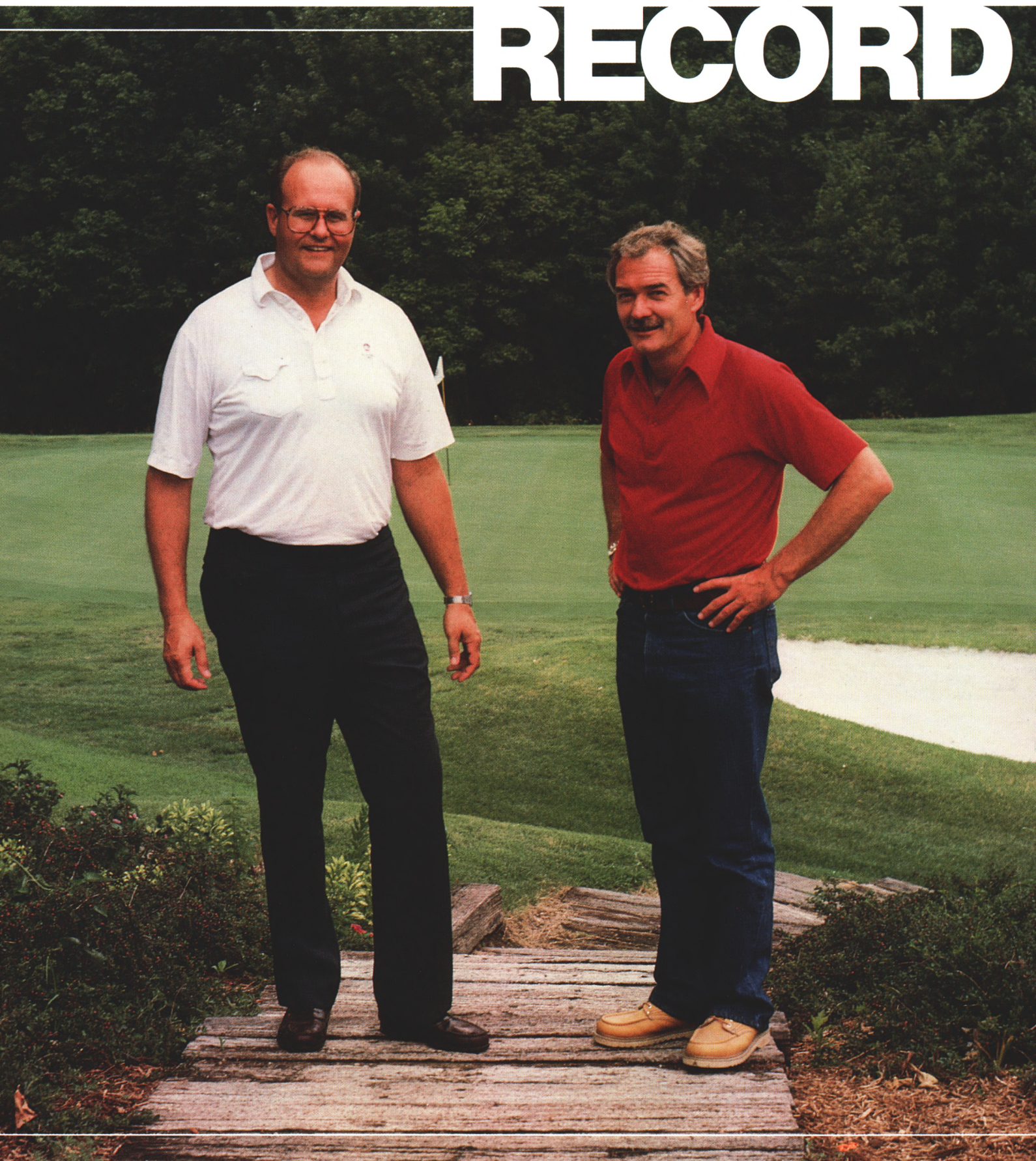


USGA®

# Green Section RECORD





USGA®



**EDITORS:**

William H. Bengeyfield  
James T. Snow

**MANAGING EDITOR:**

Robert Sommers

**ART EDITOR:**

Diane Chrenko Becker

Vol. 27, No. 3

MAY/JUNE 1989

**GREEN SECTION COMMITTEE CHAIRMAN:**

**F. Morgan Taylor, Jr.**

P.O. Box 758  
Hobe Sound, Fla. 33455

**NATIONAL DIRECTOR:**

**William H. Bengeyfield**

P.O. Box 3375  
Tustin, Calif. 92681  
(714) 544-4411

**GREEN SECTION AGRONOMISTS AND OFFICES:**

**Northeastern Region:**

United States Golf Association, Golf House  
Far Hills, N.J. 07931 • (201) 234-2300

James T. Snow, *Director*  
Tim P. Moraghan, *Agronomist*  
James Connolly, *Agronomist*  
James E. Skorulski, *Agronomist*

**Mid-Atlantic Region:**

P.O. Box 2105  
West Chester, Pa. 19380 • (215) 696-4747  
Stanley J. Zontek, *Director*  
David A. Oatis, *Agronomist*

**Southeastern Region:**

Suite 110, 2110 Walton Way  
Augusta, Ga. 30904 • (404) 733-5868  
Patrick M. O'Brien, *Director*

8908 S.E. Colony Street  
Hobe Sound, Fla. 33455  
John H. Foy, *Agronomist* • (407) 546-2620

**Great Lakes Region:**

8727 North Deerwood Drive  
Brown Deer, Wis. 53209 • (414) 354-2203  
James M. Latham, Jr., *Director*

**Mid-Continent Region:**

300 Sharron Drive, Waco, Texas 76710 • (817) 776-0765  
James F. Moore, *Director*

**Western Region:**

P.O. Box 3375  
Tustin, Calif. 92681 • (714) 544-4411  
Larry W. Gilhuly, *Director*  
Paul Vermeulen, *Agronomist*

# Green Section RECORD

1

**Two Perspectives On: "Help Wanted — Career Opportunities"**  
*by James F. Moore*

5

**Does Fertilizer/Pesticide Use on a Golf Course Put Water Resources in Peril?**  
*by Thomas L. Watschke, Scott Harrison, and G. W. Hamilton*

9

**Avoiding False Economy in Golf Course Management**  
*by J. Michael Veron*

11

**Just Hit It!**  
*by Stanley J. Zontek*

12

**News Notes for Spring 1989**

**Back  
Cover**

**Turf Twisters**



*Cover Photo:*

*Green committee chairman John Swenson (left) and superintendent Tom Van de Walle (right) at Bellerive Country Club, near St. Louis, Missouri, have found a good working environment.*

©1989 by United States Golf Association®. Permission to reproduce articles or material in the USGA GREEN SECTION RECORD is granted to publishers of newspapers and periodicals (unless specifically noted otherwise), provided credit is given the USGA and copyright protection is afforded. To reprint material in other media, written permission must be obtained from the USGA. In any case, neither articles nor other material may be copied or used for any advertising, promotion or commercial purposes.

GREEN SECTION RECORD (ISSN 0041-5502) is published six times a year in January, March, May, July, September and November by the UNITED STATES GOLF ASSOCIATION®, Golf House, Far Hills, N.J. 07931. Subscriptions and address changes should be sent to the above address. Articles, photographs, and correspondence relevant to published material should be addressed to: United States Golf Association Green Section, Golf House, Far Hills, N.J. 07931. Second class postage paid at Far Hills, N.J., and other locations. Office of Publication, Golf House, Far Hills, N.J. 07931. Subscriptions \$9 a year. Foreign subscriptions \$12 a year.

