

cups should be changed daily and irrigation levels must be closely watched to avoid overly wet conditions. These would be my priorities.

Bengeyfield: Why is it one superintendent will receive only a minimum effort from a crew while his replacement will receive a maximum effort. In other words, what are the responsibilities of a golf course superintendent in developing a sharp, efficient crew?

Malpass: This question can be answered with a quotation: "The successful manager of men derives his satisfaction from achieving with people. He takes real pride in surrounding himself with strong people and in helping them achieve. He recognizes that in a world which is changing economically and socially and which is accumulating technical knowledge rapidly, he and his people are confronted with the need to cope skillfully with these changes. To keep his business competitive in an everchanging society, he holds a very strategic position. Helping his people grow with the times is his opportunity and his challenge." Another quotation I like is: "A good executive is a man with a sense of urgency, a demand for excellence, and a healthy discontent with the way things are."

Bengeyfield: What about equipment on the great

golf courses of America? What is the most valuable piece of equipment on your course?

McKenzie: I have found the most satisfactory approach to equipment operation is to have each man assigned a specific piece of equipment for his use. Each greensman has his own assigned mower and he mows the same greens each day. The same fairways are mowed by the same man each day. By following this kind of pattern, each man is responsible for his equipment as well as for the job it does. It is important to maintain equipment in top condition and to replace it when needed. This is especially true for that equipment used most often and on the most critical areas of the course such as putting green mowers, fringe mowers, tee and fairway mowers.

Malpass: As to the most valuable piece of equipment on any golf course today, my answer would be—a pencil! In these days of ever-increasing costs, higher taxes, higher rates for labor, a good superintendent needs to examine every avenue to achieve maximum results with the resources at hand. He must be on top of new technical advances in his field. He must read his professional publications and he must attend his local, regional and national meetings. He must keep up or be lost in the dust.

Great Golf Courses of America

— Their Irrigation Systems

Panel Members: Joseph R. Flaherty, Superintendent, Baltusrol Golf Club, New Jersey

Carlton E. Gipson, Director of Golf Courses, The Woodlands, Texas

Moderator: Stanley J. Zontek, Northeastern Director, USGA Green Section.

Zontek: To start things off, would you tell us about the type of irrigation systems at your course?

Flaherty: Baltusrol is located in New Jersey and we have predominately bentgrass fairways, tees and greens. We have an automatic, electric, two-row system with master and satellite controllers. Our main lines are of asbestos cement pipe and 99 per cent of them run through the rough areas with plastic lateral lines into the fairways. The polyethylene lateral lines are only under pressure when the sprinklers are operating, but the asbestos cement main lines are always pressurized. On our 36 holes, we have 46,000 feet of asbestos cement main line and roughly 250,000 feet of polyethylene lateral lines. We have four deep wells plus a connection with the local water company. When we need it, we can obtain 500 gpm from them. In all, we have

available, 1,200 gpm for our two golf courses. We can cover from tee to green in a 12-hour cycle. Greens are never watered at night. They receive irrigation in the morning hours and always after they have been cut.

Gipson: Texas is bermudagrass country and we use 690 heads in a two-row hydraulic system. We have Tifdwarf greens, Tifton 419 fairways and common bermudagrass roughs. We have PVC pipe and a pumping station with a capacity of 1,300 gpm. We can irrigate the entire golf course in eight hours.

Zontek: What is your basic irrigation schedule?

Flaherty: I'm sure there are basic schedules for every part of the country depending upon climatic conditions. However, our regular night schedule calls for the operation of 33 valves (66 sprinklers) on half-hour shifts. During periods of high tem-



Heave-ho me lads heave-ho, a sailing we will go.

perature, humidity and cloud cover, we cut this schedule at least in half and do not start irrigation until 6 o'clock in the morning. Then we begin on the first hole and stay ahead of the golfers. If syringing is needed by mid-afternoon, we use manual hand operation techniques. The master controller is never used for syringing. Around greens, at least half the watering is still done by hand with hose and nozzle. It is difficult to irrigate the greens as well as collars and banks perfectly with an automatic system. Therefore, I put just enough water on the greens to carry them through the day and hand water collars and banks as needed when wilt develops. We have not by any means eliminated hand watering around our greens.

Gipson: We follow about the same program and do some hand watering on the banks and use roller sprinklers. Actually, we water as little as possible; seldom more than 10 minutes a night. But we do get an awful lot of rainfall and must be very careful about overwatering with the system.

