THE BULL SHEET, official publication of THE MIDWEST ASSOCIATION OF GOLF COURSE SUPERINTENDENTS.

Editor: ROGER LA ROCHELLE
1818 — 177th Street
Hammond, Ind. 46324

THE MIRACLE OF THE SOIL

by Dr. Rudolfs Ozolins, Agronomist

Soil consists principally of rock particles that have become broken down into smaller and smaller particles through processes of continuous erosion and disintegration. The collection of these mineral-yielding rock particles, mixed with clay as a foundation, together with the decomposing remains of vegetable and animal life (humus), forms the basis of our productive life.

The purpose of soil is to provide a secure anchorage for plants and trees, and to provide all of the essential nutrient elements (plant food) necessary to promote and sustain plant life.

From the productive soil proceeds the only known form of chemically-created, self-accumulating, self-supporting energy in the form of the living green plants. Plant life alone has the ability to accumulate and store chemical energy, which becomes the basic food supply for all other forms of life to subsist upon.

By far the main food of plants consists of carbon dioxide, which plants breathe in through their leaves from the air,—and water which the plants draw in through their roots from the soil and circulate upward through their structure. The green coloring material of the leaves is a variety of chlorophyll, a very complex substance, each molecule of which is organized around one atom of magnesium.

This chlorophyll, which may properly be called "plant blood", has the remarkable ability of securing radiant energy from the sun and bringing about a chemical reaction between carbon dioxide and water to form a simple sugar called Glucose ($C_6H_{12}O_6$). This simple sugar is in turn converted by the plant—in whole or in part—into starch and cellulose which form the structure of the plant. It is a remarkable fact that we owe all of our food, fuel and clothing to this wonderful chemical reaction.

Besides carbon dioxide, water and magnesium, the living plant depends for its growth upon a number of inorganic (mineral) food elements, which must be present in the soil in such form that they can be absorbed through the roots of the plant and then circulated in the plant by the plant juices. Some of these elements are true plant foods which are built directly into the plant structure, while others are catalysts that play an essential part in the chemical processes which promote the growth and development of the plant.

Thus is seen the intricate pattern of life as it develops—first through a process of chemicalization whereby carbon dioxide from the air and mineral food particles from the soil, dissolved in water, are activated by energy from the sun and thereby converted and stored as food and energy in plants, then their subsequent conversion to a still higher form to become the tissue, blood, bone, sinew and the special adornments of animal and human life.

The principle of life, whether plant or animal, is an eternal force of perfect, self-expressing, self-creating, self-supporting energy. Each form of life is limited to its own peculiar life cycle involving germination or conception, growth, reproduction and maturity. Barring accident, the only factor that can limit or prevent any form of life from completing its life cycle is starvation. Starvation may be caused from lack of sunshine and water, or it may be due to the absence from an otherwise adequate food supply of a single one, or a combination, of the vital mineral elements essential to plant or animal life.

When the pioneers first settled on our virgin soil, they found it firmly sewed to the earth by roots of trees and grass. When they cut down the forests and tore up the sod, this soil started down hill and has been going down ever since. This is because many of the essential plant food elements are not present in our soils in sufficient quantities to support annual crops indefinitely. Each harvested crop removes large quantities of these vital elements from the soil and, unless these elements are properly restored, soil depletion is the inevitable result.

It is high time that we give consideration to conserving and restoring the vital elements to our soil. The mineral resources of our soil may be compared to a bank account which diminishes with each withdrawal until finally we will be faced by "overdraft".

The President's Message

With the Denver convention and the Midwest Regional Turf Conference behind us, we can start and plan on getting our golf courses in the best of condition for the 1971 season. At the present time it looks like the golf courses have come out of the winter with less problems than any year in the past. I would like to see all the membership attend all meetings. We have a very good educational committee working for your benefit and a committee picking out some very fine golf courses for your golfing pleasure. Get all the news by attending your meetings. One day away from your duties at the club a month is the best way to relax yourself. See you around.

Joe Canale

POA ANNUA PROGRAMS — POA ANNUA WILL BE CONTROLLED ! !

Going into the 70's one has several choices being offered for the control of Poa Annua. Basically we can break these down into four programs.