# Two Perspectives On: “HELP WANTED — CAREER OPPORTUNITIES”

by JAMES F. MOORE

Director, Mid-Continent Region, USGA Green Section

## GUIDELINES FOR THE SUPERINTENDENT

**O**KAY. You're about to be interviewed for a new job. You're thinking about changing not only your address but yours and your family's life-style as well. It is obvious you are about to make one of the most important decisions of your life, assuming you are offered the chance. Are you ready? If you are like most superintendents, you're not even close.

It is the sad truth that many superintendents put more effort into choosing a used car than in considering a career change. They are more concerned with how to land the new job than they are with whether or not the job is worth landing.

There is much to consider before making an intelligent decision of this magnitude. What follows is a checklist of sorts. Once this information is gathered, the superintendent will have a good picture of the new working environment.

### Agronomic Factors

So many superintendents with formal education tend to think they can overcome any agronomic problem. This is a false and potentially dangerous assumption. As turf managers, we have the ability to influence nature, not control her. Much like a tugboat guiding an aircraft carrier, we can only help point things in the right direction. Careful consideration should be given to the agronomic challenges of the prospective course. The superintendent must also be realistic concerning his own ability. A balance must be achieved between willingness to accept new challenges and potential for failure.

To obtain a true picture of the agronomic factors at the new course, a superintendent should ask for the following items. He should also ask for time alone to examine the information.

1. *The most recent soil and water quality tests.* Pay particular attention to the levels of salt and sodium. These types of soil conditions are extremely difficult to overcome, even with the best of management.

2. *Pesticide records.* Look closely at the history of pesticide applications. This shows the stresses the course must endure. For example, repeated sprayings for a particular disease or insect indicates trouble ahead. Has the previous superintendent rotated his chemical applications to prevent the development of resistant types? Do the records indicate pest problems that cannot be overcome through routine turfgrass management, or problems with which you have little or no experience?

(continued on next page)

## GUIDELINES FOR THE CLUB

**Y**OUR PRESENT superintendent is leaving soon, or has already taken another position. The job of finding a replacement has fallen upon you, and you are learning that it is not just a matter of running a help-wanted ad in the local newspaper. If that were the case, the ad would probably read as follows:

Wanted — College graduate with extensive knowledge and experience in the following fields: turfgrass management, horticulture, irrigation design and repair, construction, personnel management, budget development and implementation, mechanics, and public relations. You must be willing to work as many hours as necessary to get the job done, regardless of personal life. You must be willing to work for hundreds of bosses who will second guess every decision and program you propose. You will also be expected to forecast, compensate for, and budget for every whim of nature. You must be able to motivate underpaid employees to produce top-quality work on a daily basis. All these goals must be accomplished without interruption to play or inconvenience to the membership. Finally, you must be willing to work in a barn.

Although this is a reasonably accurate representation of the job opening you seek to fill, an ad like this would not be very effective.

How do you go about finding such an individual? What do you look for in a new superintendent? What can your club do to attract the best superintendents available?

### How to Solicit Applications

One of the most effective means of gathering applicants is to contact the Golf Course Superintendents Association of America. The GCSAA offers an employment referral service to their membership of more than 8,000. Notices of job opportunities are mailed to subscribing members every week. These notices include specific information about the course and the position offered. Over 1,000 of the 8,000 members subscribe to this service, so be prepared to receive a great deal of mail. To have your club listed will cost \$50.00 per week. Contact the GCSAA membership department at this address: Golf Course Superintendents Association of America, 1617 St. Andrews Dr., Lawrence, KS 66046, telephone (913) 841-2240.

Most professional superintendents are also members of state and local turfgrass associations. Many of these associ-

(continued on page 3)



# Guidelines for the Superintendent *(continued from page 1)*

3. *Past USGA Green Section reports.* In one sense, USGA Green Section agronomists act as club historians. Turf Advisory Service reports document clubs' efforts to improve their facilities. By the same token, these reports also document the lack of such actions. TAS reports detail the problems experienced by the clubs and the solutions offered.

4. *The club's long-range or master plan.* It is important to have an idea of what the membership expects in the golf course. This will allow you to match your career goals and expertise with the club's plans for the future. For example, if you are a superintendent who thrives on golf course construction projects, and the club you are considering does not have a master plan, or has recently finished major construction, you probably should look somewhere else.

Some agronomic information is best gathered through your own inspection. Take a soil probe or soil profile tool. Look at the construction of the greens and tees. Are the greens located in shady areas, surrounded by trees that restrict air movement, or too small to support the play they receive? Are there worn spots in the fairways or near the greens that indicate a lack of golf cart control? Does the architecture of the greens and tees allow traffic to be distributed over large areas? Are there indications the irrigation system is under-pressured or the design of the system is inadequate? If the course is composed of a mixture of cool- and warm-season turfs, does the irrigation system address the individual needs of both? Are there environmental factors that require constant pesticide applications to sustain the turf at a level demanded by the membership?

Make notes as you tour the course. Be prepared to submit a written summary of your observations to the committee, if it is requested.

## Physical Plant

Regardless of the skill of the superintendent or the agronomic conditions, it takes good equipment and good working conditions to produce a consistently high-quality product. The maintenance building should provide a clean, comfortable environment for the golf course staff. There should be sufficient office space for the superintendent, his assistant, and the shop foreman or mechanic. Areas should be provided for the crew to eat, store their gear safely, and shower at the end of the day. Uniforms and safety equipment for the crew should be available. There should be separate and secure storage areas for pesticides, fertilizers, and equipment repair parts. The mechanic's area must be properly lighted and ventilated, and it should provide adequate room for equipment maintenance. It is a fair assumption that a club that does not provide these basic needs has a poor understanding of the demands of golf course maintenance.

Your evaluation of the physical plant must also consider the work habits of the previous superintendent. Has the equipment been well cared for, and has the maintenance performed been documented? Is the pumping plant clean, and has it been regularly serviced? Have things been patched up or properly repaired? Are the shop and maintenance yard well organized, or are they cluttered with junk? Once again, you can safely infer that a superintendent who is content to work in a sloppy shop is

likely to accept the same type of work from the crew.

## Management Factors

The relationship of the superintendent to the membership and leadership of the club is perhaps the most important factor that must be examined in considering a job change. It is a sad fact that superintendents often lose jobs because of management problems, rather than agronomic failures. Today's superintendent cannot hide in the maintenance building and remain isolated from the membership. He must convey his ideas in a professional manner to see his programs are accepted. To accomplish this goal, he should have a clear understanding of the club management's style of leadership.

It is absolutely necessary for a potential employer to have a clearly defined organizational chart identifying to whom the superintendent is directly responsible, either a committee or an individual. Be extremely wary of clubs with fuzzy management structures.

Prospective superintendents too often base their decision on whether to accept a new job on salary alone. Be sure to examine the complete benefit package. Does the club encourage and support participation in local, state, and national turfgrass educational conferences? Does it offer medical and retirement plans? Is the superintendent included in the organization's insurance policy covering liability claims against the club?

