U of M Update —

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frequently, through the purchase of low nitrogen fertilizer grades, the nitrogen amount applied was too low to meet recommendations. Related to nitrogen fertilzation, 15 of the 21 homeowners left their clippings. These lawns had higher nitrate levels than those who collected their clippings (See Figure 2). Although most homeowners did receive nitrogen from these clippings, it must be stressed that the underapplication of nitrogen on home lawns may result in lower turf qualty and the potential for decrease in turf health.[3]

It is recommended that fall and late fall fertilizations take place.[4] Homeowners applied fertilizer during the periods April-June, July-August or September-October. The most common time that homeowners applied fertilizer was the April-June period. Homeowners did not make two fertilizer applications in the fall. Of the 21 homeowners, nine applied nitrogen in the September-October period. Table 1 shows fertilizer application times.

Homeowner phosphorous and potassium rates were compared to the recommended rates determined by soil testing (Figure 1). The University of Minnesota Soil Testing Laboratory determined that phosphorous levels on *all* turfgrass sites in this study were very high. It was recommended by the soil test and the lab that *no* phosphorous be applied. This study also tested the native soils of these sites. These native unaltered soils were also high in phosphorous. It can be inferred that many of the soils in the Twin Cities region may be high in phosphorous and do not require additional phosphorous fertilizer for turf grass growth.

Soil test recommendation for phosphorous was 0.0 pounds per 1000ft^2; homeowners applied 0.59 pounds of phosphorous per 1000ft^2. The phosphorous that homeowners are applying, in the carrier form of phosphoric acid, is not being utilized in the plant. Plant tissue levels showed little response tot he phosphorous fertilizer applied, implying that the turf is receiving phosphorous from the soil. This additional phosphorous, since it is not being utilized by the plant, may be susceptible to run-off, contributing to the eutrophication of area water. Although most sites showed an increase in growth and dark green color after nitrogen applications, there were no changes in turf quality on sites that applied less or more than average phosphorous.

Potassium, a nutrient important for turf health that helps the plant during times of stress, drought or increased precipitation should have been applied at higher rates during this season. This is especially true of the 1993 summer, when the Twin Cities received precipitation higher than the 30-year average, and much of the Midwest experienced flooding. Soil tests recommended that potassium be applied at a rate of 1.0 pounds per 1000ft^2; however, homeowners applied only 0.87 pounds potassium per 1000ft^2. Considering the unusual wet summer and the soil test, homeowners underapplied potassium, which may have impacts on future turf quality, health and growth.

A project concurrent to this study was completed by Research Exploration for Teachers participant Leanne Merila. She surveyed homeowners purchasing fertilizers in area stores, lumber yards and nurseries. It was determined that nitrogen grades for spring fertilizers were 25% in the spring and 18% in the fall. Phosphorous amounts increased from 44.1% in the fall to 9.2% in the spring, and potassium increased from 6.1% to 8.4%. Fertilzers were purchased based on product sale price, friend recommendation and favorable product history. Homeowners did not use soil testing or other recommendations as tools to select fertilzer grades.

Factors that Contribute to Homeowner Turf Quality

Maintenance practices, soil type and turf quality were compared and correlated with one another and turf ratings to determine what parameters control turf quality. The lawns in this study were divided into high and low quality lawns, and comparisons between these sites were made. The sandy loam textures of high quality sites were ideal for turf. Soil nitrate levels and plant nitrogen concentrations were higher on high turf quality sites. Turf density was higher on higher quality sites. The number of weeds were 50% to 75% lower on high quality sites.

Homeowners on high quality sites applied more fertilizer annually than those on low quality sites. Although nitro-

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gen applications remained lower than recommended, homeowners with higher quality turf applied more nitrogen, phosphorous and potassium. The study determined through multiple regression analysis that the parameters contributing significantly to turf quality were total annual and nitrogen fertilzer applied, turf soil nitrate, and plant nitrogen content. Turf density and weed count, obvious parameters to the turf quality rater, contributed to the definition of turf quality also, but it was the intent of this study to find other, less obvious parameters that contributed to turf quality.

