EFFLUENT — New Water Style

By ROBERT L. SANDERS, C.G.C.S.

The superintendent stood at the golden gate. His head was bent low. He merely asked the man of fate which way he ought to go. "What have you done," St. Peter said, "to seek admittance here?" "I maintained a Country Club on earth for many and many a year." St. Peter opened wide the gate and gently pressed the bell. "Come in," he said, "and choose your harp — you've had your share of hell."

And now we are talking about having to use "dirty water", "once used water", "effluent water", or "reclaimed water". How many of you today use reclaimed water? How many would like to use effluent water? There may come a time when we, as superintendents will have no choice. Recycling appears to be our key to survival. Recycling of many of our resources is here to stay. And it is correct!

There is absolutely no reason we have to have fresh water pumped out of the ground to water our turf while millions of gallons of "once used" water is wasted and allowed to run down dry washes, into rivers or into our lakes. First we must recycle in order not to use up our water resources. Second, federal laws will soon make it more and more difficult to simply waste effluent. And third, public opinion as to ground water pumping may cause the use of effluent and this could happen to you.

In early 1976 the city of Tucson, had plans to construct a Robert Trent Jones course. The drawings were complete, land was purchased and the construction contract was signed. Public opinion caused the mayor and council to stop construction the day it started. The reason was water — the use of one million gallons per day of fresh pumped ground water and it cost the city of Tucson $250,000 not to build the course.

To my knowledge, golf courses are the only legal use of effluent at this time. All this talk about effluent and we have not determined exactly what effluent really is. Effluent is the liquid that comes out of a sewage treatment plant after completion of the treatment process. A sewage treatment plant is basically a big water cleaning machine. It consists of a series of tanks, screens, filters and other devices to separate out the wastes in sewer water.

As raw sewage enters a plant for treatment, it flows through screens which remove large objects such as rags, rocks and sticks. Then the sewage passes through a huge grinder. Next it passes through a grit chamber where sand, grit and small objects are allowed to settle to the bottom. Some suspended solids also settle out here. After the grit and etc. are removed, the sewage still contains large amounts of dissolved organic and inorganic matter as well as suspended matter. At this point the speed of flow is reduced and more suspended solids sink to the bottom of the tank. This mass of solids is called raw sludge. Now remember raw sludge and how we got it because we are coming back to it later. This sludge is removed from the tank for further treatment (as with milorganite) or disposal. This is as far as some plants treat sewage and the liquid remaining is pumped for turf.

If secondary treatment is to be, there are two main methods of treatment: 1. the trickling filter process and, 2. the activated sludge process. The trickling filter is a bed of stones from three to ten feet deep over which sewage is sprayed so it can trickle down through the layers of rock. Bacteria from the sewage collects on the rocks and consumes most of the organic matter in the sewage. The cleaned water flows out through pipes at the bottom of the filter and is treated with chlorine to kill the remaining bacteria. This water is now discharged from the plant and can be utilized for plants. The activated sludge speeds up the work of the bacteria in sewage by mixing sewage, recycled sludge (full of bacteria) and huge amounts of air. The sludge with its load of bacteria is mixed with the sewage and air. The bacteria then consumes the organic matter in the mixture as it sits for several hours. Then the mixture flows to another tank where the solids are allowed to settle to the bottom. The cleaned water is chlorinated and discharged. Some sludge is activated with additional

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bacteria and returned to be mixed with more air and more sewage. Proper chlorination of this treated waste water will kill more than 99% of the harmful bacteria in the effluent. — Remember I said *bacteria*. The secret to this process is a super saturation of bacteria and air.

Lets discuss the terms associated with waste water.

Sludge — the solid matter that settles to the bottom, floats or becomes suspended in the sedimentation tanks and must be disposed of by filtration and incineration or by transport to appropriate disposal sites.

Primary Treatment — the stage in basic treatment that removes the material that floats or will settle in sewage. It is accomplished by using screens to catch the floating objects and tanks for heavy matter to settle in.

Secondary Treatment — second step in which bacteria consumes the organic part of the wastes. It is accomplished by bringing the sewage and bacteria together in the trickling filters or in the activated sludge process.

Suspended Solids — small particles of solid pollutants which are present in sewage and which resists separation from the water by conventional means.

