Golf Course Drainage —

(Continued from Page 20)

in both design and construction. The result areas that suffer extensive erosion while on the same project there will exist an area with pockets of standing water scattered throughout.

Depressions in the surface grade are the most visible and inconvenient water problem for the membership. The condition is mostly pronounced on fairways with topsoil having more than 30% clay content, as the surface water is very slow to infiltrate after a rain or an irrigation application. For fairways with minimal grade, it is critical that depressions are eliminated during construction.

Due to numbers and random locations of depressions, the best approach is the installation of a main line initiating at an open outlet or tied to an existing line. From the main, several short lines are installed passing through each depression.

Erosion as a result of excess water flow through a restricted area is evidence of misformed or improperly designed surface grading. Soil type will determine the extent of soil movement. Sandy and gravelly soils are most subject to erosions.

Total acreage that is supplying surface water to the area must be determined in order to calculate volumes of flow during peak periods of the year. To demonstrate this point, a hypothetical situation is outlined:

A neighboring field, presently in agricultural crops, slopes to a swail, which feeds onto the golf course, crossing two fairways before reaching the creek which winds through the course. It was hoped that the swail would provide a natural hazard; however, several times this season serious erosion has occurred to a point where the swail is now two meters deep and seven meters across. A topographic map of the area is used to determine that 60m across from the neighboring field surface drains into the swail. It is evident from the material washed out of the swail that the soil is sandy in texture. An erosion control structure must be built which includes a beam to contain the surface runoff and a surface inlet. In addition to the conduit, an emergency overflow must be constructed to allow for occasional flash floods, a more common occurrence of late. Capacity of the holding area and sizing of the conduit pipe are dependent on several site variables and should be referred to a qualified consultant for their design.

Materials

Corrugated plastic tubing is the most common drainage material and is available in 36, 75, 150, 200, 250 and 300 mm diameters. When choosing between pipe diameters, a good rule to remember is with a decrease in diameter of 50%, the capacity of the tubing is reduced four times. *(See fig. 2).*

Additionally, for small diameter tubing less than 100 mm, there is very little tolerance for error in grade when installing such materials. All diameters of tubing should be installed using laser-assisted equipment. Laser installation is compulsory for tubing less than 100 mm in diameter. Use tubing that meets C.G.S.P. 41-29M and the provincial recommendations for tubing used in land drainage applications.

Envelopes are designed to restrict the entry of granular soils that may cause sedimentation within the tubing. Materials with individual grain size of 0.025-0.25 mm will precipitate out of solution under low flow conditions resulting in a sedimentation layer to form in the tubing. Once initiated, this condition rapidly worsens unless large volumes of water are flushed through the tubing on a regular basis. There are two types of woven nylon polyester stocking and a non-woven geotextile fabric. The non-woven geotextile fabric is relatively recent in the drainage industry, and has proven to be less susceptible to clogging with fines. Ideally, the results of a soil test should be matched with the individual characteristics of the envelope.

Figure 2.

SAMPLE CALCULATION FOR TUBING CAPACITY:

In a 100 mm Tube:
area = 3.14 x (0.05m x 0.05m)
= 0.00785 sq.m.
volume = area x length
therefore : for a 1.0 m. length,
volume = 0.00785 cu.m.
Whereas In a 200 mm Tube
area = 3.14 x (0.10m x 0.10m)
= 0.0314 sq.m.
therefore : for a 1.0 m. length,
volume = 0.0314 cu. m.

The outlet for drainage line is the single most important factor in any drainage system. In addition to ensuring that the outlet provides sufficient fall for the drainage line to be self-cleaning, steel outlets with gates are necessary to restrict the entry and colonization of rodents in your new drainage system.

For a long term solution to drainage problems, establish a drainage program covering five successive years. This program is based on a drainage blueprint for the complete property and is broken into manageable yearly projects, thus allowing the superintendent to budget accurately for each annual project, in addition to getting the long-term program on the agenda for the budget meeting with the board of directors. The net result is a golf course integrated with a drainage network that provides complete coverage against water problems, givng the superintendent greater control over the individual hydraulic cycle of the golf course.