The compensation package obviously will be important. However, salary is not the only factor that should be considered. Are the assistant, the mechanic, and the crew paid fairly? These are the

TABLE 1

### CHECKLIST FOR THE SUPERINTENDENT

#### Agronomic Factors

- Soil tests
- Water quality test
- Water availability
- Pesticide records
- Local environmental conditions
- Annual maintenance budget
- Past Green Section reports
- Long-range or master plan
- Construction of greens and tees
- Amount of play course receives
- Turfgrass varieties used on course

#### Physical Plant

- Maintenance building
- Irrigation system
- Equipment

#### Management Factors

- Clear organizational chart
- Stability/tenure of management
- Salary/benefits comparable to area
- Working conditions for support staff
- Maintenance budget

TABLE 2

### CHECKLIST FOR THE CLUB

- Experience
- Education
- References
- Tenure at previous jobs
- Positions held in industry and community
- Management skills
- Communication skills
- Continuing education efforts
- Licensed for pesticide applications
- Career goals



people you will have to depend on to carry out your programs. Low pay and poor benefits lead to constant turnover of the staff, which guarantees major problems for you in the future.

If it is possible, determine the stability of the club's leadership. Committees that change every year frequently demand complete changes in course management as well. Clubs with a revolving door policy of hiring and firing superintendents and managers are not likely to change just because of you. Many superintendents demand and get employment contracts before going to work for such clubs. Many a USGA Green Section report has been written encouraging continuity in the management of the golf course. This can only be accomplished when there is a continuity of club leadership as well.

Once the leadership and membership goals have been identified, one can determine if the maintenance budget is sufficient. Examine the budgets over the past three or four years. Have they tended toward reduction or growth? Is the budget comparable to other courses of similar stature in the same area? Are there major differences between what the previous superintendent has suggested and what finally was approved?

Be certain the budget figure presented to you represents only the care of the golf course. Many clubs include a wide variety of miscellaneous expenses under the catch-all heading of "Golf Course Budget." Some common examples include: the care and charging of the golf cart fleet, pro shop salaries and expenses, landscaping and maintenance of the club grounds, swimming pools, tennis courts, etc. Finally, look for budget items that are abnormally high. In some areas water and utility costs can turn what appears to be a large budget into one that is inadequate.

## Conclusion

Obviously a great many factors should be considered before accepting a new position. There are few if any perfect jobs. If they exist, be assured the present superintendent will be in no hurry to leave. Therefore, you will have to make a few compromises when considering all the factors involved. Keep in mind, however, that top-notch superintendents are in greater demand than ever before. If you fall into this category, you can afford to be choosy.



(Top) Good working conditions for the superintendent.

(Above) Good working conditions for the crew inspire higher quality work on the course.

## Guidelines for the Club *(continued from page 1)*

ations publish excellent monthly newsletters. Typically, they are eager to post job openings for the benefit of their members, and at a very reasonable cost. Any professional superintendent in your area should be able to provide you with the address and phone number of these associations.

You may also wish to contact the USGA Agronomist for your region. Each office receives frequent calls from superintendents and clubs looking for each other. The Green Section will not pick a superintendent for you. That is a decision that must be made by the

individual club. We will help put you in touch with three or more good superintendents locally or from around the country. The address and phone number of each regional office is listed inside the front cover of this publication.

Assuming you are offering a fair wage and decent working conditions, you will quickly accumulate a sizeable list of applicants. Telephone interviews should be conducted, and resume references checked to narrow your list to from four to 10 prospects. These individuals should be interviewed. Be prepared to pay their travel expenses.





### What to Look for in a Superintendent

Now comes the hard part. You must evaluate each applicant to determine the best superintendent for your course. Some key areas to consider:

As it is in most technical fields, the combination of a formal education and practical experience is ideal. Most colleges do not stress the day-to-day management duties of a superintendent. These are skills that can best be acquired through apprenticeship as an assistant working for an experienced superintendent.

Colleges offer the educational background in physiology, pathology, entomology, soil physics, and irrigation design that a superintendent needs to evaluate new situations and make the proper decisions. In addition, a formal education should also allow the prospective superintendent to develop skills in communication and management that are invaluable in dealing with memberships.

Obviously a prospective superintendent whose resume includes degrees from a recognized university as well as the school of hard knocks should be strongly considered.

Clubs facing major construction projects (such as building greens or installing an irrigation system) often feel they should hire a superintendent with experience in such construction. Although this is certainly an asset, it should not be an overwhelming factor in choosing the new superintendent. A

professional superintendent knows help is available from many sources, and is willing to seek assistance when it is necessary. Choose your superintendent based on overall ability. The best superintendent is like the family doctor, someone skilled in many areas, rather than concentrating all his efforts into one specific aspect of the profession.

Today's superintendent must be able to communicate with the membership and leadership of the club as well as with the maintenance crew and technical representatives. Superintendents who lose their jobs lose them principally because they can't communicate with their employer in a professional manner.

An effort should be made during the interview process to evaluate each candidate's communication skills. One good method is to give each candidate time to tour the course on his own. They should be given access to pertinent records, then asked to submit a brief written summary of their observations. Recognize that what is important in evaluating these summaries is the candidate's ability to express his ideas, with secondary consideration given to the ideas themselves.

### How to Attract the Best Superintendents

Most superintendents realize the best jobs are not necessarily those with the biggest budgets and the largest paychecks. Once again, many aspects of the

working environment must be considered. Pay close attention to the adjacent article discussing what a superintendent should look for in a club. Your club should meet these requirements. Too many clubs fail to take these steps, and they simply cannot keep a good superintendent. They soon develop the reputation that they are not a good club to work for.

Constant criticism of the superintendent's efforts, a poorly structured and fickle leadership, and unwillingness to provide good working conditions are recognizable characteristics. Like any industry, good management dictates fair and proper treatment of employees.

Our fictitious want ad might cause one to wonder why anyone in his right mind would want to be a golf course superintendent. There are a number of very good reasons.

- Few jobs provide greater challenge, diversity, or personal satisfaction.
- Salaries and benefit packages have become more commensurate with the requirements of the job.
- The superintendent works daily with two of the most unpredictable forces in existence — people and nature. While these forces are capable of occasionally making the superintendent's life miserable, these same forces have a much greater potential for providing the superintendent with the opportunity to excel in a game that is healthy and growing stronger.



# Does Fertilizer/Pesticide Use on a Golf Course Put Water Resources in Peril?

by THOMAS L. WATSCHKE, SCOTT HARRISON, and G. W. HAMILTON  
Professor of Turfgrass Science and Research Associates, respectively

**N**OT TOO LONG AGO, construction of a golf course was considered to be an ecologically sound and practical use of land. It often preserved green space in otherwise intensely developed sites, and provided a recreational opportunity convenient to residents. Golf courses were an extremely popular and environmentally harmonious component of the suburban/urban ecosystem.

What has happened? Why are golf courses now considered by some to be analogous to toxic waste dumps? Of course, the answer to these questions is complex, and probably has more to do with sociological and psychological issues than it does with answers that can be provided by turfgrass scientists and their research.

However, significant research is being conducted to address these concerns. Before discussing this research, it would be prudent to discuss some of the other aspects of why golf courses have created such environmental concern.

Ever since the book *Silent Spring* was published, a pesticide consciousness has prevailed in this country that has led to important and necessary legislation and regulation of pesticide development, sale, and use. However, as the Environmental Protection Agency has stiffened requirements for registration of new compounds, required additional information for re-registration, and identified various contaminated dump sites, the various forms of news media have consistently provided the public with a one-dimensional view of pesti-

cides. From Times Beach to the apple and alar scare, our mass media have tended to sensationalize any story pertaining to pesticides. The death of a navy man who had played golf at Army-Navy Country Club was attributed to pesticide exposure (Daconil). Where was the press when the case was tried in court, and Daconil exposure was ruled out as a cause of death (even to the satisfaction of the widow)?

