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A PATCH of GREEN

Official Publication of the
Michigan & Border Cities Golf Course Superintendents Association

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Selecting and Handling Sand

by **PATRICK M. O'BRIEN**
Agronomist, Mid-Atlantic Region,
USGA Green Section and
DR. MARVIN H. FERGUSON
President, Agri-Systems of Texas, Inc.,
Bryan, Texas

"Where do I find a good bunker sand?" This question is frequently asked of USGA agronomists by golfers and golf course superintendents.

No wonder! Finding and selecting a quality bunker and on your own is not easy. Furthermore, opinions vary about the playing qualities and appearances of different sands. The decision requires plenty of investigation.

Historically, golf courses often purchase a local inexpensive sand for bunkers. This sand, unfortunately, is not always suited for the purpose. All sands are not alike; they vary in size, shape, composition, color, and purity. This variability it possible to find almost anything in bunkers. Even today, many clubs simply cannot afford the high transportation costs of a more desirable sand. In some areas, particularly in the western states, good bunker sands are not always available.

Fortunately, the sand itself is usually inexpensive. It is found just about everywhere. In fact, there is such an incalculable amount of sand in the world that geologists have a hard time accounting for it all. Trucking costs generally determine the final price.

Today, purchasing sand for bunkers is routinely done, whether for replacing old contaminated sand, for new bunkers, or for dressing up a bunker with a thin layer for a tournament. Whatever the reason, several points should be considered before making a purchase:

1. A one-gallon sample of each bunker sand under consideration should be sent to a physical soil testing laboratory. Although there are no consistent methods as yet developed for evaluating bunker sands, a few precise evaluations can be made.
2. The handing of a new bunker sand is important. Each delivery should be inspected for contamination. Upon acceptance, proper, clean storage of the sand is important.
3. Bunkers should be prepared to accept the new sand. The old sand should first be removed. The new sand will be come contaminated, otherwise, and lose its desirable properties.

Bunker sand guidelines were developed by the Green Section, in 1974. Since 1948, considerable experience with testing sand for putting green construction and topdressing has been achieved. The bunker guidelines were released in May, 1974, in GOLF JOURNAL and again in September, 1974, in the GREEN SECTION RECORD. The guidelines are based on laboratory tests, practical work, and experience. The size, shape, purity, color and composition of bunker sands are emphasized. An experienced laboratory can evaluate these qualities.

Judging Sand

Size. Size is one of the most important

CONTINUED PAGE 13

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COMPUTERS IN GOLF COURSE MANAGEMENT

by Mark DeYonker
President Associated Computer Consultants, Inc.

Computers as management tools are rapidly emerging in all industries; the golf course is no exception. Computer manufacturers and the professional software firms have recognized a tremendous potential in the golf course industry. The reasons for this potential are similar to the needs of other industries, in that to make sound business decisions on a timely basis any businessman must have the information presented in a logical timely fashion. The "seat of the pants" and "gut feel" decision processes are obsolete and quickly becoming unacceptable to the business community. Hence, a management tool to assist the course manager (superintendent) is necessary, and that tool is a computer with quality software application programs.

Since computer equipment costs have recently become extremely affordable, the course manager has an excellent opportunity to automate his manual accounting systems.

Course Manager's Environment

Like every businessman the course manager is faced with increasing accountability. Owners, committee members, board of directors, golfers, employees, and the government are all holding the manager accountable for their actions and business decisions. Adding to the increasing accountablity are the rising costs of labor. Maintenance, materials, equipment, taxes, supplies and utilities; all of which fall under the responsibility of the course manager.

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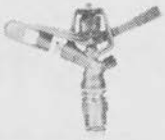

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Much of the success of the manager's responses is a result of keeping accurate records. Without them, it is nearly impossible to stay abreast of the occurences in his club or course. The ability to track and coordinate all of these costs items is becoming increasingly difficult, which makes accounting of records more critical to the successful manager. Adding the situation presented by tighter budgets, restricted cash flow, and dynamic industry changes makes the importance of good sound accounting and timely management reporting not only essential but vital to the survival of any course manager. Computers with quality industry related software programs can become an integral part of the manager's day to day business.

Course Manager's Challenge

Making sound business decisions in a timely fashion, staying abreast of industry updates and changes, and (of course) maintaining course standards are challenges in themselves. However, the course manager must also successfully manage the 5 M's; Men. Machines, Materials, Money, and Mother Earth, Your are promoted, demoted, hired or fired on the basis of how well you manage Mother Earth. The other 4 M's can be assets or obstacles to your management of Mother Earth. If not properly controlled and allocated, they may be your demise. Good control of them can make your management tasks and decisions vastly easier.

Where Computers Fit

It may surprise you as a course manager that there are software programs designed and available today to assist you in keeping solid accounting records and producing beneficial managerial reports. The following course manager industry software is available on the market today:

* Labor Hours Accounting is a series of programs to track the employees time by course/area/function performed. Assists the manager in manpower planning, employee utilization, work schedules and equipment buying decisions. Properly programmed it can assist the manager in determining potential problems areas on the course, equipment, and employees.
* Vehicle Maintenance Scheduling and

CONTINUED PAGE 12

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We gave Toro VT3 a green thumb. For example, if the seed gets dry when you're planting a new area or overseeding an old one, you'll have to start over again. That's one reason we gave the VT3 central programmer up to 30 random start times per day. You can use half a dozen or so on that new seed and have plenty left over for the rest of the course.