A (W)HOLE IN ONE

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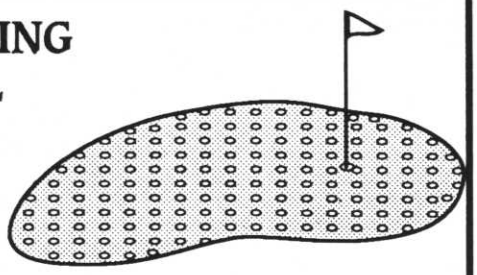
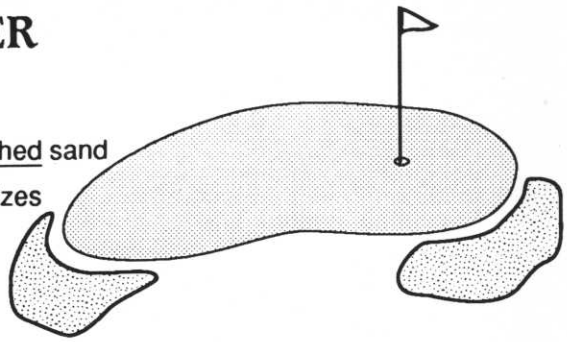
TOPDRESSING MATERIAL



- 80/20, 70/30, or mix to order
- Sand screened with 1mm screen (USGA spec)
- Product blended then rescreened through 3mm screen to assure clean mix

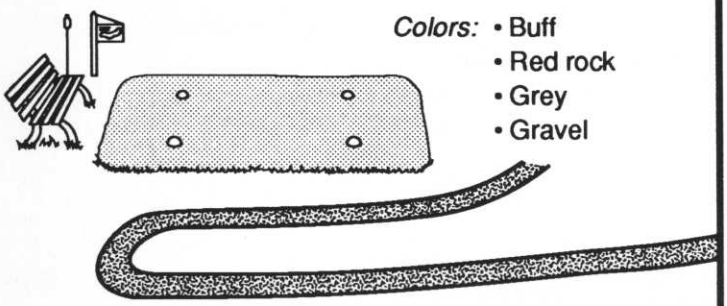
All specs available upon request

BUNKER SAND



- Clean, washed sand
- 2 particle sizes to choose from

CARTPATH AGGREGATE

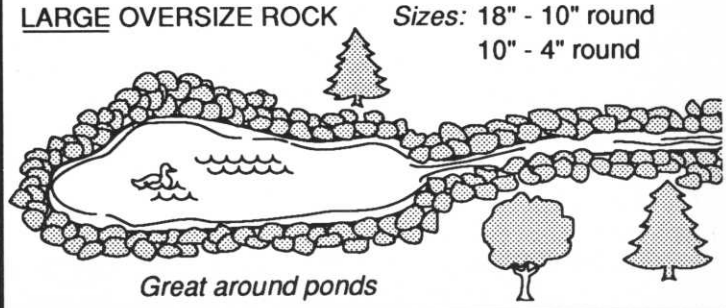


Colors:
- Buff
- Red rock
- Grey
- Gravel

RIP RAP

LARGE OVERSIZE ROCK

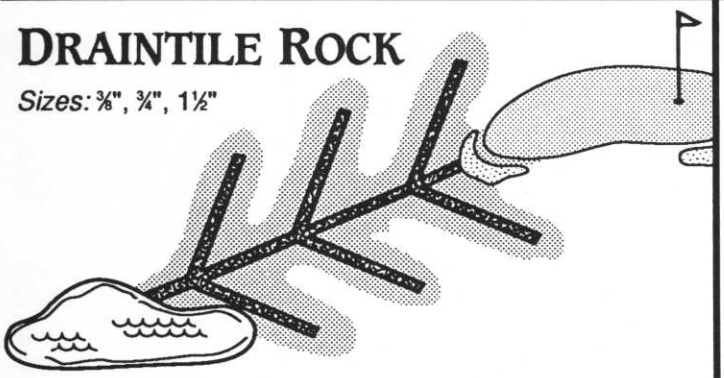
Sizes: 18" - 10" round
10" - 4" round



Great around ponds

DRAINTILE ROCK

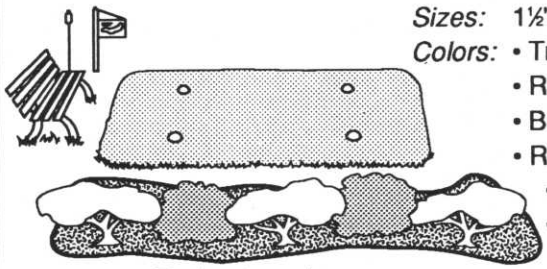
Sizes: ⅜", ¾", 1½"



