

BY JOHN WALSH

Making the switch

Arizona superintendent deals with consequences of effluent water use

Get ready because it's coming. Reclaimed water, that is. Well, at least for some. And it won't necessarily be cheaper than irrigating turfgrass with potable water.

With the increasing concern about fresh water supply, water use on golf courses is being scrutinized now more than ever. The results of this scrutiny can be categorized into two groups: those who use less potable water via restrictions and those who switch to reclaimed water. Many more golf courses will be joining the second group in the near future. Although, for some, the timing depends on where they're located. One state where it's happening sooner than later is Arizona.

When it comes to irrigating turfgrass with reclaimed water, golf course superintendents – in Arizona and elsewhere – can learn from Mike Kropf, golf course superintendent at the

private, 18-hole Golf Club at Sun City Vistoso in Tucson. Kropf, who's been at Sun City Vistoso for a little more than a year, is dealing with the consequences of switching from potable water to reclaimed, or effluent, water.

But such a decision to switch wasn't made by club management – it was made by the town.

"There was no decision-making process to switch from potable water to effluent because the town told the golf courses in the area they would be using reclaimed water by a certain date," Kropf says. "The decision to switch wasn't by choice. Oro Valley law states that if there's reclaimed water available, golf courses will use it."

The town gave Sun City Vistoso about a year's notice.

There are five courses in the vicinity of Sun City Vistoso that use reclaimed water for ir-



Mike Kropf had experience managing turfgrass irrigated by effluent water before coming to the Golf Club at Sun City Vistoso. Photos: Jacob Chinn.

rigation, and two more that will open during the next couple years also will use reclaimed water, Kropf says.

The switch from potable to effluent water happened just before Kropf started working at Sun City Vistoso. One of the reasons Kropf was hired at Sun City Vistoso is his previous work with reclaimed water. Kropf was an assistant golf course superintendent at Heritage Highlands Golf and Country Club eight miles away. The previous superintendent at Sun City Vistoso, Greg Hrycyk, left to take a job in California.

Sun City Vistoso, which opened in 1986, generates between 33,000 and 35,000 rounds annually and has about 300 annual members. The fairways and rough consist of 419 Bermudagrass, the tees are 328 Bermudagrass, and the greens are Tifdwarf Bermudagrass. The turf on the fairways, rough and greens existed before the water switch was made, but the turf on the



As a result of using reclaimed water, ciliated protozoa grow in the irrigation lines and can clog nozzles. Photo: Jacob Chinn

tees was replaced when the course switched to using reclaimed water, so it's about a year and a half old.

GO WITH BERMUDA

When irrigating with reclaimed water, it's better to have Bermudagrass greens rather than bentgrass greens, Kropf says. Other courses in the Tucson area currently have or had bentgrass greens, including Heritage, but some have switched to Bermudagrass because it's easier to manage when using reclaimed water. Reclaimed water has high levels of nitrates, and because of that and hot temperatures, bentgrass becomes "puffy," Kropf says.

"It grows faster than you can cut it, and you scalp the grass," he says. "You need to adjust for it. You get a huge surge of growth and disease pressures, especially in July and August during monsoon season. You can't mow the greens



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“Oro Valley law states that if there’s reclaimed water available, golf courses will use it.” - MIKE KROPF

fast enough. If you’re at a high-dollar course and can afford large amounts of fungicides and maintenance inputs you can manage it. It’s very high maintenance. If not, you succumb to it. It’s like thatch but different.

“The bentgrass greens slowed down a bit at my last course, so management just bit the bullet and took out the bentgrass and replaced it with Bermudagrass,” Kropf adds. “I’m a big fan of Bermudagrass greens. I don’t have the manpower or the money to deal with bentgrass. But if you have bentgrass greens, then you also have Bermudagrass that encroaches on the bentgrass greens.”

When overseeding Bermudagrass greens, they eventually will roll similar to bentgrass greens, Kropf says.

“I overseed the last week of September, and by Thanksgiving, you’re really dropping the mowing heights,” he says. “I was cutting them at 0.125 by January. I had them down to 0.115 by March and then down to 0.110 in April because of the tournaments we host. When I scalped for overseeding preparation, I had the mower down to .100. Tifdwarf Bermudagrass can tolerate that. MiniVerde, a new dwarf-type Bermudagrass, can handle it even more.”