Such positive information about pesticides is rarely seen by the public, if it ever is. Unfortunately, the public depends heavily on the news media for its daily dose of education. Therefore, opinions about issues are shaped by the articles the public reads or the news stories it sees and hears. As long as doom and gloom are perceived to be

Figure 1.





what the public wants to know, the one-sided presentation of information pertaining to pesticides will continue.

The public's perception of pesticide use is shallow and for the most part uneducated. Most people believe that when a pesticide is applied to anything, it either leaves the site in runoff or seeps into the ground and contaminates groundwater. They have no comprehension of ultra-violet light degradation, volatility, soil and organic matter attenuation, and microbial degradation. The fate of a pesticide applied to any site is an extremely complex arrangement of possibilities that cannot be explained in the simple terms that serve as popular perceptions. Consequently, for the past two decades, almost any use of pesticides has been perceived to cause a negative impact on all aspects of the environment. By association, golf courses, the former providers of green space and natural setting, have been found to be on the hit list of environmental groups.

Twenty years ago, *Golfdom* magazine (Vol. 43, No. 4) published an article entitled "Golf Resort of the Future." The article quoted a National Golf Foundation report that indicated 40 percent of the new golf clubs under construction were part of large real estate developments. This sounds familiar even today, with the country going through a golf course construction boom. The article discussed our mobile society and the need for planned communities. It mentioned lush, rolling, clean, green recreational areas, surrounded by houses and apartment buildings. Emphasis was always placed on the open spaces and the importance of natural settings within any development. Permitting such projects and the likelihood of their approval by planning commissions, zoning hearing boards, and other agencies was enhanced by the inclusion of a golf course. Things have certainly changed. A golf course in a development plan today precipitates concerns about fertilizer and pesticide use, and their impact on runoff and groundwater.

The golf course community has always been concerned about water quantity and quality. In 1968 James Moncrief, Director of the Green Section's Southern Region, wrote about water in the November issue of the *GREEN SECTION RECORD*. In addition to hydrology and the principles of applying water to land, he discussed groundwater and chemicals in the water. His primary message dealt

with being certain of the quantity and quality of available water before irrigation systems were installed.

He was concerned with the health of the turf should it be irrigated with water of inferior quality. The concern today is for whether or not what is applied to the turf unnecessarily degrades the quality of the water emanating from the golf course.

Ironically, in the same *GREEN SECTION RECORD* issue (in fact, the next article), Dr. A. Robert Mazur, then an agronomist with the USGA and now a turfgrass specialist at Clemson University, published an article entitled "The Fate of Herbicides." The basic thrust of the story dealt with those pesticide issues discussed previously in this article.

Even earlier, in the July, 1964, issue of *THE RECORD*, Dr. Marvin Ferguson, then Mid-Continent Director of the Green Section, wrote "Pesticides — Boon or Bane?" He credited the use of pesticides for the great deal of progress that had been made in improving the quality of golf courses. He also mentioned the fears of some for the use of pesticides. He concluded that all those involved in the use or commerce of pesticides have an obligation to be aware of the potential dangers inherent in the materials they use. He made the point that all pesticides should be used according to the instructions of the manufacturer, stored safely, and handled with a knowledge of possible effects upon plants, animals, and man. Ferguson's article is just as appropriate and pertinent today.

Most of today's superintendents are well trained and educated in pest management and pesticide use. Even so, it is popularly assumed that pesticides are overused on golf courses because of the "intensive management" required to provide high-quality playing conditions for an increasingly demanding golfing public.

Pest management on golf courses is usually a fairly visible practice, and at times requires sequential applications of chemicals at specific intervals, depending on the pest.

Fertilizer use is also assumed to be relatively high to maintain aesthetic quality and a growth rate that can accommodate wear. It is not surprising, therefore, that some assume turf management has a high potential to contaminate water supplies. It is obvious that research is needed on the effects nutrients and pesticides might have on runoff and leachate.

#### **The Water Quality Research Program at Penn State University**

The facilities for this project are located at the Landscape Management Research Center near the main campus of The Pennsylvania State University. The site, located on a variable slope (9 to 14 percent), was formerly used for soil erosion research, and was allowed to return to a natural state for nearly 40 years before being renovated to accommodate this project. The soil is a Hagerstown series, originating from limestone residuum, and typical of the

**TABLE 1**  
**Concentration ranges, frequencies, and public drinking water limits of eight nutrients and pesticides applied to turf plots**

| <b>Nutrient/<br/>Pesticide</b> | <b>Federal<br/>Drinking<br/>Water Limit</b> | <b>Number of<br/>Sample<br/>Dates</b> | <b>Number of<br/>Dates Not<br/>Detectable</b> | <b>Number of<br/>Dates Below<br/>Drinking<br/>Water Limit</b> |
|--------------------------------|---------------------------------------------|---------------------------------------|-----------------------------------------------|---------------------------------------------------------------|
| Nitrate-N                      | 10 ppm                                      | 29                                    | 2                                             | 28                                                            |
| Phosphate-P                    | N/A                                         | 29                                    | 9                                             | N/A                                                           |
| Potassium                      | N/A                                         | 29                                    | 1                                             | N/A                                                           |
| Pendimethalin                  | N/A                                         | 24                                    | 24                                            | N/A                                                           |
| 2,4-D                          | 100 ppb                                     | 24                                    | 10                                            | 20                                                            |
| 2,4-DP                         | N/A                                         | 24                                    | 12                                            | N/A                                                           |
| Dicamba                        | 210 ppb                                     | 24                                    | 8                                             | 23                                                            |
| Chlorpyrifos                   | N/A                                         | 24                                    | 24                                            | N/A                                                           |



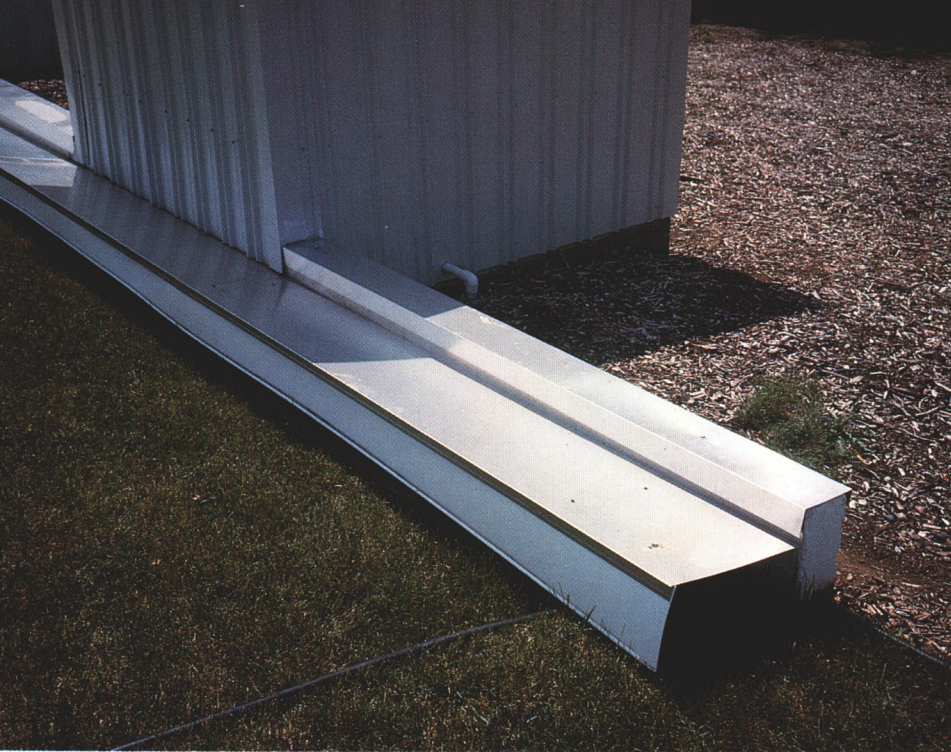


Figure 2.