DECORATIVE ROCK

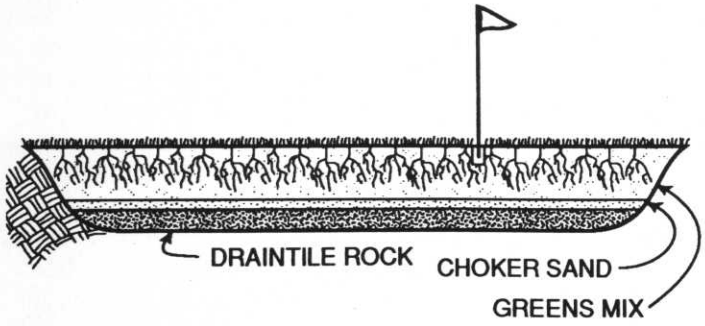
Sizes: 1½" or ¾"

Colors:
- Trap rock
- Red rock
- Buff limestone
- River rock
- Granite
- Salt & pepper



For landscaping

NEW CONSTRUCTION



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A Good Turnout At River Oaks

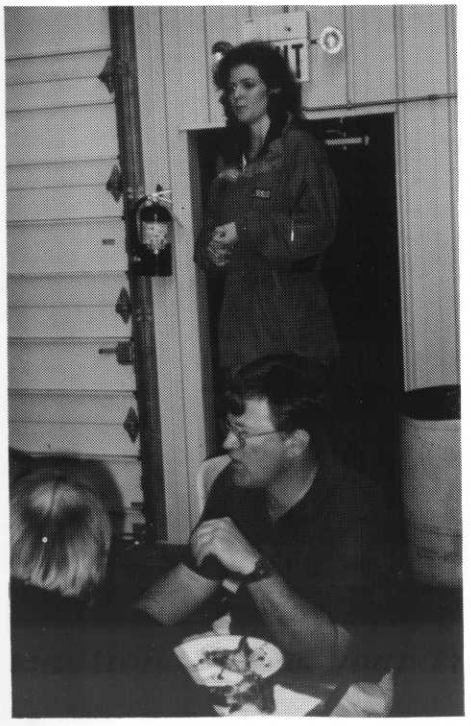
The rain didn't keep the 90+ MGCSA members from turning out for the May meeting at River Oaks. Snow at the April meeting, rain and cold for May. What will June bring? Tom Parent and his staff did an excellent job preparing the course and facilities. Nobody should have left hungry!

Tom said his maintenance building is kept that clean seven days a week. Anyone who had the opportunity to take a look at the fertigation system at River Oaks was very impressed. Tom wrote an article for *Hole Notes* explaining how the system was put together and how it works.

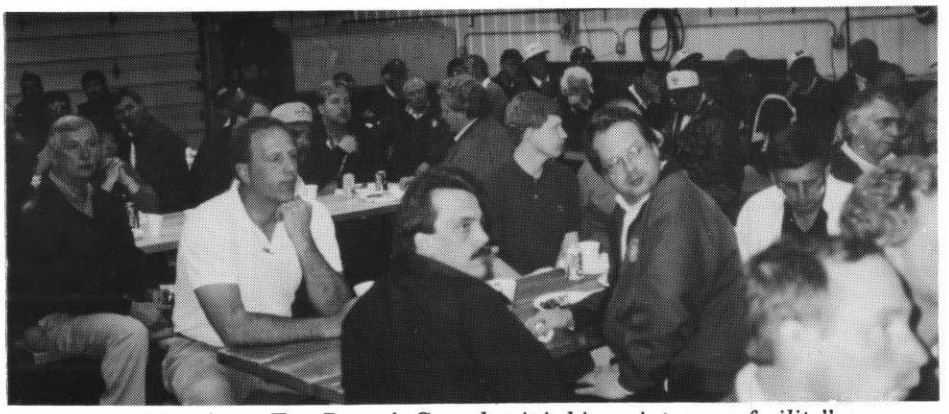
Can you believe 12 members played golf on that day? It's good to know we're not all fair weather golfers!

Amy Rolando from WCCO-TV spoke about the problems of getting accurate forecasts and perhaps an alternative for superintendents. She is one meteorologist who is very concerned about getting the forecast right for golf courses. She also is an excellent golfer!

