THE SAND IS TOO SOFT! This is a common response to the playability of sand bunkers where old, contaminated sand has recently been replaced with several inches of fresh material. Sometimes the criticism is justified; sometimes it is not. Consider the following scenario:

After many years of putting off the inevitable, Tired Trap Country Club finally decides to renovate its bunkers. The old sand, which has gradually become contaminated with soil and organic debris, has lost its original color and consistency and has become too hard. Because of its poor color and hardness, some golfers insist that there is no sand at all in some of the bunkers. In the process of renovation, the old material is replaced with 4 to 6 inches of fresh, new sand, as recommended by the USGA. Before the first day is done, golfers begin complaining that the new sand is much too soft and is unsuitable for their course.

More often than not, the sand that has been added to bunkers in such instances is perfectly good. The reaction of the golfers, though, is predictable and understandable. Having played from firm, contaminated sand for many years, playing from the new, unsettled sand is a striking change. The fresh sand would indeed seem soft by comparison.

Golfers should be advised that when this type of renovation work occurs, the new sand takes time to settle and will very likely seem soft for several months. During this time, the sand will develop a greater firmness and the golfers will become accustomed to playing from a softer base. Generally, the number of

Wetting the sand and packing it with a utility vehicle is one good way to firm newly installed material.
complaints diminishes once the new sand has been in place for several weeks.

Another complicating factor is golfers’ preferences for different types of bunker sands. Some prefer firm sands, while others like softer sands.

On the other hand, it is possible that the new sand is indeed too soft. Under these circumstances it could take years of contamination with soil and organic debris before a good firmness develops, during which time golfers would be subjected to poor playing conditions and fried-egg lies.

The difference between a good-quality sand that is temporarily soft after installation and a sand that will be too soft for months or years to come is not easy to detect, especially from a visual standpoint. The best way to avoid a sand that is too soft is to do your homework. Contact clubs in your area for recommendations, and talk to their golf course superintendents, golf professionals, and other club members for comments. Play their courses if you can, especially if their sand has recently been installed.

If locally used sands are unsuitable for play or from a budget standpoint, then a search must be made of local quarries for a satisfactory sand. Contact the regional office of the USGA Green Section in your area for guidelines in selecting bunker sands, and use the particle size range, particle shape, and chemical composition parameters from the guidelines to help sort out the potentially useful sands.

If there is any doubt about your choice, send samples of the best-looking sands to a soils laboratory that is experienced in evaluating sands for bunker use. The lab should be able to provide a description of the playability of each sand and discuss any potential problems, allowing the choice to be narrowed down to one or several selections. If doubts remain, install different sands in a limited number of bunkers on the course or in several test bunkers for further evaluation. After a few months or a season of use, the best sand should be apparent.

Having to take all of these steps to find a suitable, affordable bunker sand
is not common, but many courses pay a high price for not taking the time to fully investigate and test the sand they are placing in their bunkers. Many a course has gone through the disruption and expense of replacing old bunker sand, only to go through the whole process again within a year or two because the members were unhappy with the material.

When a sand already has been installed in a bunker and is found to be too soft, there are a number of different steps that can be taken to correct the problem. If the sand is extremely soft and fried-egg lies are common, send a sample to a good soil-testing laboratory for evaluation. If the lab suggests that the sand will be a problem for some time to come, it might recommend a different sand, with a distinctly different particle size range, be mixed with the existing sand to give it greater stability. For best results, the existing materials should be removed from the bunker and mixed off-site with the new sand. This procedure would be feasible with only a bunker or two involved, but on-site mixing would be the only practical alternative if the sand in all or many of the bunkers had to be modified.

Before an expensive sand replacement or modification procedure is instituted, though, there are a number of relatively simple practices for firming soft sand that should be tried. For example, if the depth of the sand in the bunker is 6 inches or more, then reduce it to about 4 inches in the flat areas and 2 to 3 inches on the faces. Since the degree of fluffiness of the sand is directly related to its depth, removing some of the excess sand should minimize the potential for fried-egg lies. When sand depth is at a 4-inch level, though, it is often difficult to use a mechanical rake without digging into the soil in the base of the bunker. This method of firming sand, then, requires careful use of the mechanical rake, modifications to the rake to reduce its cultivating activity, or more hand raking.

Another good approach to firming soft sand is to try to pack the particles closer together. Some sands pack more tightly than others. Sometimes, irrigating the sand is all that is necessary to adequately reduce its fluffiness. A better method is to wet the sand thoroughly and run back and forth many times across the surface with a tractor, a riding mechanical rake with the cultivator bar removed, or a utility vehicle of some type.

An excellent compaction technique for firming sands involves the use of a cement finisher (a steel plate mounted to a gasoline-powered engine that produces a compacting effect by vibrating horizontally). After the sand has been thoroughly watered, the machine is used to compact the sand to the desired firmness. The compactor can be rented by the day from most rental outlets, or it can be purchased for less than $1,500 if a large-scale sand-replacement program is anticipated. For more information, see "A Technique For Dealing With Soft Sand" in the March/April 1989 issue of the Green Section Record.

