

ceeding that of conventional plants; (4) have lower operating and maintenance costs than conventional plants; (5) create an opportunity for each of the three sub-systems – *sewage treatment, water polishing, and solid waste treatment* – to be used independently or in any integrated combination. Research and development to date indicate that CANWEL will be able to meet these requirements.

Sewage treatment

Using a new combination of physical, chemical, and biological processes, the *Sewage Treatment Unit* produces from raw waste water an effluent free from viruses and bacteria, with exceptionally low levels of oxygen demand, phosphates and nitrogen.

The biological reactors use a sludge of mixed microbial population and controlled aeration to convert organic wastes to carbon dioxide, nitrogen and cell mass. After the effluent has passed through a precipitator and clarifier, it is treated with ozone to oxidize residual contaminants and to disinfect it completely.

Aeration and all transport of liquids and sludge through the system are currently achieved by a single-air-blower, and other mechanical equipment has been kept to a minimum to reduce operating and maintenance costs.

By renovating waste water to a quality that permitted disposal *via* storm sewers or natural runoff systems, the *CANWEL Sewage Treatment Unit* could reduce the need for sanitary sewers and subsequent collection costs.

In most industrialized nations, all domestic water, whether for personal consumption or merely for flushing toilets, is raised to the same high standard of drinking-water purity, involving considerable processing expense as well as the cost of transporting large volumes of water from a central purification system to the ultimate user. Effluent from the *Sewage Treatment Unit* promises to be superior to many natural water courses and could therefore be considered safe for domestic utility uses. These uses account for at least 60 per cent of total domestic water demand. By producing an effluent suitable for such uses, the *Unit* offers the opportunity to conserve



natural fresh-water supplies and reduce the associated underground services required.

Generally, Canadian communities have an adequate supply of fresh water, and the need for fresh water conservation is based on the desirability of reducing processing and distribution costs for large quantities of potable water. In many parts of the world, however, fresh water is scarce, and the conservation of limited supplies is critical to the maintenance of life itself. In such situations the re-use of renovated waste water for utility purposes may have the effect of doubling the availability of water. And the more often it can be recycled, the greater the benefit.

By producing an effluent suitable for undiluted surface discharge, *CANWEL* will out-perform any conventional system. Nevertheless, it is expected that capital costs for the *Sewage Treatment Unit* will not exceed those for conventional plants. Operating costs are also expected to be lower than for conventional systems. Eventually, further economies can be anticipated through reduced costs of collection and fresh-water delivery services.

Water polishing

Persistent industrial wastes along with excessive dissolved salts and other natural contaminants occasionally create hazardous conditions that can-

not always be eliminated by conventional filtration processes.

CANWEL's Water Polishing Unit is designed to raise any water of reasonably good quality to the most demanding standards required for personal consumption.

The *unit* exploits the latest proven technologies. It includes filtration and reverse osmosis to reduce contaminants to acceptable levels. Ozonation for disinfection completes the process.

The *Water Polishing Unit* is the final element in *CANWEL's* water loop, and makes the recycling of virtually all domestic water – except that lost through evaporation – an ultimate possibility. For areas experiencing a net water shortage, the incorporation of the water loop for recycling could increase many times the available drinking-water supplies.

Solid waste treatment

By means of a fully automatic controlled-air incinerator, the *Solid Waste Treatment Unit* disposes of domestic refuse and recovers from it energy for the heating of water. Combined with the *sewage treatment and water polishing units* it can also be used to dispose of sewage sludge and brine concentrates from reverse osmosis.

The *Solid Waste Treatment Unit* employs a highly-efficient heat-recovery process. While the incinerator operates at temperatures approaching 900