

identally step on a bee and your eyes swell shut, that is a systemic reaction. A toxic reaction is when multiple stings inject an overdose of venom into your blood within about one minute. This could happen, for example, when a golf course worker saws through a nest of yellow jackets in a tree. After several stings you might feel dizzy, develop hives, experience labored breathing, and possibly pass out. Anyone can experience this kind of reaction.

Skin tests determine which venoms you are allergic to. If children under 16 have a systemic reaction involving hives or swelling, shock, and positive skin tests but no breathing problems, they have a 10% chance of having a similar reaction if stung. After treatment their risk decreases to only 2%. An adult who has a systemic reaction involving the same symptoms runs a 60% risk of a similar or more serious reaction if untreated. Immunotherapy reduces that to a 2% chance.

When should you go for an evaluation? Dr. Yunginger encourages anyone to visit a doctor for an evaluation if a systemic reaction occurs. Treatment depends on clinical history and skin test findings. Costs vary from community to community, but generally immunotherapy runs less than \$10 per injection. Venom cost for the first year of treatments run from \$100 to \$500, depending on the number of venoms received. For following years of therapy, the cost is less.

If you have a generalized reaction, swelling in an area other than the sting site, or hives, or if you have trouble breathing and blood pressure drops drastically, injections of epinephrine or adrenaline are given. Epinephrine is life-saving. Allergic reactions often involve a circulatory collapse during which veins enlarge and blood pressure drops. Adrenaline increases blood pressure and dilates the bronchials to help the victim get enough air.

Most doctors prescribe an emergency bee sting kit for allergic reactors. The kit costs around \$10. It comes complete with a disposable hypodermic needle and syringe containing two single doses of epinephrine and

four tables of Chlo-Amine — a chewable antihistamine. The kit also contains a tourniquet and an instruction sheet. However, you cannot rely on the kit alone. Sometimes it can take more doses

of epinephrine to reverse a systemic reaction. As with any medical situation, ALWAYS CONSULT A PHYSICIAN, IMMEDIATELY. Insect stings can be dangerous.

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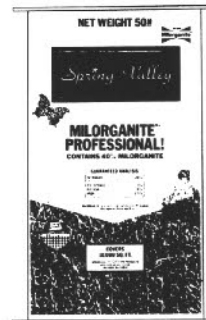
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 Fall formula . . . 10-5-15 + IRON
 Flower & shrub . . . 8-4-4 + IRON
 Tree & shrub planter 12-4-4 + VITERRA

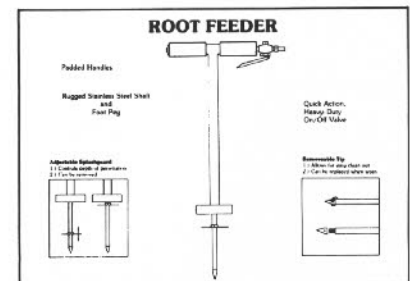
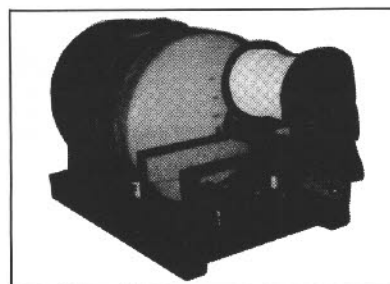
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 Fall formula . . . 12-9-20 + IRON
 Tree root feeder . . . 25-5-5 + IRON



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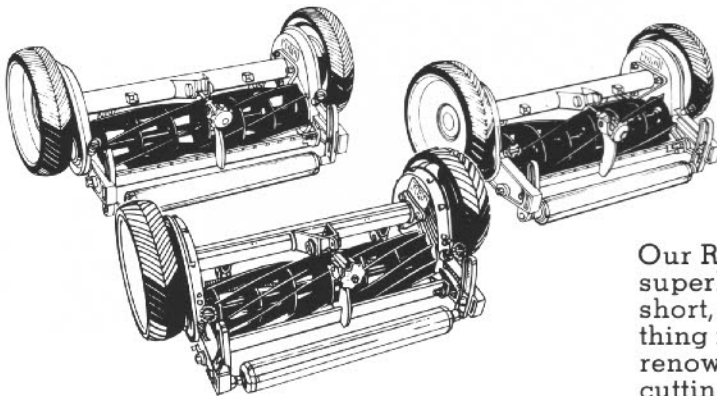
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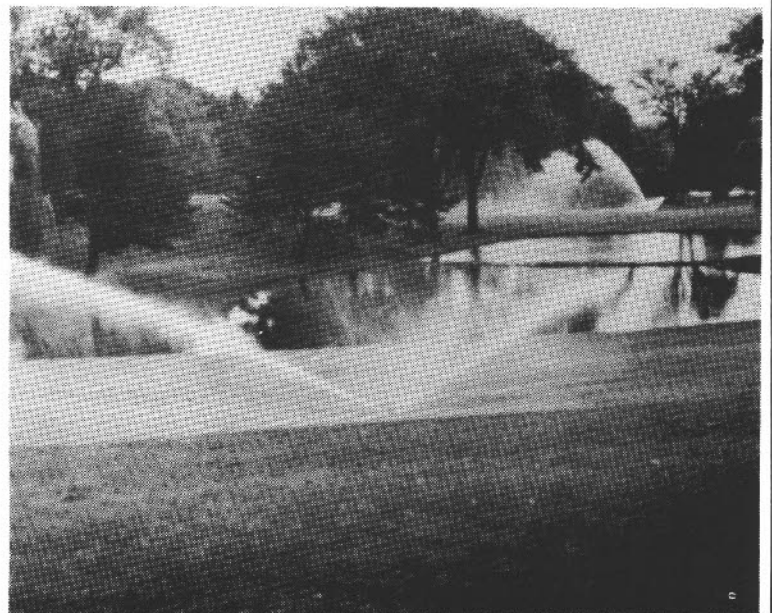
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INTRODUCING “MADE IN WISCONSIN!”