Thanks again to River Oaks for brightening up a rainy day!



Amy Rolando of WCCO TV explains her rainy forecast to fair-weather golfers.



"No, it's not Tom Parent's Crew, but it is his maintenance facility."

Over $12.5 Billion Spent On Professional Landscape Services

Seventeen million U.S. households spent $12.5 billion on professional landscaping and lawn care services in 1993, according to a recent Gallup survey. The study revealed that the number of homeowners using landscape professionals was up 29 percent over 1992, and expected to grow by an additional six percent in 1994.

Results were based on personal interviews with a representative sample of 1,665 U.S. households about their 1993 spending on these services:

- **Lawn/Landscape maintenance:** Lawn fertilization, mowing, renovation, insect/weed control, pruning and mulching.
- **Landscape installation/construction:** Plants, walkways, fences, decks, pools and other water features.
- **Landscape design:** Professional landscape design/landscape architecture services:

Average 1993 household spending on landscape services was $721. Lawn / landscape maintenance received the largest share of total homeowner landscaping dollars at $6.4 billion, followed by landscape installation/construction at $5.6 billion, landscape design at $381 million. The largest average household expenditures were on landscape installation/construction at $2,971, followed by lawn/landscape maintenance at $445 and landscape design at $424.

- **Americans 50 and older** accounted for nearly half of all expenditures on lawn / landscape maintenance services.
- **The Western United States** had the highest average expenditures on lawn / landscape maintenance services.
- **Americans 30-49 years old** accounted for 83 percent of landscape installation/construction sales; they also had the highest average spending in this category, $3,482.
- **Homeowners in the South** had the highest average spending on landscape installation/construction, $6,147.
- **Women accounted for 70 percent of spending** on landscape design services; their average expenditures in this category were twice that of men.
- **The Mid-Atlantic Region** accounted for nearly half of all landscape design spending.

The improved national economy, the upturn in home-building, and the growing awareness of landscaping's environmental and economic benefits are believed to be key factors contributing to the growth in homeowner spending on professional landscape services.

This first-of-its kind survey was sponsored by the American Association of Nurserymen, the American Society of Landscape Architects, the Associated Landscape Contractors of America, the International Society of Arboriculture, the National Arborist Association and the Professional Lawn Care Association of America.

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HOME OF NOVA TEE

Where are they today?

C.L. "Jim" Graham

By Jack Kolb

Back in 1926—1929 there was a young college student by the name of **C.L. "Jim" Graham** who was struggling to get through medical school at the University of Minnesota. Like many college students, Jim looked for summer work and because of his close association with the Feser boys he prevailed upon **Leo Feser** for a summer job on a golf course. Being a medical student, Jim was very learned in chemistry so Leo Feser would quite often consult with Jim about the role of certain products and their relationship or interaction with the management of turf. One summer a gentleman by the name of **Dr. O.J. Noer** stopped by. O.J. NOer was a Ph.D. who had left the University of Wisconsin Soils Department to promote a by-product of the Milwaukee Sewage Commission.

Young Jim Graham was fascinated by this man (Dr. O.J. Noer). After the formal introductions, Leo assigned Jim the job of monitoring the many test plots laid out on Woodhill Country Club by this vigorous and most enthusiastic soil scientist (turned salesman) from Milwaukee. As time went by, it became apparent to Dr. O.J. Noer that in order to cover all the potential sales of Milorganite in Minnesota it would be necessary to expend a considerable amount of his time. This would be true for the other populous areas of the country as well!

In order to take the load from his shoulders, Dr. O.J. Noer asked Leo Feser to become a distributor. Leo Feser felt his first love was with Woodhill Golf Course, and probably even at that time Leo was thinking of developing Orono Golf Club?

Stepping forward to offer his abilities was the young college student, **Jim Graham**, whose largest obstacle was finances. You might think that the goal of *Doctor of Medicine* could not be cast off too lightly, but after the last quarter of ***"Cadaver Carving 101"*** Jim was ready to toss off his laboratory coat and aim for the fresh air of the Minnesota countryside.