Conclusions

Unlike surveys that have attempted to determine the impact lawn maintenance practices have on the environment or turf growth, this study directly observed how homeowners control their turf quality. It found homeowners can influence turfgrass growth by adding soil and plant nutrients. This is seen in returning clippings that break down to return nutrients to the turf and when plants showed responses to applied nitrogen and potassium. Other practices assessed were compared to the recommendations made by turfgrass specialists and by soil tests, and it was concluded that homeowners are not following recommendations (Figure 1). The intent of recommendations, printed in many extension service bulletins, is to guide homeowners, as well as golf courses, to develop a healthy and high quality turf. It may be necessary to develop programs that educate homeowners in accessing and interpreting soil testing and turf practice recommendations. This finding is also supported by research completed in Pennsylvania that stated that extension agencies and soil testing laboratories need to increase the awareness of soil testing before fertilzing turf. Agencies may need to start by educating garden centers since they are an important source of information for may residents.[5] This is especially true in light of the fact that homeowners applied fertilizer in the spring when it should have been applied in the fall and underapplied nitrogen and potassium, and over applied phosphorous. Following recommendations, as it relates to the carrier, rates and times of fertilizer applications, can result in a higher quality and healthier turf.

This study also raised the question about the need for phosphorous fertilizers. It may be environmentally beneficial that fertilizer products with no phosphorous be marketed in this region, since soil tests have not recommended phosphorous. Further studies that measure the response from phosphorous fertilzer applications to turf with high soil phosphorous needs to be completed. With the recent research about the impacts of phosphorous on area water quality, it may be necessary to make changes in how phosphorous is applied. If homeowners begin to follow fertilzer recommendations, fertilzers may need to be made available at the appropriate times during the turf's growth cycle and in fertilzer grades that can meet the soil and the turf's need. It was shown that high nitrogen fertilizers were made

Figure 1. **Comparison between Recommended Nutrient Rates and Rates Applied by Homeowners.** It should be noted that the Phosphorous recommendation was 0.0 lbs.1000 ft².

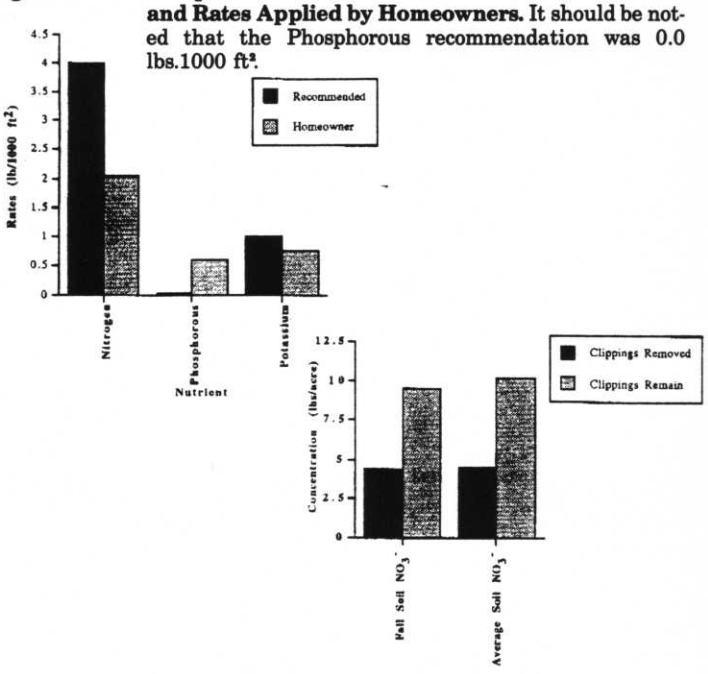

Figure 2. **Soil Nitrate Levels in Homeowner Lawns that Leave Clippings Remain and those that Collect Clippings.** A fall comparison was made to show the differences in nitrate after one season. Average combines nitrate levels in spring and fall.

available in the spring and lower nitrogen grades in the fall. This does not allow the homeowner to purchase fertilizers to meet the turf's needs. It also showed that phosphorous was a nutrient in all fertilizers sold. The adherence to recommendations may lead to significant changes in how fertilizer is marketed.