1. **Scorched earth method.** Complete burning off, or stripping sod and thatch. This has proven successful on some courses but it is a drastic program.
   Advantages. Can accomplish change over from poa to bluegrass or bentgrass in one year. Can then go on a prevention program to keep poa out.
   Disadvantages. Takes course out of play for long period of time. This like all programs, requires good cultural practices, such as good drainage, de-thatching. Aeration and correcting soil acidity.
2. **Pre-emergence. (Balan - Dacthal - Betasan - Pre-San)** This method while still very new, is completely dependent on the quirks of nature. Timing is very important, but weather conditions are the key factor. If you apply these chemicals at just the right time and nature knocks out the poa, then you can prevent it from coming back by killing the new emerging seedlings, as they germinate. The big draw back of this program is that poa usually dies all at once instead of gradually—leaving unsightly bare areas. The desirable grasses do not recover because of the chemical destroying the desirable seeds.
   Advantages. Economical—Use any fertilizer—No residue.
   Disadvantages. Affect desirable seeds—Can't reseed for 2 to 6 months. Soil can't be disturbed after application. Possible danger to bentgrasses. Will not control poa that does not die out. **Must be repeatedly applied at critical times and rates.**
3. **Growth Retardant (Po-San).** Inhibits poa seed head production and retards foliar growth. Encourages upright growth and reduce matting. Inhibits 80-100% **seed formation.** Places poa under chemical stress.
   Advantages. No soil residues—Use any fertilizer—Re-seed immediately.
   Disadvantages. Mixing two chemicals—agitate while applying—Timing must apply **before** seed heads develop. Do not use on greens. Use only in well established turf.
   Put turf under high stress—heat—drought—disease may stress weakened turf more. Temporary chlorosis will occur. Knocks out seed but not mature plants so you may never rid area of poa completely. Results are variable.
4. **Soil Control Program. (Chip-Cal)**
   Start with one fairway, green or the whole course. Follow the 6 point program that has worked on over 3,000 courses. The only program that takes out poa without depending on nature.
   Advantages. Works slowly so there is no lost playing time. Can reseed and build up desirable turf. Once control is reached, cost of program drops to very economical level. Also controls crabgrass, chickweed and soil insects.
   Disadvantages. Restricted fertilizer program.

THE PLANT:

With any program you choose there are certain ground rules that must be followed. We in the northern area of the United States know that Poa Annua is very unpredictable. In some areas it dies out every year. In other areas it lives for two or more years, so it acts more like a perennial weed. Which ever program you choose will only get results if you follow the correct principles.

THE ACTION — IT'S UP TO YOU

1. Explain program to all interested parties, greens chairman, committee and membership. Tell them what to expect and how long it will take.
2. Correct any soil deficiency, lime if acid, etc.
3. Aerate, de-thatch or spike the ground.
4. Drain low area — on fairways, trench or vertical slit.
5. Overseed often — as the poa goes out you want to fill in with Bluegrass or Bentgrass.

Now's the time to do something — Poa may go at any time and cause undue hardships on some really fine people.

Tom Cronin
RHODIA INC.,
CHIPMAN DIVISION

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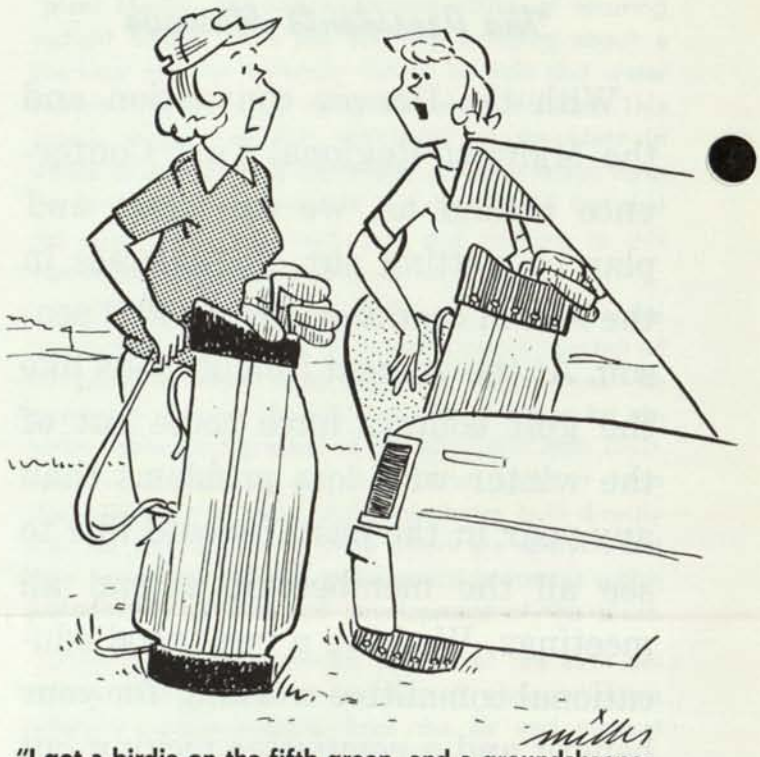

"I got a birdie on the fifth green, and a groundskeeper on the eighteenth."