Now lets get down to the "brass tacks" or basics. What is the effluent or "once used" water really like? First it is an excellent media for growth — a beautiful liquid fertilizer. The water I was working with contains 7.3 pounds of actual N per 1000 sq. ft. per year. This N was 8.1 ppm organic or slow release and 17.5 ppm inorganic or that N that may be taken up faster. Phosphate equals 30 ppm. Potassium equals 104 ppm. Also the water contains sodium, calcium, magnesium, iron, zinc, sulfur, boron, copper and molybdenum. Ph is 7.7. Great stuff — all required elements. Good Ph — Perfect! However there are a few problems:

Salts — May be high — as much as 1000 - 2000 ppm. — be careful — test your water — test your soil — know what is going on. Remember: less than 650 ppm salt useful, 650 -2000 ppm must use periodic leaching, more than 2000 ppm limited usefulness. Also remember least tolerant grasses: Highland, Colonial Bent, Kentucky Bluegrass. Of seven creeping Bents — top growth slowed as salt increased. Arlington, Seaside, Pennlu, Old Orchard — most tolerant. Congressional and Cohansey intermediate. Penncross least tolerant. Also having medium tolerance is perennial rye, tall fiscue and orchard grass. Most tolerant are all the bermudas.

Sodium — may be high — ours was 104 ppm — continuous use of effluent may allow Na to clog clay particles — decrease drainage and could be fatal to some soils. Seaside found to be most tolerant to alkali conditions.

Heavy Metals — these cannot as yet be removed in territary treated water. These may collect in some soils and cause problems. However, this is more a problem in highly industrial areas. Also our calcarious soils precipitate out some of these therefore causing us a small problem, however, these metals end up somewhere in our world.

Last and by far the most apparent and troublesome is algae growth. Our water fresh out of the plant looked like tap water. Of course if you drink it, you are going to be very busy for awhile for it actually would be a "dose of salts". As

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soon as this water is exposed to sunlight we have a tremendous bloom of algae. I have seen it 6 - 8 inches thick floating on the surface. It clogs valves and sprinklers. It smells and feels greasy. It dies and floats to the surface as a dark brown heavy froth and it was mine, and it will be your job to convince your employees and players that it is algae and not something else. However everything is not what it might appear to be and that reminds me of a story. — Chicken hawk story - Lark, Dove, Duck-(Drake).

This brings up another problem and that is people. People and their opinions. Many feel effluent is dirty. Course employees don't like to work in it. Players are very sensitive to getting water on their clothes. There may also be problems with uninformed people drinking out of sprinklers and we already know where he is going to spend some time. Seriously, those working with effluent should keep up on all immunizations because as we said before, chlorine kills bacteria, it does not to my knowledge kill virus. Nothing that is available today kills all virus. If we could discover this procedure, I am sure we would have the cure for the common cold.

Effluent is here to stay; It should be used!

California law AB 1784 (papan regulation) Section 13550 of California's western code makes it illegal to use fresh water on a golf course if effluent is reasonably available. Now convince me, we as superintendents are not going to have to live with it and learn about it. Some solutions to our problems have been: Dual water systems may be necessary for greens — one system effluent and one system fresh water to be used to leach out salts, sodium (after calcium applications) and heavy metals. Leaching rule: 6 inches water to remove ½ salts in 1 foot soil — 24 inches water to remove 9/10 salts in 1 foot soil.

Algae — Do not allow the effluent to stand in the sun. Allow no exposure to the sun. Take the water out of the plant straight into the irrigation system or into a closed tank. Also add strainers or sand separators to the system as insurance. Use "dirty water" irrigation parts. There are some available on the market.

Another aspect is education. The people associated with the course must be educated. They must be convinced on the use of effluent. Remind them that grass purifies. 60% of the water used returns to the environment pure. An 18-hole golf course, if watered 1 inch can absorb four million gallons of water. Remind them that grass produces oxygen. One acre produces enough pure O^2 for four people for one year. And 18-hole golf course produces enough for the life support of 1,000,000 people and it is clean and pure.

Then after all this you might want to write a letter to Santa Claus expressing your desires. Maybe it should go something like this:

Dear Santa Claus:

Please leave me 18 greens that will be proof against wear and tear, disease, bugs, unreasonable players and other pests. Please leave at Tom Smith's house: one durable soft rubber putter which may be cast violently on the ground without injuring the turf on my greens. Please leave at Ed Jone's house one digging fork and a spade in order that he may have something to dig with in his back yard to satisfy his craving for digging and thus relieve the strain on our tees. Please leave some message of inspiration with the Royal and Ancient and the USGA which will encourage them to adopt a new cup with a diameter of at least ten feet so that in the future it may be feasable, if there are any missed putts, to blame them on the player rather than on the superintendent. Please leave your message of good will firmly fixed in the haughty hearts of our members and make it last at least for many months and make it possible for the superintendent to actually enjoy his work within a month after he found it necessary to close the course for a single day.

If you will do all this dear Santa, you need not visit my house. We'll take care of the kids this year.

Humbly yours,
The Superintendent

Thank-You

Editor's Note:

Bob Sanders, CGCS is the Golf Course Superintendent at the Skyline Country Club, Tucson, Arizona.

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