

## The Use of Effluent Water for Irrigation

By Charles Howard

Re-use of water through many cycles is becoming routine. In fact, a writer in technical literature recently stated that we are becoming "an effluent society."

There are two major factors responsible for this development: the first is water economics. With water supply constant and demand continuously growing, the discarding of once-used water is, and will become, more just a memory of a wasteful past.

The second factor is the improvement in sewage treatment. Through utilization of modern equipment and methods in the treatment of sewage, the production of effluent and disposal of sludge is making sewage systems flexible enough to deliver effluent of a useable quality where and when needed.

Sound engineering in the design and redesign of plants to produce ever-better results, on a system-by-system basis, will be required.

Sewage has, of course, always returned. Whether by drainage from fields and pits to springs and wells or more directly by surface streams, one man's sewage discharge has always been the next man's supply. Historically, little concern was felt since these waters were considered to have been "purified" by natural processes.

The utilization of domestic sewage effluent has been predominantly agricultural. With rare exceptions (Golden Gate Park in San Francisco and locations such as the water-short Southwest) until the past 10-15 years recreational use was avoided.

Now with ever greater demand by both the public outcry and federal agencies to clean up the nation's rivers, lakes, streams, and aquifer recharge water, land application of effluent, as opposed to discharge into streams or the ocean, is becoming more common.

Regional water planning for the best use, and re-use, of all predictable water is a primary force in the push to re-use effluent on the land, and recreational facilities. With water cleaning grass and existing distribution infrastructure, are subject to increasing attention for that application.

In Florida, where currently more than 50 golf courses are using effluent for most of their irrigation water, there is a movement to require all municipal golf courses to buy effluent for 80% of their irrigation requirement.

In Texas, several municipal golf courses use effluent for irrigation and more are in planning. Several golf courses across the Southwest have used effluent as their only irrigation water source for many years.

Domestic sewage effluent is ordinarily about 99.9% water. A considerable part of the remaining 0.1% is the same mineral content that was originally present in the water. The increase in solid content because of use is usually only a few hundred parts per million. Therefore, if the municipal water supply is suitable for irrigation use, its sewage effluent is usually suitable unless industrial or chemical wastes are discharged into the sewage to be treated.

Treated sewage effluent has benefits and risks as a source of irrigation water for turf grass. The nitrogen level can be as high as 20 milligrams per liter (depending upon the plants' permit allowance). However, there is much discussion and little test data to determine how much of this nitrogen is available to the turf grass plant. Estimates of the portion lost to volatilization during the process of dispersing the effluent through the irrigation system range from 45% to 60%. If the turf grass is getting only 3.0 milligrams of nitrogen per liter of water applied, there is little saving in a regular fertilization.

The phosphates occurring in sewage effluent may benefit the turf grass. However, most effluent contains sodium that can be a detriment to the turf grass. Increased sodium level is usually the most harmful aspect of using effluent water for irrigation. The sodium level that is toxic relates to both the soil type and the particular turf grass species, since tight clay soils are more quickly affected than loose, granular soils, and there is wide variance in salt tolerance of turf grass species.

Excessive levels of sodium in the soil not only causes reduced turf density, but also reduces the effectiveness of other chemicals and fertilizers.

Zinc, copper and boron are other elements commonly occurring in sewage effluent that are potentially harmful to turf grass.

The pH of effluent is ordinarily in the range of 7.5-8.5, and soil irrigation with sewage effluent will gradually increase in pH creating another situation which may require remediation for long term turf grass maintenance.

To summarize, the increased use of sewage effluent for golf course irrigation is inevitable. The quality of the water at the beginning of the domestic sewage cycle, the quality of water required by the treatment process and thereby the quality of the effluent to be used for irrigation needs to be known. Additionally, knowledge of the type of soil and the species of turf grass are aspects of an equation for successful use of sewage effluent for irrigation.