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CARTOON CONTEST CORNER

This month's winner of the $5 prize is Mike Bavier, Superintendent of Inverness Country Club.

A Positive Perspective on Pesticides

By R. G. Van Buskirk

Your neighbor is asking; your family is asking—and you may be asking: "Do we need pesticides? Are they good or are they bad? What's all the shouting about?"

So let's take a look in some depth at the subject and see if it can be put in proper perspective.

Man is dominant on this planet. To achieve and maintain this position, he has by necessity and plan been forced to change ecological checks and balances so that they **work in his favor.**

Some gifted writers, with an emotional, romantic and mystical bent, have effectively managed to persuade many people, including some politicians, that the balance of nature should not be disturbed.

It's astounding to find that some scientists back this romantic concept of the balance of nature.

Left alone, insects would abound in teeming trillions. If undisturbed, weeds would take over the land. If uncontrolled, rodents would cause the catastrophes they created from the Dark Ages on into the 18th Century.

Man had to change the balance of nature so that he could eat and remain healthy. One way he did this was to grow crops instead of weeds. He fostered the growth of huge herds of cattle and large flocks of poultry instead of allowing these animals to grow wild according to natural selection. He strove to manage food growth instead of remaining a hunter.

Acts like these are contrary to undisturbed nature. And nature responded by creating hordes of pests to prey upon these man-nurtured products.

Nature, the kind the romanticists want kept in balance, is an unrelenting enemy of man. All true scientists know this.

This is one part of the balance of nature perspective that all of us must see and understand.

There is another part to the scene that we must also view clearly. And it's not a good scene. Man **does** create problems for himself. He does, by design, error or inadvertence disturb some natural conditions which then act to man's detriment.

He over-populates and, in turn, this leads to pollution — especially of the water and the air. He has reached a point where he threatens to disturb the **balance of man** — adversely.

And this, too, we must see. But these two views are more separate and distinct than they are intermingled.

And therein lies the great hazard to all of us today. We are, fortunately, discovering the evils of pollution. But many of the good things we do to control the balance of nature, in our favor, are now being illogically questioned. If we lose our perspective, we can go backwards and lose the "balance of man."

For example: Cranberries treated with a herbicide were, improperly and in grossly distorted fashion, ruled to be carcinogenic. A hasty governmental dictate resulted in the great cranberry scare and farce of about a decade ago.

Recently, Cyclamates were outlawed, precipitously many think, before scientific data was adequate to really establish harm to humans.

Currently, the pill is under attack. Again, the evidence appears miniscule that the pill is a significant threat to human health. On the other hand, the pill works and some people are beginning to recognize

that the world population explosion in the cause of many ills — including pollution.

Pesticides are being attacked in the same hasty manner. Some people go so far as to demand that all pesticides be eliminated. Again, half truths and incomplete facts are leading to damaging legislation —legislation which weakens man's dominance in nature.

These few of many examples available are cited to show that we are being confused by the writings of numerous "instant" experts. Their articles often create emotionalism and sometimes lead to loss of reason which verges on the point of near hysteria. Often, hasty legislation follows.

The American Medical Association has stated that "there is no evidence to date that humans are appreciably affected by long-term ingestion of the minute traces of pesticide present in raw and processed food."

Wild life counts show that fish, birds and mammals abound and have, in fact, their own population explosion going on. Pesticides are not deterring their growth.

Minute traces of pesticides **are** found in our waterways. This is because we now have extremely sophisticated instruments which can detect the presence of chemicals in parts per million, billion or trillion!

Yet, to the critics, sewage and waste dumped into our waters — and pesticides applied to our crops, or used for public health purposes to benefit man, are presented as equal pollution and health hazard problems.

This trend is alarming and completely incompatible with the reasoning we have come to expect from late 20th Century man.

A perspective on pesticides is our subject. So let's look at the subject. What was it like when we had no pesticides?

WHAT WAS IT LIKE WITHOUT PESTICIDES?