Last month, the ryegrass and *Poa trivialis* were kicking out of the greens, and Bermudagrass was coming through. Kropf says it takes a month to six weeks to get through the transition.

WATER DELIVERY

One would think using reclaimed water to irrigate a golf course would be cheaper than using potable water because the quality isn’t as good. But that’s not the case at Sun City Vistoso. Kropf pays \$830 per acre-foot. Compare that to \$5 an acre-foot other area courses pay for well water because they were grandfathered in using that water, to which they have rights.

To deliver the reclaimed water to Sun City Vistoso and other area courses, the city had to route a pipe, which is T-ed off at a nearby main road. Heritage Highlands pays less for reclaimed water than Sun City Vistoso because it already had a reclaimed water line routed

directly to it.

“My water is routed through the local municipality,” Kropf says. “I have to call Oro Valley (the nearest community supplier) every morning and tell them what I watered and what I need. Once it gets all orders, it calls Tucson Water and has it sent. I pay \$2.55 for 1,000 gallons. At Heritage Highlands, they pay about \$2.05 because they don’t have to go through the local municipality. They get their reclaimed water directly from Tucson Water.”

The golf courses using reclaimed water didn’t have to pay for the pipe that was installed – the municipality paid for it up front.

“When all is said and done, I pay more for reclaimed water than potable water,” he says. “Technically, you’re not supposed to pay more for reclaimed water, but it’s not a savings because I have to overwater to leach out the salts and increase the application of soil buffers and calcium applications to compensate for the high salts in the reclaimed water. I haven’t seen a larger increase in the budget for water, I’m just adjusting my program.”

A NEW SYSTEM

Sun City Vistoso’s new irrigation system came on line November 2005. Hrycyk was involved with the irrigation renovation, so the system was new to Kropf when he arrived. However, he learned much about water management during the six years he spent at Heritage Highlands when he was the irrigation manager.

“Everything was new except for the pump station, which I’m repairing now,” Kropf says.

The pump station was replaced in 1999, and club management didn’t replace it when the irrigation system was renovated because the system was costly (\$2.5 million) and management wanted to get the full life out of it, Kropf says.

“I’m running on one pump now,” he says. “The reclaimed water ate away at the rubber bushings and seals on the pump shafts causing the pumps to seize.”

The two pumps and the installation will cost about \$40,000, Kropf says.

The new irrigation system has four or five



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heads on each lateral line, and Kropf has individual control on each head.

"It's nice because the soils aren't great," he says. "The course was built on rock. I think I'm overwatering. I water every day. I can't go

every three days like others because the soils don't have a good profile and dry out quickly. If I don't keep water on the turf, you can see the salts coming up, especially in the rough. The sodium levels are so high that water is being

pulled out of the plant by the sodium in the soil instead of the plant pulling the water out of the soil. The grass turns gray. Once you see the gray and wilted look of the grass, it takes a while to get the green color back."

Kropf's maintenance budget is \$1.2 million, and \$390,000 is budgeted for water. As of April, Kropf was \$60,000 underbudget for water. He didn't use as much water as planned because there was a good monsoon season. Kropf believes the new irrigation system is highly efficient.

"I'm not watering as much as they did before with the old irrigation system, but the reclaimed water cost is more than if I had potable water," he says.

The reclaimed irrigation water arrives at the course and sits in two holding ponds that are next to the clubhouse. Algae grows in the ponds, and it smells at times.

"I've tried different algacides and nothing worked, so we had to get guys out there and skim the algae off the pond," Kropf says.