As noted earlier, irrigation is a good method for temporarily firming a soft sand. Ironically, sands that are raked when they are wet tend to be especially fluffy as they dry out. Because of the surface tension of water, wet sand particles tend to bridge more readily when they are cultivated and therefore develop a looser texture. As drying occurs, the structure of the sand remains intact until it is subjected to traffic. This is quite a common effect, since irrigation is often done during the night, and sand bunkers are usually raked during the early morning hours.

To partially overcome the soft-sand problem that occurs when wet sand particles are raked, many courses regularly use wetting agents in their bunkers. Since the wetting agent reduces the surface tension of water, the bridging effect is reduced and the sand is better able to retain its firmness after cultivation. To be effective, the wetting agent must be used regularly, as often as once per week during periods of frequent irrigation or rainfall and regular cultivation. Only light rates of wetting agents need be applied, and nearly any product is satisfactory for this use as long as it is non-phytotoxic. This practice is most likely feasible when just a few bunkers are involved. Other means of firming sands should be considered when dealing with a large number of bunkers.

In trying to develop greater firmness in a naturally soft sand, two general strategies must be adopted. The first involves filling more of the pore space between the sand particles by way of compaction techniques or by adding sand particles of a different size. This has been the theme of the practices mentioned in the discussion thus far.

Removing the cultivation bar and adding lead weights to the smoothing apparatus is one way to modify the mechanical rake for accommodating soft sand.
The second strategy consists of subjecting the sand to as little cultivation as possible. This makes sense, because cultivation is a loosening process that would only make a soft sand softer. Unfortunately, raking is an integral part of sand bunker maintenance, serving to keep the surface smooth and to keep weeds in check. A compromise must be reached, then, to serve these opposing needs.

A typical sand-raking program at many courses involves the use of a riding mechanical sand rake as little as once or twice per week to as often as once per day. The rake usually is equipped with teeth or a bar that cultivates to a depth of several inches. What's more, the operator usually makes numerous passes around a bunker to do a thorough job of smoothing and cultivating every square inch of sand.

Given the frequency and depth to which bunker sand is raked, it is not surprising that there are so many complaints about fried-egg lies in newly installed sands. If the objective is to maintain greater sand firmness, then it is clear that cultivation depth and frequency should be reduced. Therefore, instead of raking the bunkers six or seven days per week, reduce it to once or twice per week, if possible. On days when the mechanical rake is not used, touch up footprints and other irregularities with hand rakes.

Another option is to modify the mechanical rake so that it smooths the surface without doing much cultivation or loosening of the sand. Cultivating teeth can be shortened, or the cultivating bar can be raised or removed, for example. Golf course superintendents have come up with all kinds of homemade accessories for the mechanical rake which work very well for smoothing sand while doing a minimal amount of cultivation. From time to time the cultivating bar can be temporarily reinstalled on the machine to control developing weeds in the bunkers.

Regular use of the mechanical rake causes other sand softness problems as well. When used frequently and at fast speeds, the rake can redistribute the sand throughout the bunker and cause a wide variation in sand depth. It is not uncommon to find 8 to 10 inches of sand in some areas and only 2 to 3 inches in other locations. Naturally, softness problems are more prevalent in areas where the sand is deeper. Sand depth, therefore, should be closely monitored in bunkers where the mechanical rake is often used.

As noted before, many courses are reducing their use of the mechanical rake and relying more and more on hand raking. The misuse of the mechanical rake is a key factor with respect to keeping soft sands soft, hastening the contamination of good sands with soil and other debris, and causing the deterioration of bunker edges and lips. Indeed, hand raking is an excellent means of keeping soft sand firmer while keeping the surface of the sand smooth and playable. Many styles of rakes are for sale, and some are very well suited for this purpose. Some have short, stubby, cultivating teeth, while others have none at all. Hand raking programs require more labor time, but many courses find that the improvement in playability and the reduced rate of sand and bunker edge deterioration are important compensating factors.

Most of the options for dealing with fluffy bunker sands are temporary measures. They are usually quite adequate, though, because all bunker sands are subject to soil and organic matter contamination that makes them firmer over a period of time. Silt and clay particles from the base of the bunker and from its edges eventually become intermixed with the sand to fill pore spaces and bind the sand. Soil, dust, and organic debris also find their way to the bunkers by way of wind, mowing and edging practices, or other means. As time goes by, then, the problems encountered with soft sands and fried-egg lies gradually disappear.

Whether or not to use geotextile liners in sand bunkers is an arguable point. It is a factor, though, in a bunker renovation program where a soft sand is being used. Because a liner can, with luck, remain in place for a number of years and greatly reduce the rate of soil contamination from important sources (i.e., the base and edges of the bunker), it can substantially increase the amount of time it takes for a very soft sand to become firmer. Where the use of liners is being considered, therefore, it is even more important to test the sand that will be used to be sure that it is not too soft.

Sand bunkers are important and expensive features on many golf courses, and they are a source of criticism for many golf course superintendents and club officials. Complaints about soft sand and fried-egg lies, however, need not occur if reasonable caution is taken in selecting, installing, and managing bunker sands.