Figure 3.

karst geology found in the Ridge and Valley province of central Pennsylvania. The surface soil was texturally classified as clay (23 percent sand, 36 percent silt, 41 percent clay), based on particle size analysis at the time of tillage.

Renovation of the site took place from 1982 to 1985 and included grading, installation of individual plot irrigation systems, installation of lysimeters in the upper and lower portions of the plot slopes, restoration of collection weirs, fabrication of flow monitor and subsampling equipment, and linkage of automated datalogging and computer systems.

Surface preparation for turfgrass establishment consisted of rototilling (102mm depth), stone removal, rolling, and leveling by hand raking.

Plots were 6.45m by 18.9m and were separated by plastic edging material that extended 102mm into the soil. Edging was laid to eliminate inter-plot surface and near-surface movement of water or applied chemicals. Each plot (Figure 1) contained 21 pop-up sprinkler irrigation heads calibrated to deliver water at a uniform rate of 76mm/hr during 1985. In 1986, the system was fitted with nozzles calibrated to deliver 152mm/hr.

An epoxy-coated concrete weir was positioned at the bottom of each slope to intercept runoff water. The runoff was directed through a galvanized steel chute into a building that housed the flow-monitoring and subsampling

apparatus (Figure 2). Pan lysimeter-type subsurface sampling devices (Figure 3) were installed 152mm below the soil surface to capture percolating water. The depth capacity of the samplers was 38mm.

The lysimeters were constructed from round, high-density polyethylene containers filled with 16mm diameter glass marbles as ballast. A piece of polyester geotextile material separating the glass ballast from the overlying soil prevented sediment from entering the lysimeters. Polyethylene fittings at the top and bottom of the containers facilitated venting and emptying the samplers. Water samples were withdrawn through a centrifugal pump.

Inside the building, water from the chute flowed through a polyethylene splitting chamber (for subsample collection) and into a partitioned galvanized steel tank. A length of eight-inch corrugated PVC pipe was suspended below the splitter to act as a baffle to minimize wave formation in the tank. Water accumulating in the receiving side of the tank flowed through a standard hydrologic V-notch into the exit chamber and was pumped to a storage/disposal tank. A float and counterweight assembly was positioned in the receiving side of the partitioned tank and was banded to a pulley attached to a potentiometer. As the float assembly responded to changing water levels in the tank (a function of runoff flow rate),

it turned the potentiometer and produced a voltage signal associated with that water level and flow rate.

The voltage signal in each building was read every 60 seconds by a microprocessor-equipped datalogger in an adjacent lab. The voltage signals were converted into flow rates, and the data were recorded on a bulk storage tape drive, accessible by PC communication software. The data collection system could be activated manually, or automatically by the detection of rainfall at an adjacent weather station.

Runoff water for quality analyses was subsampled continuously from the splitting chamber over the course of any runoff event. Water was transferred at a rate of 16ml/min to a liter high-density polyethylene bottle.

Three turfgrass types were established in late June of 1985. The three experimental treatments (establishment method) were: 1) a seed mixture consisting of 25 percent Merit Kentucky bluegrass, 25 percent Julia Kentucky bluegrass, 20 percent Shadow chewing fescue, and 30 percent Citation perennial ryegrass; 2) a contractor's seed mixture containing 60 percent annual ryegrass, 20 percent common Kentucky bluegrass, and 20 percent creeping red fescue; and 3) a three-year-old Pennsylvania Certified 100 percent Kentucky bluegrass sod grown from the following seed mixture: Adelphi (25 percent), Baron (25 percent), Fylking (25 per-



cent), and Nassau (25 percent). All treatments received a complete fertilizer (according to soil test recommendation) at planting. Soil pH was 7.0 and no lime was applied.

Plots were mowed weekly to a height of approximately two inches (clippings removed) during the growing season. Irrigation was not employed as a routine maintenance practice, however scheduled irrigations were used to produce runoff and leachate samples. Mechanical cultivation techniques such as core aeration, slicing, or spiking were not used.

Pesticides included in the study were pendimethalin, 2,4-D, 2,4-DP, dicamba, and dursban. Beginning in 1986, plots were treated with pesticides and fertilizers four times annually as follows:

Spring — Pendimethalin for pre-emergence control of annual grassy weeds, plus a complete, soluble fertilizer. Early summer — 2,4-D, 2,4-DP, and dicamba for postemergence control of broadleaf weeds, plus urea fertilizer.

Late summer — 2,4-D, 2,4-DP, and dicamba plus chlorpyrifos for the control of insect pest species, plus urea.

Fall — 2,4-D, 2,4-DP, and dicamba plus urea.

Irrigations were conducted approximately one week before and two days after each chemical application in order to produce runoff and leachate samples for analyses of pesticide and nutrient concentrations. Duration was typically 90 minutes for pre-application events and 60 minutes for post-application events. In addition, all natural precipitation events were monitored for the occurrence of runoff and percolate.

Water samples were collected immediately following precipitation or irrigation events for subsequent processing and storage.

Turfgrass quality parameters (color, cover, weeds, and overall quality) were visually estimated periodically throughout the growing season to document the development of the turfgrass, and to determine whether stand quality was related to overland flow. Total vegetative cover was determined as a percent of the total area covered by vegetation (as opposed to stand density counts), and reflects the amount of exposed soil associated with each treatment. Weeds were also assessed as a percent of the total area covered by weed species (not as a percent of the total vegetative complex).

Runoff was much lower than anticipated regardless of establishment method. Runoff from sodded slopes was so low that from 1985 to 1986 the irri-

gation system had to be redesigned to deliver six inches per hour instead of three inches per hour. This change was required to develop hydrographs and provide subsamples for nutrient and pesticide analyses. The likelihood of six inches of natural precipitation occurring in central Pennsylvania is extremely remote. In addition, this simulated storm was imposed 48 hours after the application of fertilizer and pesticides.

Three years after establishment, slopes that were sodded still had significantly less runoff than those that were seeded. When infiltration rates were measured, sodded slopes had significantly higher rates than those that were seeded. It was concluded that sodding, as an establishment technique, provided protection for the surface soil structure. Rainfall and irrigation that fell on the site during establishment compacted the surface of seeded slopes, and this effect has persisted throughout the study. Certainly, other factors (stand density, thatch, species differences, etc.) contributed to the runoff differences.

The effect of nutrient and pesticide transport in water is largely a function of ambient concentrations of these potential contaminants and the sensitivity of non-target species. These data provide evidence of the relative transport potential of eight nutrients and pesticides, and should also be useful in predicting transport properties of chemically similar substances. This research did not define the interaction of each compound with the various environmental factors that affect the eventual fate of a given material. The rates of transport of the nutrients and pesticides examined in this study were very low, however, especially considering the amount of irrigation used to produce runoff. In addition, the transport calculations were based on concentrations determined for the treated site.

As a point of reference, U.S. Public Health Administration drinking water standards and measured concentration frequency data are shown in Table 1. The dilution effect of runoff occurring from impervious areas in actual watershed circumstances was not considered. Actual stormwater outfall concentrations of these pesticides and nutrients would be significantly less than the levels found in this study. It should be noted also that in almost all cases where pesticides were detected, the levels were lower than what is allowed in drinking water.