By defining the parameters that control turf quality, this research has introduced more opportunities to study the factors that control homeowner turf quality. We determined that fertilizer amounts, soil nitrate, plant nitrogen concentration, as well as verdure and weed count contribute to homeowner turf quality. This study will aid researchers in the future to develop efficient and environmentally safe ways to show homeowners how they can manipulate the parameters that control turf quality.

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[2] Daniel T.C., et al. 1994. Minimizing Surface Eurtophication from Agriculture by Phosphorous Management. Journal of Soil and Water Conservation. May, 1994, pp. 30-37.

[3] Mugaas, R.J. 1991. Turfgrass Management. Minnesota Extension Service Bulletin. AG-BU-5726-E. University of Minnesota.

[4] Rieke, P.E. 1992. Fertilization-Fall and Late Fall Style. Hole Notes, May 1992.

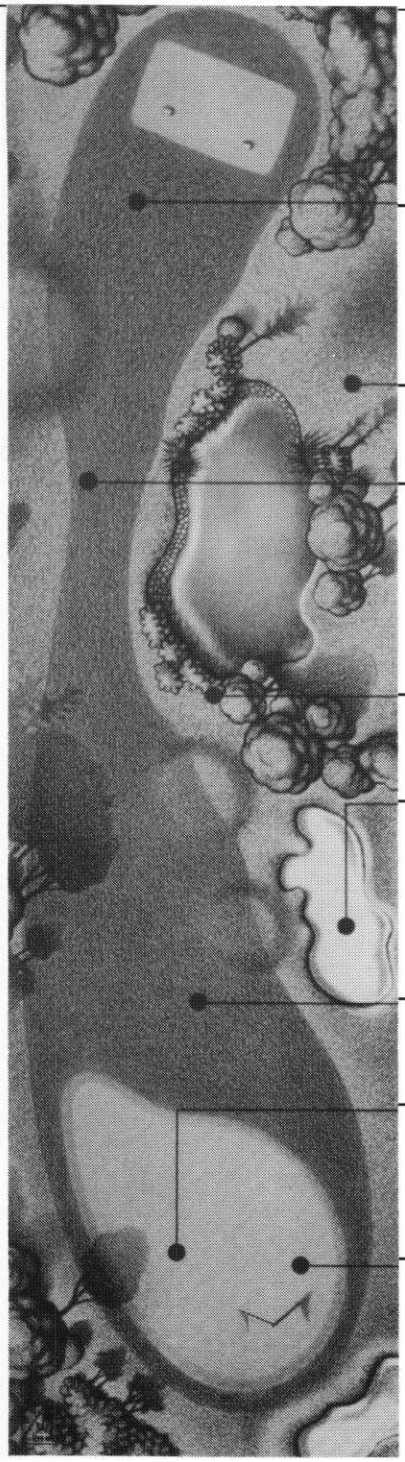
[5] Pennsylvania Turfgrass Council and Pennsylvania Department of Agriculture. 1989. Pennsylvania Turfgrass Survey. Pennsylvania Agricultural Statistics Service, Harrisburg, PA.

The authors would like to thank Jenni Swenson from the Department of Soil Science for her assistance in obtaining and analyzing data.

John W. Schultz is a master of science graduate student in the Department of Soil Science. He is also a science teacher at Hopkins North Junior High School.

Dr. Terry H. Cooper is a professor of soil and environmental science at the University of Minnesota. His interests include soil morphology, environmental science, urban soil use and undergraduate education.

Paul G. Johnson is a Ph.D candidate in Horticulture, specializing in turfgrass management at the University of Minnesota.