Zontek: You are both concerned about applying too much water through the irrigation system.

Gipson: I don't know of a better way to put it.

Flaherty: It's just good business to put on just enough water to carry the grass. If we put on enough water to bring the soil to field capacity and then get a rain, we have no way to get rid of the excess water. Of course, there is a great temptation to put on too much water because everyone likes to have the course as green as possible. However, I found whenever I apply a little bit too much water we have more disease and more problems. It brings me back to letting things get just a little bit off color rather

than have them lush and green all the time.

Zontek: If you were an irrigation engineer, what would you change in irrigation design?

Gipson: In installing about five irrigation systems, I find myself making a few changes each time as I go along. For example, I've found that quick couplers should not only be installed on each green and tee, but I want some in the fairway landing areas as well. There is just no way you can properly irrigate a golf course with an automatic system alone. Quick couplers are needed and if you try to get along without them, you are going to be in trouble.

Flaherty: I think most problems lie with the original design of an irrigation system. I'm talking about the physical layout of pipes and sprinklers and controllers and drainage. At Baltusrol, we retained a local hydraulic engineer who did the design of the system first and then we looked for the equipment for installation. I spent a great deal of time with the engineer. Together we did our best to tailor a system to fit our golf course. Then we selected the equipment to fit our system. To be very honest, if I had to do it over again, I don't think I would make any basic changes in this system. The original design was good, the equipment is good and it has worked beautifully for us.

Gipson: I think an automatic system should be as simple as possible. We don't need more sophistication, more complicated controllers, etc. You cannot program water 14 days ahead of time—at least not in my country. What the golf course superintendent needs is an automatic system that can be operated as simply as possible and one that he can repair (including the controllers) on the golf course.

Please, don't make automatic systems more complicated.

Flaherty: I couldn't agree with you more, Carlton. The last thing in the world we need is a system that needs an engineer to operate it and keep it in repair.

Gipson: I think a point we would both stress is that of proper automatic irrigation system installation. The best possible design can become all but useless if it is not carefully and properly installed.

Zontek: Do you think the irrigation system you have contributes to your great golf course?

Gipson: Automatic irrigation systems give us a higher degree of flexibility in carrying out our irrigation program. We try to keep enough moisture in the ground to keep the grass growing at an optimum rate. We try to achieve this level with the automatic system because it can be precisely controlled. However, if additional water is needed during the day, it is applied by hand or manual operations. Of course, automatic irrigation is very valuable when applying chemicals and fertilizers to avoid the possibility of chemical burn.

Flaherty: The biggest temptation in automatic irrigation is to put on too much water. This is easy for me to say, because we are in the process, and have been for several years, of trying to keep *Poa annua* out of our fairways. Consequently, I use less water than the superintendent who has predominately *Poa annua* on his course. In the latter instance, you have to put on more water than you should in order to carry the grass through a hot spell. It's surprising, but some members don't object to a few brown spots here and there once they become used to the idea. The best golfers are more concerned with the lie they get on the fairway than the color of the grass. Of course, they do not want it burned up or brown. How-

ever, if it's a little off color and they still get a good lie, they prefer it to soft, spongy turf. This is one of the big points in championship golf. The lie is the thing. On the other hand, if you are attempting to maintain *Poa annua* fairways, it's tough not to have the fairways wet. It think it is impossible not to have them too wet at times.

Zontek: What are your comments concerning the future of golf course irrigation?

Gipson: At the Woodlands we are building an entirely new town and we project 140,000 people there by 1990. We plan to start using effluent water from the disposal system on our golf courses as soon as possible. I used effluent water for golf course irrigation on a golf course in Mexico City in the early 1960s. The price of domestic water was just out of reason and a disposal plant was installed. It cleaned the water and we used it very effectively on the course at little or no cost.

Zontek: In summarizing our discussions, it seems safe to say that Great Golf Courses are not overwatered. In fact, they probably tend to be on the dry side with firm, fast greens. Tees should also be firm and fairways should not be wet and soggy. This is the type of playing conditions most golfers want today. A few high and dry brown spots are really not objectionable. They are not a sign of poor water management, but rather a sign of good and careful water application. One can always add water to any turfgrass area but it is almost impossible to remove an excess of it. Green and lush golf courses may look good, but they do not play well.

Irrigation systems contribute greatly to any golf course. It is how well the course plays—not how long it is or how short it is. Hopefully, it is the ball dropping into the cup in the fewest number of strokes.

A little too much water.