## Conclusion

To the degree that the site employed for this project is representative of other turfgrass sites in central Pennsylvania, the impact of well-managed turfgrass on water quality appears to be positive in nature, based on the hydrologic characteristics of all three cover types and establishment methods studied. The results indicate that dense, high-quality turfgrass stands, regardless of establishment method, affect the overland flow process to such a degree that runoff is insignificant. The ability of this type of vegetative community to allow water to infiltrate and promote the metabolism of solutes suggests it might possess the ability to be employed as a water quality treatment medium.

Establishment and maintenance of turfgrass of high quality is not realized without management inputs, which include quality construction techniques, limited use, and cultural requirements, including nutrient and pest management. Levels of management inputs required to produce the turf quality necessary for positive water quality impacts have not been determined. The range of uses and existing conditions for already established sites illustrates the complexity of the situation.

It is probably safe to assume, though, that many poor-quality turfgrass areas are not recipients of sound, professional management. Although these sites may not exhibit the infiltration capacity of high-quality turf, nutrients and pesticides are less likely to have been used on them.

Last, much of the highly managed turfgrass in the United States is maintained in regions of varying degrees of urbanization. Considering the magnitude of runoff contributed by impervious surfaces, and the fact that treated turfgrass acres in those watersheds constitute only a portion of the pervious fraction of the landscape, dilution of low-level spikes of nutrients and pesticides would certainly occur. Acceptable background levels of these materials in surface water have not been determined. It is likely, however, that their concentrations in stormwater and impact on receiving bodies of water would be considerably less than other urban pollutants not associated with well-managed turfgrass areas.

*This research project was funded in part by: U.S. Geological Survey, College of Agriculture/Penn State University, and Pennsylvania Turfgrass Council.*



# Avoiding False Economy in Golf Course Management

by J. MICHAEL VERON

Past President, Lake Charles Country Club, Louisiana

**T**HE UNITED STATES Golf Association was formed in 1894 by five member-owned private clubs. The last 20 years, however, has seen a rise of golf and country clubs owned by third-party corporations. This can, of course, present significant management problems.

In equity clubs, stockholding members elect a board of directors from among themselves to oversee the club's affairs. Typically, members elected to the board are respected professionals and business leaders in the community. Each has achieved a significant measure of success in his chosen field, and he brings to the board a particular philosophy he believes has accounted for that success.

On a typical eight-member board, one might find a doctor or two, a lawyer, perhaps an accountant, a banker, a retailer, a realtor, and an insurance agent. Like most successful people, these individuals have egos. Each approaches service on the board as an opportunity to put his personal imprint on the club and further demonstrate to the members that their confidence was well placed. Since they're not paid, members serve for the personal gratification of solving problems — and each board member comes to meetings convinced he has the formula for the club's success.

The problem, of course, is that none of these individuals achieved his success through owning or operating a private club. Just how much business experience of the butcher, baker, or candlestick maker can be transferred to the job of the board member is questionable. New board members, in their customary zeal, are fond of proclaiming that the club is "finally going to be run like a business" — as if no previous board had ever considered that possibility. The question, of course, is not whether the club is to be run like a business, but rather what *kind* of business. The retailer likens the club to a retail operation, the banker to his financial institution, the doctor and lawyer to the way each manages his practice.



*The clubhouse at St. Andrews, where the game has always come first.*

What results is a group of self-directed independent people from different backgrounds thrown together with no training or experience for the job they are to do together. Sounds impossible, doesn't it? The wonder is that otherwise intelligent, successful individuals can be persuaded to take such an assignment.

To some degree, each board member's point of reference has merit, but none fits completely. The truth is that a private club devoted to the recreational pursuits of its members is unlike any other business, except, perhaps, a resort. Since a board comprised of resort owners or operators is unlikely, board members must acknowledge the limitations of their own experience, and understand that their new assignment requires a different perspective.

At a minimum, board members must avoid believing in what may be called the false economy of club management. In particular, across those parts of the Deep South economically dependent on oil and gas, the last several years have brought difficult times for private clubs. Since membership in a private club is

understandably considered a luxury, it is among the first things surrendered in times of economic hardship. Clubs in the region watched membership rolls decline precipitously after 1983. Faced with reduced dues lines and member purchases, boards had to cut spending.

The challenge for board members has been to determine where the cuts are to be made. Some prefer an across-the-board approach. In other words, if revenues are down 25 percent, then all departments are to be cut 25 percent across the board. Although it is simple and easy to administer, an approach like this ignores priorities.

Obviously some expenditures can be sacrificed more easily than others. Planned capital improvements can usually be scrapped more readily than maintenance. As obvious as this may be, experience has shown that board members find it difficult not to erect some visible sign, or monument, to their service, something they can later point to as evidence of their tenure. Deferring maintenance, however, frequently costs a club more money than it saves when



deteriorated equipment, fixtures, or golf course conditions later require more drastic remedies than would otherwise have been necessary.

There are variations to this approach, but it is a common failing of each to ignore priorities. The first priority of any business facing spending cuts is to protect its primary revenue-producing asset, *i.e.*, the goods or services without which the business cannot survive. Obviously, the golf course is the primary revenue-producing asset of almost every club. The golf course is what attracts members and their dues. The golf course makes it possible for members to buy golf clubs, balls, and clothes from the pro shop. The golf course brings members out to the club, where they make food and beverage purchases.

A member fundamentally dissatisfied with the golf course is soon to be an ex-member. A club with a reputation for having a goat ranch for a golf course has a dim future. On the other hand, members who enjoy the condition of the golf course are likely to play more often and spend more money on themselves and their guests. Clubs known for their excellent golf courses seem to be successful in attracting members almost without exception.

For these reasons, where revenues are limited, it is important to preserve the quality of the golf course if at all possible. Cuts in the golf course budget should be made after less essential budget items are cut, and with a proper eye toward what can be deferred without a serious compromise of the quality of the course without the risk of greater expense in the future.

For example, failure to maintain a poorly functioning irrigation system can produce widespread turfgrass stress, resulting in disease and permanent loss of turf. The cost of eliminating the disease and the resulting eyesore, not to mention the poor playing conditions, is usually much greater than whatever money was saved by not maintaining the system in the first place. The old maxim "an ounce of prevention is worth a pound of cure" may seem trite, but maxims persist largely because they are true. This maxim applies here as well as anywhere.

If despite its best efforts a club determines golf course spending cuts are necessary, it remains vital that reductions in expenditures be made judiciously. Most of the professional literature indicates that the average annual golf course budget for private clubs today across the Deep South is between \$300,000 and \$350,000. It is not uncommon for more prestigious clubs to have golf course budgets of \$500,000 to \$700,000. By comparing its budget with that of other clubs, a club can gain perspective in knowing what kind of golf course it can expect for the size budget it has, and for the reduced budget it seeks.

The club's greatest asset within its golf course maintenance program is obviously its superintendent. Unfortunately, his salary offers a tempting target for the budget paring knife. At a minimum, many board members may find it difficult to reward even the most deserving superintendent with a raise in the midst of a general belt-tightening. Ironically, it can be argued that the superintendent's importance is inversely related to his budget; the smaller the

budget, the more important the superintendent becomes.

A club on a small budget cannot afford mistakes in maintenance that later require costly cures. A superintendent on a small budget cannot afford to apply the wrong chemicals or engage in other poor cultivation practices; he knows he lacks the money to correct problems he has failed to prevent.

At the same time, a superintendent with a larger budget often has the commitment of the club to do whatever is necessary to maintain its course in first-class condition. He suffers from no lack of the latest in chemicals and cultivating equipment, and while he must inevitably satisfy high expectations, his superiors understand what resources are required to do so.