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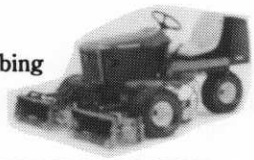

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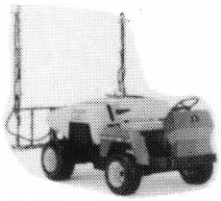

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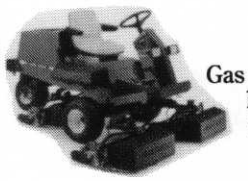

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A Letter to the United States Environmental Protection Agency

Ms. Carol Browner
Administrator
United States Environmental Protection Agency
401 M Street S.W.
Washington, D.C. 20460

Dear Ms. Browner:

Recently, an inter-Agency working group studying the scope of the Worker Protection Standard (WPS) concluded that the Standard should be applied to the small turf and ornamental nursery areas operated by some golf courses for their own internal use. I am writing on behalf of the Golf Course Superintendents Association of America (GCSAA) to ask you to direct Agency staff to reconsider and reverse this action.

We agree tht the WPS properly applies to facilities that grow turf or ornamentals for off-site sale. However, we believe that it should not apply to golf courses with small nurseries or greenhouses for on-site replacement and repair, for the following reasons:

1. **The decision exceeds the intended scope of the WPS, as communicated to us by the officials who drafted the Standard.** The decision hinges on the definitions of two key phrases: "production agriculture" and "commercial." "Production agriculture" clearly refers to a crop that is grown and harvested for sale. "Commercial" implies a transaction or exchange.

   Bits of sod grown for the purpose of replacing damaged sections of putting surfaces (greens) do not meet these clear, common-sense definitions. Neither do flowers or shrubs used on the course. Products used strictly for internal replacement and repair purposes.

   The EPA programming officials who drafted the Standard repeatedly told us that they never intended to include golf course turf plots and greenhouses under WPS. Based on recent discussions with working group participants, it seems that the enforcement officials on the panel felt differently. Apparently, the enforcement officials out-voted the programming officials who defined the rules and wrote the language.

2. **Golf course turf plots and greenhouses are typically very small areas, and are not necessarily segregated from the playing area and grounds.** The working group seems to have envisioned a "sod farm" when considering turf plots at golf courses. However, these plots, which are used primarily to replace very small areas of damaged turf on greens, are rarely more than one-quarter acre in size (or 1/600th of an average 18-hole golf course property). Some plots are smaller than 200 square feet. Many golf course "greenhouses" are nothing more than lean-to shelters built with heavy plastic and timber. At their biggest, golf course greenhouses might be roughly as large as those operated by amateur gardeners across the country.

   We believe the application of WPS rules to a tiny fraction of the overall property is unreasonably burdensome to golf courses and registrants.

3. **The decision has a substantial economic and business impact on registrants and creates a serious dilemma for golf course managers.** Based on all previous Agency statements about WPS and golf courses, many registrants labeled or re-labeled products designed specifically for golf courses to clearly exclude WPS uses. Now, they face the expensive and time-consuming prospect of re-labeling or "split labeling" to allow the use of their products on a tiny but important fracton of the golf course.

   Similarly, we as superintendents face the prospect of not being able to treat our turf plots with the same non-WPS products we use on the other 599/600ths of the course. Therefore, a non-square-foot section of turf taken from the plot to replace a damaged area on a green may not have the same growth properties as the rest of that green and may not knit or blend properly.

4. **Most importantly, this decision offers no additional protection to our workers.** Golf course chemical applicators are among the best-trained and equipped of any user groups. Virtually all are state-licensed, even if it is not necessarily required by state law. The products used on greenhouse ornamentals and turf plots would, of necessity, be identical to those used on the playing field and grounds. Thus, a worker using the same registered product under the same label-directed management practices would suddenly be subject to different rules and a different label — simply for stepping over an imaginary line.

   We believe the potential for mistakes and injury increases, rather than decreases, with the addition of confusing complications.

This decision is particularly upsetting because it was made with virtually no input from the affected constituents. A check of the record will show that GCSAA and its members have always been supportive of the Agency and its goals. On WPS issues specifically, GCSAA has worked diligently and cooperatively with the Agency over the past eight years. Throughout that time, we were assured by the programming officials that the Standard would not apply to golf facilities, as they were seen to be clearly outside the scope and intent of the law.