Another problem with reclaimed water is

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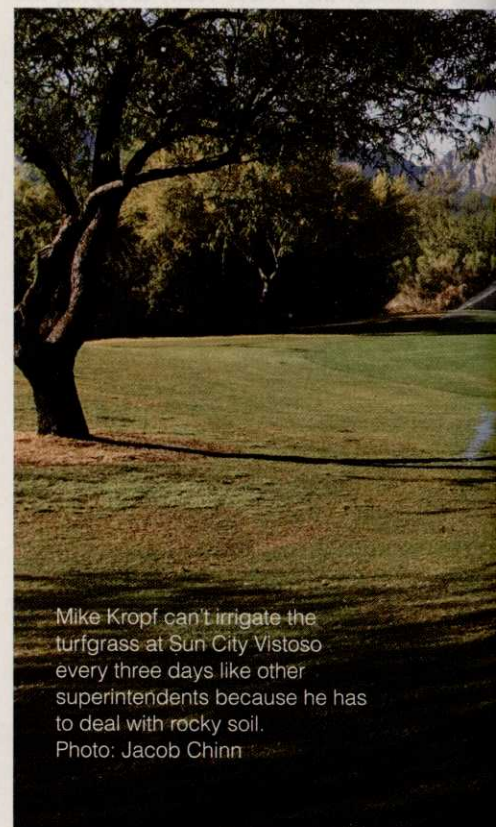
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Mike Kropf can't irrigate the turfgrass at Sun City Vistoso every three days like other superintendents because he has to deal with rocky soil.
Photo: Jacob Chinn

ciliated protozoa, which grow in the irrigation lines. Protozoa grow once they get in the irrigation lines because they don't like oxygen or light. Filters don't work because the organisms grow on the filters, Kropf says.

"It's a snot-like material that clogs the nozzles to the point where it looks like silly string when the heads turn on," he says. "So I'm adding a citric acid and other chemicals to clean them out. You need to stay on top of that or else the sprinklers won't work because they're so clogged."

Irrigating with reclaimed water tends to wear equipment out more quickly. Kropf says the crew at Heritage Highlands replaced nozzles more often because the plastic wore out.

"Metal parts also corrode badly," he says.

CULTURAL PRACTICE CHANGES

Irrigating with reclaimed water doesn't just affect one's watering practices. It impacts cultural practices as well. In many cases, being more aggressive is necessary. Because of reclaimed water use, Kropf is aerifying the rough more often.

"Members who have been here for 20 years

asked what I'm doing, and they say no one has done that before," he says.

Kropf slices the fairways during the winter and aerifies with solid tines (not pulling cores) on the greens because he can't core aerify as often as he would like. He also has been dethatching because of buildup.

Kropf also backs off on his fertility program. He tests the soil three times a year and the water once a month.

"I base my fertilizer programs off of that," he says. "I'm using high levels of potassium because Bermudagrass responds to it in a lateral growth pattern. I'm also going to more organic slow-release fertilizers instead of the synthetics because I don't need salt. I feed as I go and try to time it with the overseeding. I want the turf to peak in March and April because of tournaments we host."

According to the soil tests, the sodium level is now three times higher than optimum range because of the high levels of sodium in the reclaimed water. The turfgrass doesn't always look gray because of overwatering keeps the salts