There were many interesting stories related to the promotion of Milorganite. Those who are old enough to remember will testify that O.J. Noer was a stirring speaker and a hands-on lecturer. Slide projectors were not very popular back then, and O.J. held court out on the fairways and greens of the particular course that he happened to be working. His knowledge of soils was infinite, and traveling as he did from course to course gave him a practical approach to many problems. For instance, **Leonard Bloomquist**, who at the time was Superintendent of Brookview Golf Course, had a problem with No. 10 green. The green was virtually topdressed with Milorganite. O.J. took one look around the periphery of the green, pulled out his trusty knife and cut a large plug. O.J. knew with his first look that the Elm trees which were 60 to 70 feet in radius from the green had invaded with their roots.

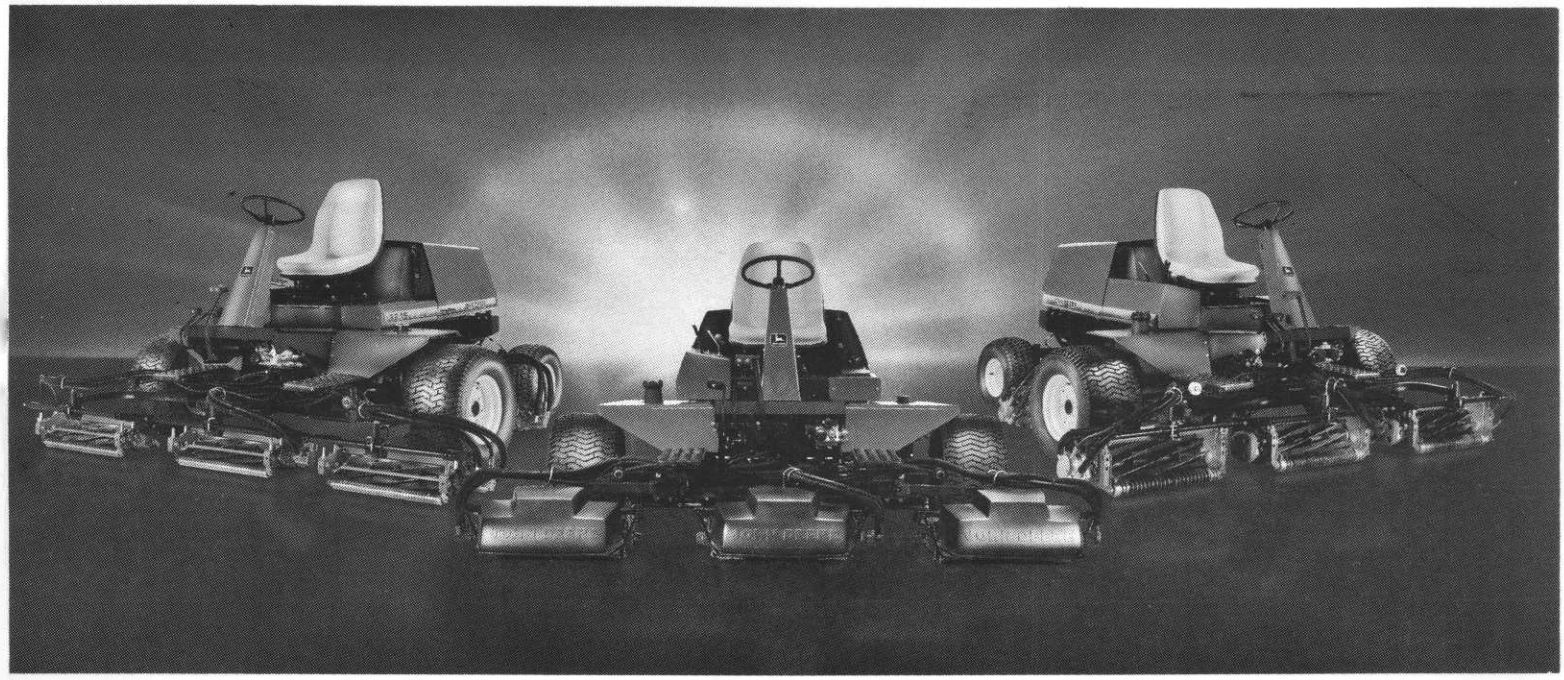
Jim Graham

Being young and dramatic, Jim Graham had some original ideas on how to promote his product. As you should know, the Twin Cities of that day were quite different than today. Most all of today's suburbs were farms back then. Jim would pick a site, usually a hill along a main artery such as Lyndale Avenue or Highway 12, get permission from the owner (which was usually a farmer) and spell **M I L O R G A N I T E** using copious amounts of the product. A popular columnist of that day, who later became a legend in radio and television, was a man by the name of **Cedric Adams**. Cedric noted *those green messages* along the highway and his curiosity caused an investigative inquiry. He then wrote an article in the Minneapolis paper. According to Jim this made the product a "Household Word" and the sales began to climb. Shortly thereafter **Woodhill** and **The Minikahda Club** were using Carload lots of the material.