When our association offered to provide information to

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Environmental Protection Agency—

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the working group about the realities of the areas in question and the potential impacts of this decision, we were told this was not appropriate or necessary. Now, it appears that the working group lacked the necessary information to gauge the true impacts on both users and registrants.

GCSAA's members are strongly committed to worker safety and regulatory compliance. They have structured their management, training and communications programs around non-WPS regulations. Now, we face the difficult task of telling them that the Agency has changed its position. This turn-about may damage the trust and goodwill our members have always shared with the EPA. Such a result would be particularly unfortunate at a time when the Agency has a mandate to serve constituent needs more effectively and to reduce unreasonable regulation.

GCSAA is a progressive organization that cares deeply about worker safety, risk reduction and environmental protection. It is our objective to be recognized as a model environmental industry. We do not object to reasonable regulation merely because it may involve some inconvenience. However, we fail to understand the Agency's rationale in this decision. Under this ruling, registrants spend money unnecessarily and our management practices are complicated substantially, but workers are not protected any more effectively — and perhaps less effectively.

We champion the EPA's role in protecting and preserving human health and the environment. However, we do not believe that this ruling fulfills the intent of the law or furthers the EPA's mission. Therefore, we respectfully request that the Agency take prompt and appropriate steps to reconsider and reverse this action before enforcement begins in earnest.

Thank you in advance for your consideration in this matter. If you or your staff desire any additional information, GCSAA is always happy to oblige. — *Sincerely,*

Gary T. Grigg, CGCS
President, GCSAA

Joe Moris, Tartan Park, congratulates Tom Fischer, Edinburgh USA, on a job well done at the Edina Realty LPGA Classic.

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Rinsing and Recycling Plastic Pesticide Containers

The Empty Pesticide Collection and Recycling Program was developed to save a resource from being thrown away and to provide pesticide users with an alternative method of disposing of empty pesticide containers. Plastic pesticide containers can be recycled providing the containers have been rinsed and are free of pesticides. The plastic from the collected containers is mixed with new plastic to make other pesticide containers.

Rinsing Pesticide Containers is IMPORTANT!

By effectively rinsing pesticide containers, the following happens.

- Saves money; puts all the pesticide and rinsate into the spray tank where it can be used.
- Protects the environment from a potential source of contamination.
- Complies with state and federal regulations on pesticide use.

Common Problems that cause pesticide to remain in or on a container making it unacceptable for recycling.

- The pesticide container was allowed to dry before being rinsed. The dried product is very difficult to remove by normal rinsing. Pesticide containers need to be rinsed as soon as they are emptied.
- Inadequate time was allowed for the rinsate to drain out of the container. The rinsate often contains pesticide.
- The outside of the container was not cleaned. Pesticides sometimes splash or spill onto the outside of the container. The spilled material must be cleaned off. Pay special attention to the threads in the cap area.

For information about the Empty Pesticide Container Collection and Recycling Program contact:

Minnesota Department of Agriculture
Agronomy Services
90 West Plato Blvd.
St. Paul, MN 55107

Telephone: (612) 296-5136; FAX: (612) 297-2271
TDD (612) 297-5353

Some of the MGCSA members enjoyed hors d'oeuvres and conversation after the mixer.

1995 Metro Area Empty Pesticide Container Collections

Date	Location	Time
	Carver County	
July 11	Mid-County Co-op, Cologne	9:00 a.m.-3:00 p.m.
July 12	Waconia Farm Supply, Waconia	9:00 a.m.-3:00 p.m.
July 13	Hennepin Co. Shop, Burschville (Cty. Rd. 10&19)	8:30 a.m.-noon
	Dakota County	
July 13	Farmers Mill, Castle Rock	9:00 a.m.-3:00 p.m.
July 14	Cenex, Hampton	9:00 a.m.-3:00 p.m.
Aug. 10	Central Rivers Co-op, Isanti	8:00 a.m.-5:00 p.m.
	Anoka County	
Aug. 15	Lino Lakes City Hall 1189 Main St. (Cty.Rd. 14)	8:00 a.m.-noon
Aug. 16	Burns Twsp. Recycling Ctr. Cty. Rd. 5 & 65	noon-4:30 p.m.
Aug. 17	Peterson's Mill, North Branch	8:00 a.m.-5:00 p.m.
Sept. 7	Hennepin Cty. Shop, Hopkins	8:30 a.m.-noon

The empty pesticide container collection program is open to all pesticide users. Containers must be rinsed and free of any pesticide residue on the inside and outside of the containers.

