With continued focus on water distribution, dramatic percentage decreases will continue to occur

valve-in-head sprinklers offer the most precise water applicator feasible at this time.

We may conclude that valve-in-head sprinklers, sophisticated scheduling features and ET-based central controllers are adequate tools to support sound water management. However, irrigation manufacturers feel there is ample room for technological innovation and improvement.

First and foremost, irrigation manufacturers understand that their products need to be easy to install. Sound water management cannot be supported by the latest technologies if those technologies are problematic to install. Irrigation manufacturers will continue to invest in radio technology, which eases installation problems and hastens system upgrades.

In fact, some manufacturers will search out or intensify strategic alliances with companies that already supply state-of-the-art radio solutions to other industries.

Second, even with a sophisticated central control system, sprinkler heads need to apply water evenly, causing manufacturers to continually improve water distribution. Assuming that a control system supplies adequate tools for sound irrigation practices, the most important component of an irrigation system is the sprinkler head.

For example, some manufacturers can now produce sprinklers with scheduling coefficients (the application rate multiplier used to insure that the area of a sprinkler's pattern that gets the least amount of water is sufficient to replace water consumed by ET) of 1.2. Scheduling coefficients of sprinklers have improved from an industry norm of 2.0 - 2.5 to a current industry norm of 1.3 - 1.5.

That means that golf courses that employ the latest sprinkler technology automatically conserve at least 25% (and up to 50%) of their previous water usage and reduce waste by 50%.

With continued focus on water distribution, dramatic percentage decreases will continue to occur.

Finally, central irrigation system software needs must be intuitive to the system user or the system will not fulfill its potential. Irrigation equipment manufacturers do not have intrinsic expertise in software development.

However, they do understand that superintendents have very specific control needs. The challenge before irrigation manufacturers today is to translate control needs into more understandable central software systems. New developments in central software will continue the progression toward a more consistent and intuitive user interface.

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Recycled Water

Treated Effluent as an Irrigation Source

BY RON ANDREWS
Grand Harbor

Whether you are gearing up an irrigation system for a new golf course, trying to find another water source, or simply up for renewal on your consumptive use permits, it is likely that the subject of effluent irrigation will arise.

Treated sewage effluent, or reuse water as it is commonly known, is becoming available on a much wider scale than it has been in the past. Sewage plant operators are coming under much greater pressure to dispose of effluent water in the most environmentally appropriate manner.

Direct discharge to state bodies of water, long a common practice, is no longer a preferred choice. Plant operators are also finding mounting pressure on deep well injection disposal systems. Both of these methods have had the sling and arrows of pollution watch guards launched at them.

The two modern alternative disposal methods that are receiving the most attention are reuse as an irrigation source and the recharging of systems of artificially created wetlands linked to state water bodies.

Each of these methods has its advantages and both are likely to impact golf courses. For new golf course developments with home sites, this pressure to find better disposal methods will cause plant operators to force these communities to take back the treated effluent that is generated from the sewer tie-ins. This is one of the reasons Grand Harbor uses effluent water.

As more pressure comes on plant operators to dispose of treated effluent through irrigation re-use, they are naturally going to look to all properties with large consumptive uses. To many this means golf courses. Never mind that golf courses don't use the quantity of water that many people think they do.

Also, do not expect plant operators to market their water as something that they need to dispose of. No, more likely it is now a valuable resource for which you should be willing to pay. Perhaps it is, but there are a lot of complicated issues when it comes to irrigating with effluent.

The intent of this article is to discuss these issues from the point of view of a golf course operation that has used effluent for several years.

The first thing you need to consider is what your water sources are now. Your are a much better candidate for effluent irrigation if you are using a non-renewable or a potable water source as part of your irrigation programs. At Grand Harbor, the bulk of our irrigation water comes from a system of storm water treatment lakes and wetlands.

Such a system is already a highly efficient re-use strategy that

carries the side benefit of providing a diverse habitat for many different species. However occasionally, we will enter a drought that is significant enough to lower our lake levels and impact our ability to irrigate from this source.

This is where effluent irrigation is most important. Without this resource, we would be forced to turn to our Floridan aquifer wells much sooner and more often. This is a second reason why during the permitting of Grand Harbor we were required to accept treated effluent.

However, most of the time, the storm water lake system has plenty of water and meets our needs nicely. Clearly, effluent would be a more valuable resource to a golf course that did not have such a strong first line source.

The quality of the effluent source available to you is also going to be important.

Talk to the plant manager. He or she will have a good idea who is contributing to their input stream and what level of treatment the plant is providing. Most plant managers can provide a good lab report on the irrigation suitability of the effluent leaving their plant. Failing that, obtain a sample and pay for an irrigation suitability analysis.