It is another kind of false economy, then, to save a few dollars by withholding deserved compensation from a competent superintendent, who may consequently leave for greener pastures. Simply put, it takes a more talented superintendent to produce excellent conditions with a \$250,000 budget than it does to produce similar conditions with a \$350,000 budget.

A superintendent who keeps his equipment running well after its useful life, knows chemicals well enough to substitute less expensive variations intelligently, or has a talent for in-house construction projects on the course is producing real savings for his club that usually do not appear on any accounting documents.

In summary, a club riding out rough economic times must understand that a competent superintendent will help preserve and protect its most significant asset during those times, and later take better advantage of increased revenues when they become available. On the other hand, a golf course seriously neglected for even one or two years may take as much as five years to recover. In that time, the club will be lucky to retain its membership base, and will almost certainly have lost the opportunity to take advantage of improved conditions by attracting new members.

In reviewing golf course expenditures, the wise board member would do well to survey other clubs throughout the region for information regarding the compensation packages being offered superintendents. A superintendent whose compensation is competitive throughout his region will more gladly suffer manpower cuts or deferred equipment purchases knowing that his club understands his importance and the value of his expertise.

*Deferred maintenance means more drastic remedies later.*





# JUST HIT IT!

by Stanley J. Zontek

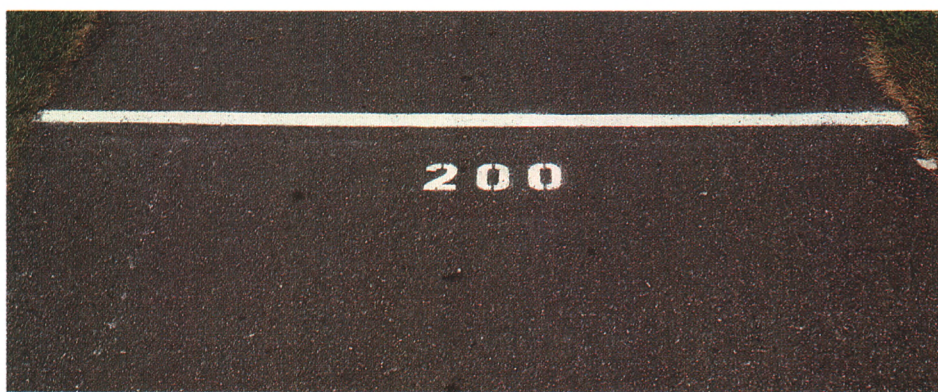
Director, Mid-Atlantic Region, USGA Green Section

GOLFERS have always looked for an edge. Years ago, having a good caddie who knew all the breaks on a green and all the distances to the green was a definite edge. The best caddies were always in demand. There was not the emphasis then, as there is today, on equipment and balls. In fact, at one time most all the molds that determined the number of dimples on a ball were made by one manufacturer, and all the balls basically enjoyed the same type of wound construction and the same balata covers. Caddies with local knowledge provided the only real winning edge.

All of this has changed. Golf magazines are full of ads proclaiming "the longest ball." It is difficult to keep up with ball construction, the number of dimples, types of coverings, and even the color and color combinations of balls. Golfers scurry to purchase balls that go farther, spin faster, land softer, and hold a green better than other brands. The same readers relish articles on equipment controversies, and spend vast amounts of money on state of the art clubs, shafts, grips, and grooves, which they feel give them the edge over their opponent and improve their score. The days of the caddie are gone. They have been almost totally replaced by the golf cart.

As today's golfer heads for the first tee, without the special knowledge of a caddie, he must rely on the golf course superintendent to determine yardages from tee to green or from points on the fairway to the green. Practically every golf course now uses some type of yardage indicator. Tee signs give the yardage, par, and handicap number for each hole. Some even have a picture of the hole and a marker indicating where the cup is located on that day. The modern golfer is better equipped than ever before, even without a caddie.

At one time, the USGA was opposed to yardage markers intended to indicate distances to the green from certain points. Even considering this opposition, many distinctive trees and ornamental shrubs were planted alongside fairways, usually 150 yards from the green. As time went by, the USGA



(Top left) "Just hit it" head is past the 222 head. Where does it stop?

(Top right) Nice yardage plate.

(Above) Yardage marker on cart path.

dropped its opposition to the markers, and since then many other techniques have been used. Some courses now have markers at 100, 150, and 200 yards from the green. They come in many forms:

As marker plates or domes on the center line of fairways.

As pipes, poles, or posts standing in the rough.

As painted lines on cart paths.

Some courses still rely on natural markers and course landmarks with diagrams of each hole on the scorecard showing individual yardages from those landmarks to the green.

Indicating distances to greens by inscribing numbers on individual sprinkler heads is becoming the most commonly used method of yardage indication. The

obvious attempt is to make it as easy as possible for the golfer to determine his distance from the green.

Of all the types of yardage indicators in use today, the type most discouraged agronomically is the use of living trees and shrubs planted specifically in the rough for yardage indication. Before the USGA dropped its opposition to marking the golf course, these natural markers were probably the most used technique. Unfortunately, special problems develop when natural markers are used.

By far the biggest problem with natural markers is as they grow, the once small shrub or tree quickly becomes large enough not only to adversely affect play, but also the mainte-



*(Right) Simple, neat, visible, and effective yardage marker.*

*(Far right) Using a naturally occurring tree as a marker.*

*(Below) Yardage plates on sprinkler heads.*

*(Below middle) The smaller tree IS the marker.*

*(Below right) Domed fairway marker; looks like a big golf ball.*



nance of the golf course. Remember, marker trees or shrubs are usually placed close enough to the fairway to be easily seen. As they grow, they can become a nuisance and an obstacle from which there is no relief under the Rules of Golf.

Living markers are also prone to special problems and needs. They must be pruned to keep them from growing too large, sprayed, and even protected with screens and mulch in the winter. Sometimes they die, and they must be replaced. Some types of plants are eaten by deer and rodents, creating another problem.

On the other hand, relief can be given from artificial markers. For many good reasons, then, it should be recognized that living markers can present special problems with course appearance, how it plays and is even maintained. It is inconsistent to have a yardage aid actually become a hindrance to play.

One of the arguments for using yardage aids is the concept that they will speed play. While this may be true, some yardage indicators are difficult to see, and can actually slow play. Golfers can spend precious time walking around looking for a yardage marker. Sometimes, it is almost like looking for a lost ball. The marker must be visible to be effective.

To serve their purpose, yardage markers must be accurate. The laser is the most accurate technique today. Once the yardage is accurately determined, be sure to move or remove old markers — especially trees and shrubs, which in some cases are in the wrong place. Do not keep them both; it only makes things more confusing, and again it slows play.

Finally, beware of fads. A good example of this is where marker balls are used on flagsticks. While they can be of assistance under certain circum-

stances or with certain golfers, indicators for hole location on greens just may not be needed on every green or under every circumstance. Most courses no longer use this system.

A number of golf clubs object to the overuse of artificial yardage markers. They rely on existing landmarks to determine distances. A prominent tree, the beginning or end of a sand bunker, for example, are all appropriate yardage indicators. It depends on what the golfers want, and they should be the final judge.

Marking yardages on a golf course in one fashion or another seems to be here to stay. The demise of the caddie and the increasing use of the powered golf cart all but guarantee this. Regardless of the technique, remember that knowing the yardage to the green is only a small part of the game. The important part is actually hitting the golf ball. As the old adage says, when in doubt, "Just hit it!"