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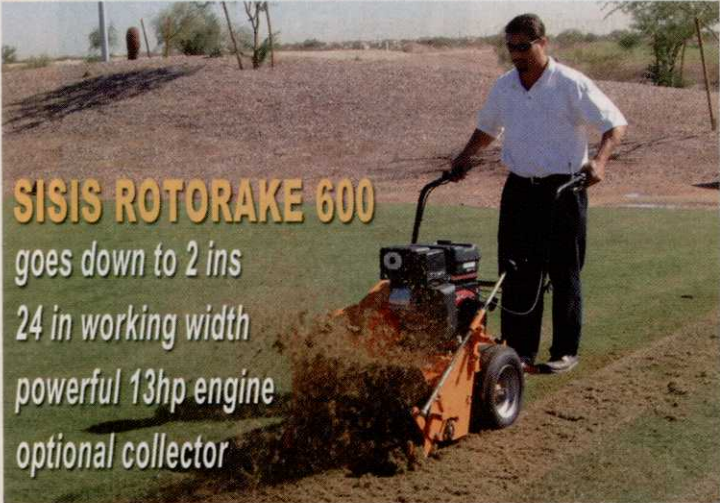
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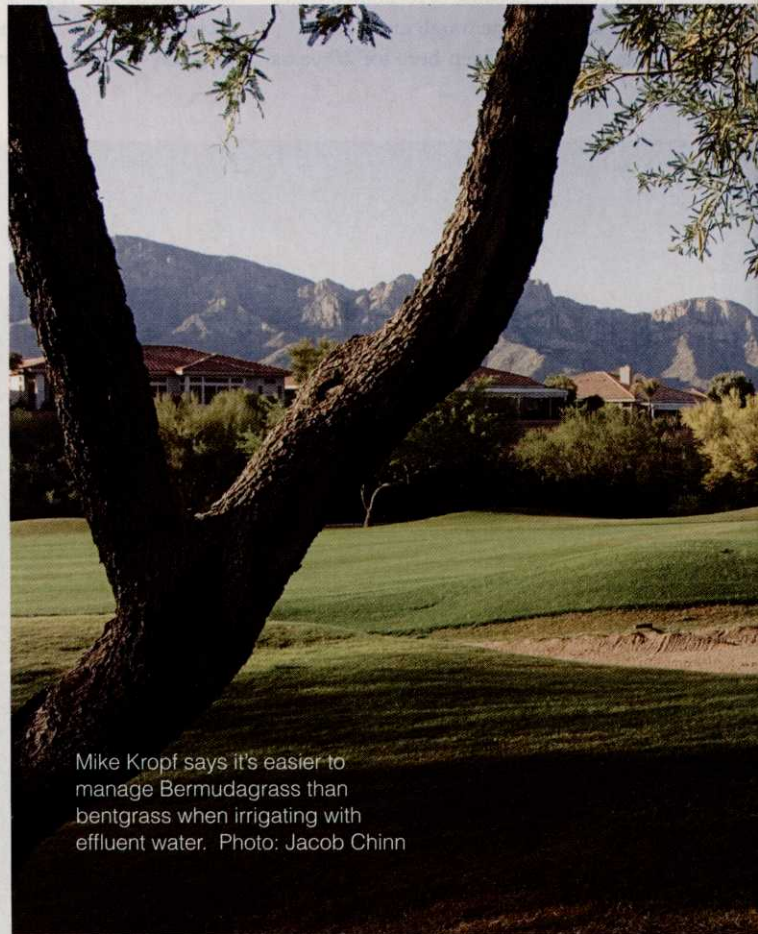
The biggest change is the pH level in the water, which was 9.1 on Kropf's last water test, and that correlates with the higher pH of the soil tests. Tees had pH levels at 8.3 and 8.4. Greens had better pH levels at 7.8 and 7.9. The high soil pH locks up micronutrients, so Kropf has been adding micronutrients and a lot of calcium, which displaces sodium in the soil and moves the sodium down past the roots with the flushing process of applying excess water.

When Kropf arrived at Sun City Vistoso and started mowing the push-up greens, the buckets were juicy - full of water - so he didn't put a lick of fertilizer on them for a month until he got them down to more manageable conditions. He wanted to make them stronger and less susceptible to disease or insect problems.

Kropf also is putting down higher levels of Primo than he normally would because of the reclaimed water use. During July, August and September, he says he can't mow the roughs fast enough.

Despite the changes in his fertility program, Kropf's fertility budget hasn't changed drastically.

One area that Kropf doesn't worry much about is turf disease, mainly



Mike Kropf says it's easier to manage Bermudagrass than bentgrass when irrigating with effluent water. Photo: Jacob Chinn

because of the characteristics of Bermudagrass and the arid climate. In April, it's so dry salts will increase from the heavy use of reclaimed water causing plant stress and increased disease pressures. Kropf applies a fungicide for fairy ring, which is really the only disease the turf gets, unlike with bentgrass.

"Bermudagrass has more tolerance to salt than bentgrass," he says.

RECLAIMED WATER'S IMPACT

In the future, it's inevitable more golf courses will switch from potable water to reclaimed water.

"It's less likely in places such as Washington state where the water tables are so high," Kropf says. "I doubt you'll see this there, but you'll see it anywhere Mother Nature doesn't produce enough water. And environmentalists like it because the grass is a natural filter for waste water."

Even with reclaimed water, there are different quality levels, and Kropf says he's supposed to be getting the minimum standard of "A" quality effluent; however, there are no national standards for reclaimed water.

Whether the switch to reclaimed water is made this year or in five, superintendents in areas that are likely to switch can prepare by realizing they'll need to implement more cultural practices, such as aerifying and slicing, applying more soil amendments, and constantly analyzing incoming water because reclaimed always seems to be changing.

"The biggest thing is – as far out as you can get – to start planning where you're going to adjust fertility programs," Kropf says. "Down the road here, guys are struggling because they didn't adjust enough for what was coming in the water. If you're going to get reclaimed water, plan on getting a lot of nitrogen and sodium." **GCI**



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