Test your other water sources while you are at it. For us, this process did a lot to dispel many of the myths of poor quality effluent water. The effluent we receive has a more desirable pH (6.4 - 6.9), lower total salts, lower sodium and bicarbonate than either of our other water sources.

The total nitrogen level is usually very near 10 ppm, which is 2.5 times higher than our storm water lakes. Phosphorus (p not P O) levels are 4 - 6 ppm, or 30 times the level of our storm water lakes. These differences are contributory to a fertilizer program. However, it takes 16 inches of irrigation (0.04 inches/day) to provide 1/2 lb. N/1000 sq. ft. The same quantity of irrigation with effluent would provide 1/3 of a lb. per 1000 sq. ft. more than what irrigation with our storm water would provide.

These are not exactly fertigation levels, but they are significant, especially for the phosphorus. Minor elements are in a suitable range, but zinc (0.5 ppm) and boron (0.3 - 0.4 ppm) levels are somewhat elevated. We have removed zinc and boron as much as possible from our fertilizer sources and have not seen any build-up to date.

People are concerned about where you are putting this water. We do not use it for clubhouse irrigation.

From behind Grand Harbor #7. Lined and walled effluent receiving lake to the right. Percolation pond in use of the left.

In short, we have not found quality to be a problem. It would be remiss of me to not at least mention the perception issues. People are concerned about where you are putting this water. We do not use it for clubhouse irrigation. Minimize over-spray to adjacent properties.

The treatment levels provided by most plants will kill the majority of potentially harmful bacteria or viruses that may be present. However, when this water leaves the plant, it looks potable, so you will need to provide warning signs.

If you are still considering effluent for irrigation purposes on your property, you now have to work out the storage problem. Most of us will not be lucky enough to have effluent delivered to us in a pressurized main that we can tap on demand.

In Florida, it may be possible to obtain a DER permit to store this water in on-site unlined lakes, as long as these lakes are used for irrigation. We elected not to pursue this route for a couple of reasons.

First, our concern was that a certain amount of water would leach away through the lake bottoms, especially during drought periods. Second, we were concerned that the nutrient levels of the effluent, when added to our lakes, would give us greater difficulty with water quality and appearance issues in our freshwater lakes. Instead, we built a 2-acre lined lake that can fluctuate 6 ft. in level.

Adjacent to this lake, we constructed 1.5 acres of cleverly disguised percolation ponds to add to our storage and to increase our ability to dispose of excess effluent during rainy periods.

It was necessary to add aeration equipment to the storage lake to eliminate algae problems in the water. When we do not receive enough treated effluent, we have a high volume transfer pump that moves water from the storm water lakes to the lined lake. This adds about 8% to our cost of pumping this portion of our irrigation.

It the treated effluent is not available in sufficient quantity and the storm water lakes are getting too low, then we can free flow artesian water from the Floridan aquifer into this same lined lake. We have gained the significant advantage that we will not be leaching this well water away through the bottom of an unlined lake.????

This storage strategy has worked well for us and has helped deal with the reality that we have to receive effluent every day, whether we need it or not.

In fact, in Florida at least, I would say

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this is the most significant problem with using treated effluent for irrigation. We are relatively lucky in that we receive only slightly more treated effluent in the winter than we do the rest of the year.

Despite this, we still receive more water than we need for irrigation in the winter and less than we need in the hot dry months. We also receive too much during the rainy season.

Our ability to store a lot of water helps us match supply and demand and the percolation areas we built help even more. We linked the two golf course irrigation mainlines and this gives us more demand, and therefore better balance during these difficult periods.

Lately, we have added spray disposal areas that we can irrigate without impacting playability. Still, it is sometimes a challenge to use all they send. Our initial costs were quite high.

We paid for the construction of the lined lake, the transfer lines from the plant, and the pump to pump the water to the property.

In exchange, we were to receive the water free for a period of time, with a negotiation process to determine a fair price set at a future date.

The reality is; everybody's deal is different. That's the way life works.

Educate yourself about the issues and negotiate as strongly as your position will allow.

Your course will probably have to sign an agreement that will dictate that you must take a certain quantity daily. Keep that number small and your storage large. Despite the difficulties of using treated effluent as an irrigation source, we are happy to have it during drought years.

This year has been challenging though, as we have received 66 million gallons of effluent in the first 10 months, and it has been a very rainy year.

During September, October and November, we were blessed with over 30 inches of rainfall. Still, the difficulties have been manageable and are offset by the relatively high quality of the water and the less restrictive covenants about how and when you can use it.

Maybe it will be drier next year.