One sales promotion that did not work was a little perk devised to move more material without first increasing the demand or consumption of the product. Jim was told by the manufacturer (Milwaukee Sewage) that for each ton of product oredered the customer was to get "one ton in addition at no extra cost." Jim worked his heart out and recorded record sales. That was in 1932. In 1933, when Jim started his round of sales, each and every customer had carried over just enough or the exact required amount of material that he would need for the 1933 season. The young entrepeneur had a very lean profit for the 1933 season.

Jim Graham's company was known as **MINNESOTA MILORGANITE** and continued to operate until Jim's retirement in 1970.

Today Jim lives in retirement at a facility known as Sun Grove in Peoria, Ariz. He would love to hear from his old compatriots.



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The 3215 with standard cutting units is a 25.5-hp machine designed to perform well on any turf type, but especially on the more delicate cool-season grasses. Cutting units are 5 inches in diameter and feature 7-bladed reels.

	STANDARD CUTTING UNIT	HEAVY-DUTY CUTTING UNIT
25.5 hp	✓	N/A
32 hp	✓	✓

SIMPLE SOLUTION

The 32-hp 3235 can be equipped with standard or heavy-duty ESP™ cutting units. The ESP units are 7 inches in diameter, have 3-inch rollers, and feature 8-bladed reels to handle tough conditions like mowing warm- and transitional-season grasses.

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'Tis The Season

By Pat Jones

"Spring has sprung,
the grass has 'ris,'
I wonder where
the media is?"

Pardon the poor poetry, but consider the point: April brings with it the traditional beginning of the golf season and the peak of interest in lawn care. If you haven't already noticed an upswing in media coverage of golf and lawn care chemical use, you certainly will this month. With the articles will come renewed attention and questions from golfers, local press and public officials.

'Tis the season for criticism of golf, golf courses and golf course management practices. How can you handle it? The best advice is to heed the words of Lord Baden-Powell, founder of the Boy Scouts: "BE PREPARED."

Be prepared for hard questions from golfers about your chemical application policies. Be open and honest. Invite the questioner to visit your maintenance facility and see things firsthand. Consider voluntary posting. Use the information from the GCSAA fact sheet, "Questions and Answers About Golf Course Chemicals" for a brief article in your facility's newsletter or simply post the fact sheet on a bulletin board (call us at 913/832-4470 for a copy of the "Q&A").

Be prepared for questions about why your applicator is wearing a "moon suit." White Tybek coveralls do look suspiciously like space suits, particularly combined with a full-face respirator. When golfers ask, let them know that you're simply following the label, which is the law, and use the analogy of an x-ray technician. Even though occasional

x-rays are completely safe for patients, the technician protects herself because she is repeatedly exposed. (You also might want to talk to your safety equipment vendor. Some manufacturers are now offering green-colored Tyvek suits that are less obtrusive.)

Be prepared for the articles that will surely appear in your area newspapers about pesticides and human health. Respond appropriately and reasonably with a letter describing your facility's IPM practices and safety record. Feel free to call us at GCSAA to give you guidance on the letter or to review your draft.

Be prepared for the possibility of an inspection by environmental regulators or occupational health officials. The most common violations are inadequate application records, poor storage and labeling practices and failure to have a written hazard communications program. Make sure that your springtime agenda includes attention to these critical compliance areas. (The most likely cause for an inspection is a complaint by a disgruntled former employee. If you terminate an employee, be very sure your facility is ready for an inspection.)

Finally, **be prepared** for the possibility of legislative initiatives that attempt to restrict chemical usage in your state. Activist groups are well-aware of the media attention that can be generated by introducing an anti-chemical bill in the spring. This is the most likely time of year for such bills to be introduced.

So, if you're preparing for a new season, don't forget to prepare for the scrutiny that might come with it.