Containers can be brought to any collection site. There is no charge for participation in the program. All containers collected are recycled.

For more information about the empty container collection program contact: Steven Poncin, Minnesota Department of Agriculture, 90 West Plato Blvd., St. Paul, MN 55107. Phone: 612/296-5136 FAX 612/297-2271.

The Life of Mr. G. Penncross

By Anna Joelsson Softing
Chalmers Golf Club, Sweden

(Ed. Note: Anna Joelsson Softing, head greenkeeper at Chalmers GC, Sweden, with a little story about the life of a creeping bentgrass seed.)

It all began when I, a little seed, was born. I was a "test-tube" seed and was made in a huge clean and hi-tech laboratory in Pennsylvania, USA. They gave me the name Greg Penncross and I got four stars (out of five) in the quality seed ranking list.

Flown over the Atlantic Ocean

My childhood was traumatic, just the fact that you are totally unaware of your origin can be confusing to a little seed. My upbringing was also demanding due to the fact that everyone wanted me to mature without delay so that they could keep the generous government and company contributions. At an early age I was considered mature enough to move away from my surrogate family which was growing on the turf. Without any warning came a big machine, which smelt horrible from diesel, and ran over my family turf. All over the neighborhood seeds were being separated from their families. Between hard and cold metal rollers I and millions of my seedfriends were thrown into a huge sack without mercy. After that they put us on a big white Concorde, (disappointingly economy class), and we were flown to a little country called Sweden and an even smaller peasant village called Landvetter and taken to a big and famous club called Chalmers GC. We had just arrived when we were thrown into a dark and humid room with other species of grass seeds.

But just because I had a rough start in life, doesn't mean I'm racist. Hell no, they are also seeds although they aren't as green and pretty as me.

The life on a golf green ain't easy

In this little room time passed slowly and I was kept alive only with the little food storage I had under my seed shell. But suddenly one gloomy afternoon someone came and carried us out into the open, put us on a jumpy and small vehicle and drove away with "full speed ahead." You had to hold on tightly! The storage packing was torn open with haste and I saw the light of day again.

Pale white working hands picked me up and raised me to the blue and white sky so impatiently that I almost fell off and the owner of the pale hands said to me: "Be a good sport, grow, get strong and make a family." She fed me well so that I would enjoy my life here. But the life on a golf green is not easy. My feet are always cold and the air is always filled with huge and horrible golf balls which can exterminate whole families if you've run out of luck. And still, this isn't the whole story — daily, heavy and overweight people step right on me with shoes full of spikes big as Indian totempoles.

Other terrible things

Every morning Anna (one of the older families on the golf green told me her name) comes along with her big Ransomes greensmower and cuts my top off. You also have to cope with steel blades which cut down beside you, you better watch your feet! And if that isn't enough they throw sand right on you and bury you so deep that you sometimes have trouble breathing. After that they usually drag a steel net over my shoulders to even the sand or as I say just for the fun of it, the wicked people!

Cheering and swearing

But life wasn't all pain and misery — daily these golfers checked me over and with admiration in their voices said: "Look at him, girls, he's so good looking and green, much more handsome than the guy that was here last year." The golf balls that rolled over my backside also gave a thrilling feeling, and then I heard cheering and occasionally a bad word.

