemes in Israel. Currently only a portion of the flow is being treated by the existing oxidation ponds; by the year 1985, a total of 90 million cu.m per year will be treated, after the new Soreq Biological Treatment Plant will be completed and placed in full operation.

The process selected for the biological treatment consists of a modified low rate, activated sludge process which will provide carbonaceous matter removal, nitrification and denitrification. Unlike more conventional systems, the modified process will provide for the above reactions to proceed simultaneously, within a single reactor and without chemical additions. The process has been tested for a four year period under actual field conditions at two large capacity technical scale pilot plants.

The full scale biological processes will take place in two parallel, large circulating flow reactors, each of 55,000 m<sup>3</sup> volume and equipped with 36 horizontal rotor-aerators units, with 75 KW motor/unit. The rotors will induce the internal recirculation of the liquid and will provide the oxygen required for the biological processes. The total oxygen demand of the biomass varies continuously on a daily and hourly basis. Because of the simultaneous aerobic and anoxic conditions prevailing along the closed, convolute channel, an adequate control of the aerator units is not possible by conventional direct monitoring of the dissolved oxygen concentration in the biological reactors. The total number of aerators required in operation will be controlled by a Respirometer Unit, which will continuously monitor the total oxygen demand variations. The rotor aerators submergence will be varied by monitoring the water level in the reactors. The denitrification process will be continuously monitored and controlled by an automatic on-Line Nitrate Analyzer.