—GCSAA Briefing, March/April 1995

First Annual

Celebrity Golf Tournament

to benefit the Down Syndrome Association of America

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Groundwater, Turf Management and Public Perception

By Michael L. Agnew, Iowa State University

Groundwater is defined as any water which occurs beneath the surface of the earth in a saturated geological formation of rock or soil. It accounts for the drinking water of half the total United States population and 95 percent of the rural populations. At one time, groundwater was generally thought to be protected from contamination by impervious layers of subsoil, clay, rock and the soils' own degradation process. However, in 1979 the pesticide Aldicarb was found in wells on Long Island and in Wisconsin. This, along with detection of nitrate in groundwater, forced groundwater contamination to become the top environmental issue.

The primary sources of groundwater contamination can be classified as either point of source or nonpoint source contamination.

Point source contamination can be traced back to a specific source. In 1988, the U.S. Environmental Protection Agency reported that deficient septic tanks, leaking underground storage tanks and agricultural activities (i.e. fertilizer application) were the most frequently cited sources of groundwater contamination.

A nonpoint source of contamination is one that cannot be traced back to a specific source. In water that did not meet state use designations by the EPA, nonpoint sources of pollution were cited as the cause of water quality, degradation in 76 percent of lake acres, 65 percent of stream miles and 45 percent of estuarine water. Examples of nonpoint sources of contamination include agricultural fertilizer and pesticide runoff, agricultural fertilizer and pesticide movement through the soil, and sediment from construction sites.

Factors Influencing Contamination

Understanding the soil type, solubility of chemicals, water table depths, topography and vegetation can assist in the site evaluation for groundwater protection.

Soils that have higher infiltration and percolation rates are more susceptible to groundwater contamination. Sandy soils, modified sand golf greens and modified sand athletic fields are examples of areas having high percolation rates. With the exception of native sandy soils, these areas are constructed in a 12 to 24-inch soil profile with water diverted from the modified soils to soils with lower percolation rates. However, native sandy soils can be found in most states. These areas are highly susceptible to groundwater contamination.

The solubility of pesticides can directly influence groundwater contamination. The EPA has identified several turfgrass pesticides as having potential for leaching into the groundwater. They are Carbaryl, Chlorothalonil, 2, 4-D, DCPA, Dicamba, Fenamiphos, and Trifluralin. Only a few of these products actually remain soluble in water. The Farm Chemical Handbook provides information on pesticide solubility.

Fertilizer sources also vary in their rate of solubility. Nitrogen is more likely to move into the groundwater when present in the soil in a soluble form. Soluble forms of nitrogen include synthetic nitrogen sources (ammonium nitrate, ammonium sulfate, calcium nitrate) and urea. Slow-release nitrogen sources have a lower water solubility than the soluble forms of nitrogen. Within the slow-release nitrogen group, some slow release nitrogen sources are more soluble than others. For example, ureaform and milorganite are less soluble than short chain methylene urea.

Nitrogen Sources

Slow Release
Natural Organics
- Milorganite
- Sustane
- Restore

Synthetic Organics
- Ureaform
- Methylene Urea
- Sulphur Coated Urea

Water Soluble
Synthetic Inorganics
- Ammonium Nitrate
- Ammonium Sulfate
- Calcium Nitrate

Synthetic Organics
- Urea

The depth of the water table directly affects the susceptibility of the groundwater to contamination. Shallow water tables are more likely to be contaminated than deep aquifers. In Iowa, much of the drinking water is from shallow water sources.

The topography of the site also influences the movement of fertilizers and pesticides. Heavily sloped areas are more likely to lose water, nutrients and pesticides through runoff. All other conditions being the same, it stands to reason that the greater degree of slope, the greater the water loss due to the increased velocity of water flow. The length of the slope also influences the movement of fertilizers and pesticides. The greater the extension of the sloped area, the greater the concentration of the flooding water.

The presence of vegetation on the soil surface will greatly affect the loss of fertilizers and pesticides through both runoff and leaching. The kind of grass, the thickness of the stand and the vigor of its growth greatly affect runoff and are of great importance in the control of pesticide and fertilizer movement. A thick, healthy stand of cultivated turfgrass is much less susceptible to runoff than are pastures. Pastures are more compacted and are not as thickly vegetated as lawns. In research conducted at Penn State, nutrient loss through runoff was greater on seeded sites than on sodded turfgrass sites. The loss of water by percolation is also less on vegetated lands than bare soil. The

(Continued on Page 32)