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As a blower, it uses a 100 M.P.H. "jet stream" to blow damp or dry debris into an easily bagged pile. The air discharge chute converts to straight ahead or side use, too. And, there's an optional hose kit to get in and out of . . . corners and tight places. The *two* and only Toro Vacuum/Blower. It's a product of over 60 years of experience in lawn maintenance equipment.

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Computers, cont.

Costing can assist the manager in developing productive cost saving preventive maintenance schedules, identifying logical replacement of equipment, and aiding in renting vs. buying equipment decisions.

* Inventory Control can help reduce expediting costs, and lower premium prices on out-of-stock situations by providing the manager with reports showing current below minimum stocking levels.

* Budget Tracking and Status will aid the manager in budget planning, identifying budget over-runs, and projecting budgets. Can be critical in planning and status decisions.

* Diary Logging and Retrival can keep the manager abreast of upcoming pertinent events such as golf outings, work schedules, and projects. Can aid the manager in tracking absenteeism, tardiness, and injury occourences.

* Computerized Irrigation Management can assist the manager in planning logical, timely watering to increase course effect as well as maximizing water and energy usage.

* Word Processing can help the manager with coorespondence and proposal preparation. The professional image is becoming more important to the manager; word processing can effectively enchance the manager's communication ability.

* General Accounting, such as accounts receivable, payroll, general ledger, and accounts payable are readily available from many sources throughout the country.

Other applications available in the near future range from energy management to disease forecasting and diagnosis.

COMPUTERS IN GOLF COURSE MANAGEMENT -
Continued in next month's P.O.G.

Never say you're feeling great when you go in for your annual check-up. Some doctors take that as a personal challenge.

A deficit is when you have less than you had when you had nothing.

Sand, cont.

properties of solid materials. Determining the particle size distribution of a representative sand sample is fairly precise. Sand particles between ¼ to 1 millimeter are recommended for bunkers. Larger or smaller sands have disadvantages in playability and maintenance.

The playability of a sand is significantly determined by its particle size. The correct particle size distribution gives the golfer the option of playing either an explosion or pick shot in dry conditions. Sand of this size will provide a variety of lies, depending on the incoming trajectory, velocity, ball angle of entry, and moisture content of the sand. In general, low incoming shots, which have a high velocity, tend to bury. High shots, which enter at near perpendicular angles, will produce "fried egg" lies; i.e., the ball penetrates into the sand and leaves a ring of sand around itself. Most importantly, when playing the bunker shot from either fairway or greenside bunkers, sand in this particle range gives the golfer the sensation of feel and finesse. The same particle-size distribution in each bunker is important to uniform playability.

The sand range recommended is identical to the sand specified for putting greens and topdressing if the very fine sands (below¼ millimeter) are screened and removed. This alleviates many maintenance problems. Sand is frequently blasted onto putting greens, especially at courses where bunkers are closer than 12 feet to greens. This sand will filter through the grass blades and be out of sight, except when it is wet and the particles stick together. This helps speed play, since less time will be spent brushing sand from the line of putt. Also, explosion shots will, in effect, topdress the green with the same range of sand particle size as that recommended for construction and topdressing, thereby eliminating dissimilar sands on the surface.

Laboratory testing is essential to ensure proper particle size distribution. Even if a specific sand grade such as "mason," "brick," "glass," or "concrete" sand is used and is supposed to contain ¼ to 1 millimeter size particles, it may also contain other particle sizes smaller than ¼ millimeter or larger than 1 milli-

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Sand, cont.

meter. On a board scale, these sand names are absolutely meaningless because of their great variability in particle sizes. The names may only be important locally if there is good quality control and the particle size range has been determined.

Never consider a dune sand for bunkers. The particle size distribution is too narrow. Dune sands in all parts of the world tend to be in the ⅛ to ¼ millimeter mean size or range. Only very fine sands are easily windblown.

Ideally, a minimum of 75 percent of the bunker sand should be in the ¼ to ½ millimeter range. In fact, some experts prefer all the sand particles in this range. However, particles between ½ and 1 millimeter are included to help prevent wind erosion and compaction. A mixture of different size particles appears to set up better than those of uniform size.

There are areas, however, where wind velocity is a severe problem and a higher percentage of larger and heavier particles (between 1 and ½ millimeters) are recommended. Common sense must be used in this instance. This is the only exception in the particle size guidelines.

Purity. A good bunker sand is clean. It will not contain impurities, such as silt, clay, coarse sand, or gravel. Usually bunker sands are washed to remove silt and clay, and screened to remove large particles. The presence of only 5 percent silt and 3 percent clay in a sand can impede drainage. A laboratory can precisely test for purity.