Scientists can tell us that prehistoric man didn't live very long. The reasons are apparent. He knew nothing of viruses, bacteria, fungi. He knew nothing of the values of sanitation. He drank stagnant water, ate rancid meat, lived near swamps and was often louse and flea-ridden. And he didn't know how to grow crops.

He probably died from malaria, filariasis, dengue, yellow fever, virus encephalitis, typhus, plague, amoebic dysentery, cholera, diarrhea and numerous other diseases. He was lucky to live into his twenties.

Thousands of years later, one modern product called DDT effectively controlled or participated in the control of all these listed diseases. But prehistoric man lived — and died — too soon to benefit from DDT.

Man wasn't really the dominant creature on earth then. But he was adapting. He was learning to change the balance of nature. By Homer's time, man had discovered that sulphur helped to "avert" pests. He was a little more sanitary in his habits—but not much better off than his caveman ancestor.

He had become less a hunter and more a farmer. He couldn't cope with insects but by now he could recognize them as an enemy. He often thought of insect infestations as being supernatural acts from which there was no escape.

Population was inhibited by three major factors: famine, disease and war. Famine was caused by bad weather and by swarms of insects which stripped the crops. Disease often raced through a country like wildfire; sometimes killing one-fourth of the population. Invading armies plundered and ruined the crops. Several major plagues have occurred in the past. In the Middle Ages, between 540 and 690 A.D., all of the known world was ravaged. The plague killed as many as 10,000 people per day in Constantinople alone.

In 1348 and 1349 about one-fourth of the European population was destroyed.

One onslaught occurred between 1650 and 1700. People didn't realize that fleas carried the plague from rats to humans. So the possessions of sick people were burned because it was believed burning would stop the plague.

Plague still lurks in parts of the world — ready to kill again on a mass scale.

This was nature zealously at work — and receiving very little tampering by man.

Gradually, man learned about sanitation, microbes, viruses, and disease-carrying insects. But it took long centuries before he knew how to protect his crops.

And famine and disease continued to stalk the world while man used beating sticks and flails in an impotent attempt to ward off invading hordes of insects.

PESTICIDES DISCOVERED

Some progress occurred during the 19th century. Pesticides, in rudimentary form, were discovered. Paris green was used on potato crops as early as the 1860's to fight the Colorado potato beetle.

Bordeaux mixture was used in France in the 1880's to combat downey mildew on grapevines.

In the early 1900's, a few companies were formed to specialize in the production of pesticides. This was a big step forward. The products made were composed of inorganic chemicals such as lime, sulphur, compounds of arsenic, lead, mercury, coal tar products, soap, petroleum products and Pyrethrum and rotenone. Paris green and Bordeaux mixture also continued to be used.

With the advent of chemicals, man began to control insects. Food quality and yield improved. Farm profits increased. And the beating stick and flails faded into history in all leading countries. But even today in some backward areas of the world, primitive methods are still used.

Pesticides, as known and used in the early 20th century, helped agriculture. But progress was slow because the educational process was slow.

Zinc arsenite and basic lead arsenate controlled worms on apples. White oils were discovered to have phytonomic and insecticidal properties; oil emulsions were invented; plant hormones were discovered.

An insoluble copper fungicide was synthesized and replaced Bordeaux mixture for certain uses. Called Coposil, it could be used with greater safety to plants than any other copper fungicide then known.

Bugs were being controlled to some degree for the first time in history. And crop yields grew and quality of food improved.

Weed killers appeared and the hard-working farmer began to get a chemical assist. His back-breaking labor was reduced somewhat.

But early 20th century chemicals, while being a

great scientific advancement, did not solve the problem. Bugs, weeds and fungi are fierce competitors to man. Nature can be beautiful but it also can be and is relentless in its battle against man. The early chemicals, such as lead arsenate, sulphur, rotenone and Pyrethrums temporarily did a good job of restraining insects. However, the ability of insects to procreate is a tremendous one.

Furthermore, nature adapts. Bugs develop resistance. Chemicals, formerly effective, eventually become less effective or ineffective against some insects. But man, too, is a part of nature and he can also adjust and meet new challenges. In 1942, he made such an adjustment.

In 1942, the world was at war. Millions of men were in the armed forces. Disease has always besieged armies. Body lice were responsible for 500,000 deaths in Napoleon's armies and contributed to the defeat of the Spanish Armada. Disease again endangered our armies in World War II — especially in the malaria-laden Pacific Islands. And food supplies were short with the farmers being hard-pressed to supply food and fiber for ourselves and our allies.