The most beautiful grass in the world

In this environment I grew big and strong and time passed on. It became even colder and inhospitable. Anna gave me less and less to eat, the golf balls and the nail-shoes stopped showing up and my top was cut less frequently, stopping completely in late October. And suddenly the weather changed and it got really unbelievably cold and it started to snow and this continued for what seemed forever. Anna came and checked on me occasionally but she never brought any food. Now I had come to the stage in both mind and life that I just didn't care anymore. And one day after heavy rain the temperature dropped and the water froze to ice. I began having trouble breathing, and felt more and more weak for every hour that passed. When I had come to the point where I had given up, I felt the pressure over my chest easing. The ice began to melt and the temperature rose. Anna came with some refreshments and one day she came with a sack that I recognized. New seeds were spread out and right beside my right side a blond and well developed little seed landed. She was called Emerald Pennlink.

It's spring once again — the golfers return, life is great — and the rest I'll leave to your imagination.

— Greenkeeper International, official publication of the British & International Greenkeeper Assoc

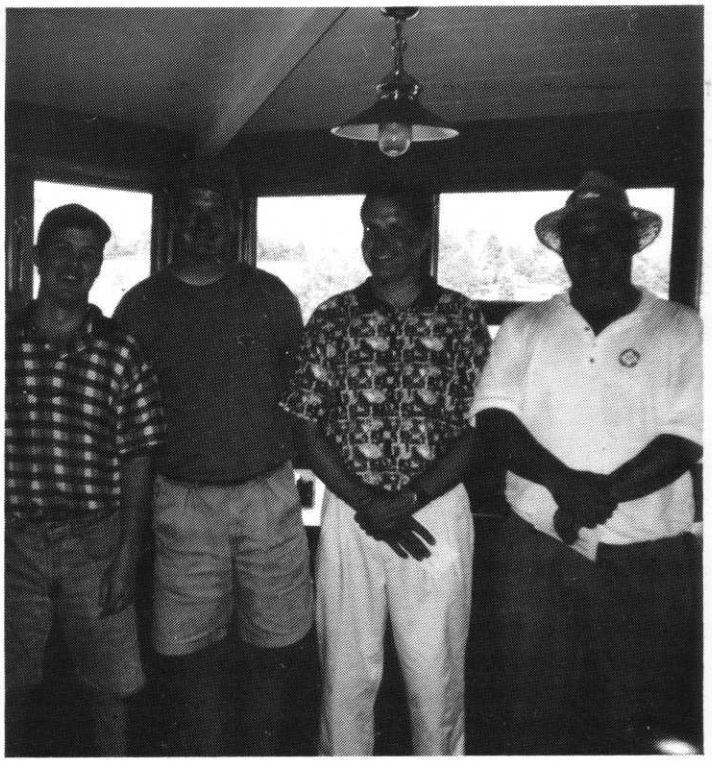
Grants Available For Hazard Abatement Projects

The Department of Labor and Industry is pleased to announce another funding round of its safety grants program under Minnesota Statutes, Section 79.253. Employers covered by workers' compensation insurance, including self-insured employers, are eligible to apply for matching grants to abate safety hazards in their workplace. The hazards must first be identified in a safety survey done by a qualified person and must have resulted in specifically recommended safety practices and/or equipment.

Grants up to $10,000 are available. The employer must provide at least $1 in project costs for every grant dollar awarded. The grants are designed to promote safety in the workplace, particularly those that are in high-risk industries. Qualified projects having the greatest impact and feasibility will be given priority.

Applications, program qualifications, and information are available from the department. Applications will be accepted from March 6, 1995 to December 31, 1995, or until the allocated funds are committed. They will be processed on a continuous basis. The department has allocated a total of $300,000 in grant awards for each quarter of 1995: March 1–June 30, 1995; July 1–September 30, 1995; and October 1–December 31, 1995. If the funds are expended for one quarter, applications will be held over for consideration the following quarter.

For further information or a grant application, please call James Collins, Workplace Safety Consultation, at 612-297-2393.



The Winning Team at the June meeting in Bemidji was Tom Little, Minnesota Golf Cars; Pat Sullivan, Bemidji T&CC; Scott Hoffman, Madden's on Gull, and Steve Shumansky, Perham-Lakeside. They were 17-under par in a Best 2-Ball Net mixer.