# News Notes for Spring 1989

## New Video on Green Construction Now Available

*USGA Putting Green Construction* is a brand-new videotape just released by the Green Section and now available only through USGA, Golf House, Box 2000, Far Hills, NJ 07931. Narrated by Steve Melnyk, the 25-minute presentation takes the viewer step-by-step through today's latest specifications and actual construction techniques for a USGA Putting Green.

The reasons and justification for rebuilding greens to the Green Section specifications are dramatically illustrated, from the concept of a perched water table, to a physical soils laboratory, to on-site comments from architect and superintendent alike. This tape will prove invaluable to every club, green committee, superintendent, architect, and builder contemplating new putting green construction. It provides guidelines for the proper building of greens based on the latest scientific research, and the experience of the Green Section staff.

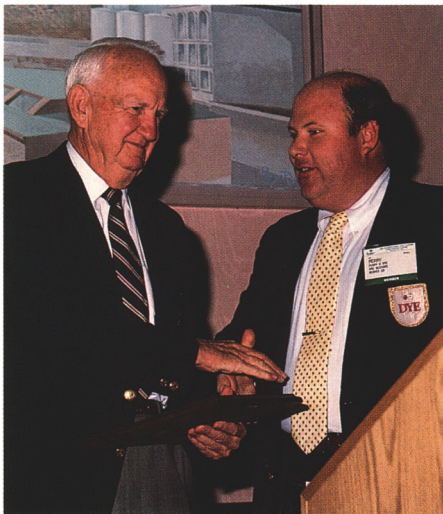
Beautifully filmed, *USGA Putting Green Construction* is available in VHS or Beta for \$19.95.

## New Brochure on the Green Section Putting Green Specifications Also Available

Coincidental to the new videotape on putting green construction, a new booklet, *Green Section Specifications for Putting Green Construction*, has also become available recently. This is the latest revision in presenting the specifications. It has been in the rewriting stage by the Green Section Staff for over a year. Except for a few minor, subtle changes, the specifications remain exactly as they were originally published in 1960, including the incorporation of the intermediate two- to four-inch coarse sand layer. The new publication offers greater detail of the steps involved, and warns there is no such thing as a "modified USGA green." The new booklet and videotape offer companion reading and viewing.

## Golf Course Builders Association Presents Annual Award to USGA Green Section

The Golf Course Builders Association of America presented the 1989



Marion Farmer (left) accepting the 1989 Annual Builders Award from Dave Canavan.

Annual Builders Award to the USGA Green Section during its banquet last February, in Anaheim, California. Marion Farmer, former Chairman of the Green Section Committee and member of the USGA's Executive Committee, is shown accepting the award from Builder Association President Dave Canavan. Don Rossi, Executive Director of the Golf Course Builders Association, coordinated the ceremonies.

## Mole Cricket Correction

Author/superintendent Tom Burton, of Sea Island Golf Club, Sea Island, Georgia, advises us we had the names reversed when we identified the two species of mole crickets in the January/February, 1989, *GREEN SECTION RECORD*. Naturally enough, the correct labeling should indicate Mr. and Mrs. Tawny Mole Cricket on the right and Mr. and Mrs. Southern Mole Cricket on the left.

Incidentally, this may not be an inconsequential correction. Unless some means is soon found to control mole crickets, golf course superintendents throughout the country may soon get to know mole cricket identification firsthand. The problem is widespread.

## The Turfgrass Advisory Service: Still the Biggest Bargain in Golf Course Management

If your golf club has not subscribed as yet to the USGA Green Section's Turf

Advisory Service for 1989, there is still time to take advantage of the Service at reduced rates. By signing up before July 15, the following rates apply:

Half-day visit — \$650.00.

Full-day visit — \$975.00.

No other charges are made. Your club will receive a direct, on-site consultation visit by an experienced turfgrass agronomist who has specialized in the management and problems of golf turf. Each visit is followed by a full written report detailing the recommendations and discussions of the day. Follow-up assistance by telephone and regional meetings offer further contacts throughout the year. There is no better or bigger bargain in golf course management. The Green Section TAS fee is still less than two-tenths of one percent of most golf course maintenance budgets today. Contact the office nearest you as shown inside the front cover of this issue of the *GREEN SECTION RECORD*. Your best golfing turf is yet to come.

## The Passing of Herb Graffis

All of golf lost a dear friend with the passing of Herb Graffis, 95, on February 12, 1989, at Fort Myers Beach, Florida. His contributions to all facets of the game for over half a century cannot be measured. As a golf writer, a war correspondent, a columnist for the Chicago *Sun-Times*, a television personality, an author, a ghost writer of books on golf, and co-publisher of *Golf-dom* and *Golfing* magazines with his brother Joe, Herb Graffis has left this a far better world because of his love of this game.

He was a founder of the National Golf Foundation, in 1936. He was a founder of the Golf Writers Association of America. He has received far-ranging awards in golf, from induction into the World Golf Hall of Fame, to the USGA Green Section Award, the GCSAA, and the PGA Distinguished Service Awards. Few will ever equal the recognition he so justly deserved. He created the slogan "Golf Keeps America Beautiful," and gave it to the USGA Green Section.

The pain of knowing Herb Graffis has left us is ours. But so is the joy his life has brought and meant to us all.



# TURF TWISTERS

---

## WHEN HUMIDITIES ARE HIGH

**Question:** Last August, after two months of hot, arid weather the humidity levels rose significantly, and irrigation seemed to cause more problems than I thought possible. Any suggestions? (Illinois)

**Answer:** Sometimes it helps to rely on daytime hand watering under the conditions you describe. Adding water to a wet soil only compounds the problem of heat dissipation when evaporation rates are low.

## THERE'S A COMMON DENOMINATOR

**Question:** The Tifdwarf bermudagrass on my brand-new putting greens experienced many problems last summer. The greens consistently showed a purplish, mottled appearance normally associated with the low-temperature response of Tifdwarf, along with a very open-type growth habit. Did I buy certified Tifdwarf bermudagrass from the sod nursery? (South Carolina)

**Answer:** During the summer of 1988, the Southeastern Region became aware of and worked with a number of courses with the very same problems. All of these courses were supposedly planted with Tifdwarf bermudagrass, but it was not possible to achieve the level of conditioning they expected. After eliminating the possibility of problems associated with disease or other pests, nutritional problems and basic management practices, it was determined there was a common denominator; the bermudagrass sprigs used for planting were all supplied by the same nursery. The Tifdwarf was definitely an inferior type, and not the true Tifdwarf variety developed and released by Dr. Glenn Burton.

As for addressing the correct problem, there is really no alternative other than removal of the present bermudagrass base and replanting with certified Tifdwarf. This is truly an unfortunate situation.

## FOR A SIMPLE SAND TEST

**Question:** Is there any way to tell if the sand we are receiving for topdressing is the same we originally had tested at the physical laboratory? (Oregon)

**Answer:** In addition to visual inspection, a simple process will tell you quickly whether your sand is the right stuff. To ensure consistency, use a half-cup measure of the sand you originally tested that is of good quality. Place the half-cup of sand in a jar and add a small amount of Calgon water softener powder. Half fill the jar with water and shake it vigorously for one minute. When you stop shaking, the water will have a cloudy appearance that will vary with the amount of silt or clay found in the sand sample. Seal and keep this jar as a sample reference.

As each new load of sand arrives, you can perform this same test to determine if excessive fines are in the sand. If the newer material is obviously dirtier than the original, simply send the load back. It is vital that the end user avoid excessive fines in the greens and receive what is ordered.