The insect, man's constant and eternal enemy, was also at war with us on all fronts. At this point, when most needed, **DDT** was introduced.

This remarkable chemical was synthesized in Germany in 1874. But it lay dormant for sixty-five years. Then, in 1939, Dr. Paul Muller discovered its amazing powers as an insecticide.

DDT: VICTIM OF INCOMPLETE FACTS

The army introduced DDT into the battle in all the malaria-ridden areas where our troops were located. It did a tremendous job. Since then, DDT had been credited with preventing 500,000,000 illnesses and saving 25,000,000 lives. Probably no chemical, not even penicillin, has been such a boon to mankind. It's on its way out now, a victim of incomplete facts, emotionalism and hasty legislation. But, eventually, history will place it in its proper perspective.

DDT was the first of the wartime and postwar organic chemicals. But even DDT could not do the job alone. Insects still adapt. New species enter the North American continent continuously. Resistances build up. So, after the War, other synthetic organic pesticides, systemic insecticides and antibiotics were developed.

And production soared — giving the U. S. more and better foods, assisting the farmer, helping the economy. For example, as late as 1941-1945, the average corn yield in the U. S. was around 33 bushels per acre. Now, the yield is 79 bushels per acre. The average cotton yield was 262 pounds per acre during the war years. Now, it is 511 pounds per acre.

Many major crops show equally impressive yield increases. Modern farm chemicals, created after World War II, were major contributors to this impressive yield increase which occurred between 1945 and the late 60's.

Yet, currently, pests cost agriculture about $15 billion dollars each year. It's an unceasing battle.

Now, in the 70's, the world finds itself in trouble. Its population is doubling about every 35-years. Ten to twelve thousand people die of starvation or malnutrition each day. Disease kills thousands in the backward countries and waits, ready to strike, in all countries who drop their guard.

Pollution is readily apparent everywhere. Bodies of

water such as Lake Erie have been ruined; beautiful San Francisco Bay is threatened. The air is impure. No wonder man is disturbed and wants action.

But it must be action prompted by reason — not hysteria, cultism or emotionalism. Pesticides have been caught up in this maelstrom of ecological concern. And the record shows that pesticides help man to have the basic essentials of life: food, clothing and good health.

ACQUAINT YOURSELF WITH THE FACTS

Some dedicated scientists have been studying pesticides for years. Pesticides are a poison. They must be used properly. This is true of aspirin, iodine, table salt and hundreds of other items. But these scientists find the following:

1. "Only a few pesticidal chemicals reach man's body, and then only in minute traces, except by accident, suicide and murder."

2. "The effects of a chemical are proportional to the dose and, for the most toxic chemicals known, no detectable toxic effects occur below a certain dose level."

The trouble is that these scientists, who study pesticides, write for medical and technical journals. Only a fraction of 1 per cent of the people ever have an opportunity to read what these men write.

And most people get the antipesticide stories as reading matter in their morning newspapers. Many of these readers are now completely convinced that pesticides should be banned.

"A world without pesticides" is a subject in itself. Growers, packers and consumers all have a tremendous stake in the food and fiber industries. So when you read antipesticide articles in newspapers and magazines, or when you hear radio and T.V. commentators crusade against them, stop and think of how it would be without pesticides.

Read the articles **carefully.** Look for words such as "may", "might", "could", etc. These are all speculative words which allow the writer to conjecture on the unproven — but, always, the sensational.

Note other words, too, such as "insidious" and "biocide." These words, used authoritatively, but without explanation, detail or documentation establish a hostile mood toward pesticides.

The politician, skilled at judging popular response, notes these articles. He is quick to act if he thinks it means votes. His hasty legislation is already a matter of record.

The point: read carefully and thoughtfully. Challenge the writer. Get a proper perspective.

Then, don't hesitate to tell your neighbor, your minister or a new ecology convert the facts as you see them. And let your representatives in state and national governments know how you feel.

Pesticides have played an important part in man's progress. Until the 20th century, we were much closer to the Dark Ages than many of us are willing to admit.

Pesticides have given us abundant, clean food; they fight human disease; make sick animals well. They are a poison, but, handled correctly, they are one of man's important allies.

So, acquaint yourself with the facts. There is a lot involved and it affects all of us.