Shape. Angular sands, rather than round sands, are preferred for bunkers. Angular sand will shift less frequently

under the weight of a golfer. Fortunately, most golf courses are now receiving angular sands. The majority of sand for golf courses comes from beaches, river beds, and igneous and sedimentary rock deposits.

Desert sands are most likely to be rounded. Wind-borne sand particles scud along the ground colliding with each other, bouncing off obstructions, and wearing off their rough irregularities. Eventually, smoothed and rounded, they approach a perfectly spherical shape and may keep it without further wearing for millions of years. It was once believed that sand grains were rounded while washing down river beds, but laboratory experiments showed they are too light-weight to abrade each other in water. Evidently, most of he rounded sand grains in the world have been exposed to wind abrasion at one time or another. There is relatively little reason to believe that sand extracted from a river bed would be rounded, and a lab test can provide complete assurance. The laboratory determines shape subjectively by feel and visually with a microscope.

Composition. Sand composition varies greatly. Most sands, however, contain quartz, the most common form of silicon dioxide, or silica. A hard, quartz sand is preferred in bunkers, since quartz resists weathering and retains its original shape permanently.

Many clubs select sands based on appearance without considering composition. For example, some clubs select limestone sand because of its brilliant white color, even though limestone sands are subject to weathering and the fine particles released during weathering affect the playability and the maintenance of the sand. Limestone sand surfaces are too firm for explosion shots. This firmness is caused by the cementing action of the softer grains. The fact that many cart paths are constructed of limestone material attests to the strength of the cementing action. However, this is not nearly so much of a problem today because bunkers are raked more frequently by mechanical power rakes. More frequent raking keeps limestone sands from becoming firm. Dolomitic limestone sand is less subject to weathering, but

CONTINUED PAGE 17

Sand, cont.

still it should not be considered if a quartz sand is available.

Some clubs use manufacturing sands in their bunkers, such as those used in glassmaking. An example is a glass sand from the Devonian Oriskany Sandstone deposit, located in West Virginia and Pennsylvania. This sand is 99 percent quartz, with a desirable white color. Nevertheless, it is just as important to have these sands evaluated as any other to ensure proper particle size.

Color. The contrast of white sand with green grass creates a scene of great beauty. A white sand is preferred, particularly for television and for golf courses that hope to attract players who are passing on nearby highways. White sand surely attracts the eye but, on a sunny day, the reflection of light from a brilliant white sand can affect the golfer. It is harder to find and hit the golf ball with the glare from brilliant white sand. This is especially true for golfers with eye problems. Light tan sand is considered by many to be more natural and better from a golfer's viewpoint.

Angle of Repose. Every material has an angle of repose. This is the angle with the horizontal at which a material will stand when piled. The angle of repose will vary with particle size distribution, particle shape, and moisture. The angle of repose may help predict sand behavior on flashed bunker faces, the probability of fried egg lies, and retention of foot-prints.

This test, as of yet, is not done on bunker sands. Rescarch is currently underway with this new variable and may be included in future bunker sand evaluation methods.

Handling Sand

Once the sand is selected, it should be inspected for contamination upon arrival. Many times a delivery truck will bring sand to a club immediately after hauling a load of coal or another substance.

If the sand is not directly placed in the bunker by the delivery truck, provide for proper storage. Dump the new bunker sand onto a concrete or asphalt surface, if possible, and thereby avoid soil and debris from entering the sand when loading from bare ground.

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Sand, cont.

Traditionally, sand is hauled to bunkers with maintenance trucks from the storage area. Oftentimes the trucks cannot move in and out of certain areas, and it becomes necessary to shovel the new sand from the trucks. Moving sand into bunkers by truck or shovels causes a soft sand. It usually takes between 90 and 120 days and plenty of water (rainfall or irrigation) for the sand to set up properly so that golfballs will not become bouried in it. A faster and better method of transferring sand is with a gunnite machine. This machine blows sand under high pressure through a hose up to several hundred feet into the bunkers. The force is such that it compacts the sand during the placement and eliminates the problem of a buried lie.

Removing Poor Sand

Avoid placing a good bunker sand over a poor bunker sand. It is always best to start from scratch. If a bunker sand with a particle distribution of ¼ to 1 millimeter is placed over a larger sand, the old sand will shortly come to the surface with raking. The finer sand will filter through the coarse sand, producing the original condition.

On the other hand, many older clubs have bunker sands that have become contaminated with silt and clay. These sands become hard if they are not raked frequently. Water will not move through them to drain lines. If the bunkers constantly fill with water, silt and clay will continue to work up into the sand, causing it to become increasing dirty. Under these circumstances, it is always a good idea to replace the sand and clean out or install new drains. Add fresh sand to bunkers whenever the sand depth has decreased below a minimum of four to six inches on the base or two inches on the face. This is usually required every three to five years. Redistributing the sand from low areas to high areas will often suffice.

Summary

Many existing bunkers are filled with a poor playing quality sand. Through laboratory testing, proper handling of the new sand, and removal of the old sand, better apearance and playability of bunker sands will result. Good bunkers are an asset to any golf course. Investigate for best results!

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