Song To An Unsung Hero

The ultimate tribute to any inventor is the incorporation of his surname into the language without a capital letter. For some reason, the British have been especially generous with this form of accolade; the Earl of Sandwich, Lord Cardigan, Lord Chesterfield and the Earl of Davenport are regularly honored in everyday speech—and so are such commoners as Macintosh, Macadam, Gladstone and Bowler. But what of Thomas Crapper, the father of the modern toilet? While American slang has acknowledged Crapper with both a noun and a verb, it is still a dubious sort of fame—and the man whose Valveless Water-Waste Preventer perfected the efficient disposal of the unmentionable is still a prophet without honor in his own country.

In "Flushed With Pride," the latest manifestation of the British affection for water-closet wit, novelist Wallace Reyburn finally gives Crapper his due. Although the book has the ring of a classic hoax, Reyburn presents ample evidence that his man not only lived but made a lasting contribution to mankind's comfort.

Thomas Crapper lived and died in Victorian times, but in terms of sanitary conditions the age was still dark. To flush their toilets, the Victorians simply pulled a chain that lifted a valve that released water from a cistern into a flush pipe. In other words, they just pulled the plug. Since the plumbers who made the valves could rarely insure a snug fit, the water in most toilets flowed ceaselessly. This flow, multiplied by thousands, threatened to dry up reservoirs and spread drought and pestilence over the land.

Superflush: In the 1870s the British Board of Trade sent out a call for a more efficient system—and Crapper, a Chelsea sanitary engineer, came up with the best answer. His ingenious solution, which can still be observed beneath the lid of many toilet tanks, depends upon a float, a metal arm and a siphonic action to empty the reservoir. Crapper's Valveless Water-Waste Preventer passed its most critical public test in a demonstration at the Health Exhibition of 1884, achieving a superflush that completely cleared away ten large apples, a flat sponge, three wads of paper and four paper sheets stuck to the bowl with grease.

As his biographer cannot resist observing, Crapper's success "was no mere flush in the pan." He went on to develop Crapper's Seat Action Automatic Flush (tipping the seat activated the flush mechanism), a cantilevered toilet for prisons that kept all the piping hidden (convicts tended to bash guards with weapons fashioned from toilet pipes) and a revolutionary drainage system that did wonders for clearing the Victorian air (it was no accident that fainting damsels of the day were said to suffer from "the vapors").

Such breakthroughs earned Crapper a three-story headquarters on King's Road and a royal commission to install the facilities in Edward VII's new country home in Sandringham. Visitors to Sandringham can still observe a subtle example of the class distinctions of the period by noting that the toilet-chain handles in the servants' quarters are plain oval rings, while those adorning the royal lavatories are either "Crown Derby" or "Cream and Gold Fluted China" models.

Aquarius: Reyburn's portrait is embellished with cloacal trivia, such as Winston Churchill's preference in toilets and an account of the invention of the perforated toilet roll" (not a Crapper coup). Crapper himself lived to a ripe 73 and never lost interest in his vocation. His grandniece recalls visiting Crapper's factory in his last years and watching the old boy happily yank at the chain of an "Aquarius" or "Cascade" model to test some new modification.

Although the Crapper building has given way to a mod boutique, and most of the inventor's proudest fixtures have long since crumbled, at least one testimony to his memory remains. It can be found in the cloisters of Westminster Abbey, among the tombstones of England's most celebrated sons—the inscription "Thos. Crapper, Sanitary Engineer Chelsea." The inscription adorns a manhole cover.

DISINFECTING WATER WELLS

Where drinking water is provided on the golf course by small diameter wells equipped with hand pumps there is always a danger each spring that the water in the well can become contaminated, when lying dormant all winter, by surface water leaking into the well bore. To overcome this difficulty it is recommended that all drinking water wells be disinfected before they are placed in service. A concentrated solution of chlorine and water is often used for this purpose; common laundry bleach sold at most grocery stores, and which contains 5¼% Chlorine, is ideal when used in the following amounts.

Diameter of Well Casing	Depth of Well	Cups of Bleach	Gallons of WATER
2"	50 ft.	¾	8
3"	50 ft.	1¾	18
4"	50 ft.	3	32
5"	50 ft.	4¾	51

The bleach and water should be mixed in the above amounts and poured into the well casing and kept there for a minimum of two hours after which it should be pumped to waste. A water sample can then be collected for bacteriological analysis, bottles for collecting such samples are available from all health departments.

C. E. (Scotty) Stewart