In the past few years there has been an increased awareness on the part of the American consumer of goods and products that carry the “Made In The USA” label. Renewed pride in the purchase of these products has certainly helped the recovery of the American economy. We have that same intent with this new series of articles that you will be seeing in each issue of THE GRASSROOTS for the next couple of years. There isn’t a single golf course maintenance facility in Wisconsin or anywhere else in the entire country without one or, more likely, several products or pieces of equipment produced within the borders of our own state. The editorial staff of THE GRASSROOTS will be travelling about the state, gathering the stories of these many industries that are critical to the golf course maintenance industry, here at home, across America and indeed, around the world. They are our neighbors, members of our clubs, our friends and our colleagues. They have, taken together, an enormous impact on the Wisconsin economy. And each one has an interesting story to tell. Our task is a very easy one.

Our first story features one of the oldest and one of the best known — MMSD and the renown fertilizer, Milorganite. This year marks the 60th anniversary of Milorganite and we salute that accomplishment. Their quality has been unchallenged for all of these years. And, of course, their history is tied closely to the WGCSA because of O.J. Noer.

We are grateful to Jim Spindler and his gracious acceptance of our invitation to author this story. As the “new kid on the block,” Jim spent a lot of time in research and investigation of the archives of MMSD and has prepared an excellent narrative for your information and enjoyment.

MSM

THE MILORGANITE STORY

By Jim Spindler

Milorganite, like many turf products, is a long established product made in Wisconsin. This year 1986, is an important year to Milorganite, and to the turf managers in Wisconsin and elsewhere. This is the diamond anniversary of the beginning of commercial production of Milorganite and with the development and production of Milorganite came a product and the people who have played a major role in the modernization of turf management.

For more than 60 years people like O. J. Noer, Charlie Wilson, Jim Latham, Bob Welch and others have played a tremendous role in developing many turf management practices that are still used today. Before Milorganite the only fertilizers available to turf managers were manures, dry blood, composted materials, ammonium sulfate, salt peter, etc., products that were either difficult to handle or risky to use on turf. Before O. J. Noer, greens and fairways were often planted to fescues, ryes and bluegrass. O. J. promoted the use of bentgrasses, especially when modern mowers were developed.

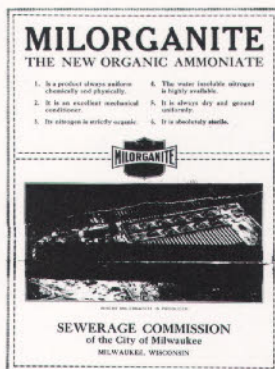
that is to provide adequate sewage disposal. At that time all the sewage produced was dumped into one of Milwaukee’s three rivers; the Milwaukee River, Menomonee River, or Kinnickinnic River, and out to Lake Michigan. Then, as now, all of Milwaukee’s drinking water came from Lake Michigan and bathing or swimming was popular in the rivers as well as the lake.

In 1913 the Legislature of Wisconsin passed an act authorizing the City of Milwaukee to create

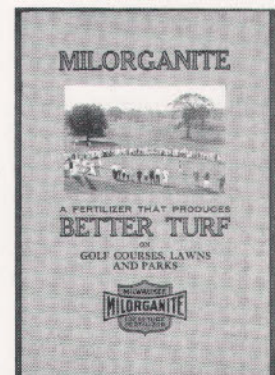
Since Milorganite was first offered for sale more than 3,633,330 tons have been produced. Presently, about 65,000 tons of Milorganite are produced and marketed every year. It has been sold in all 50 states as well as in Canada, Venezuela, India, Puerto Rico, Japan and many other countries.

How It All Started

In 1879 the City of Milwaukee was directed to clean up its act,



This is the first flyer printed in 1927.



This is the first booklet put out in 1927.

a sewerage commission. That same year a chemist in Birmingham, England was experimenting with sewage sludge. He wanted to see what would happen if air was allowed to bubble through a mixture of sludge in a test tube. When the weekend came he turned off the bubbles and went home. On returning on Monday he found that the solids had settled and the sewage was purified. This was the beginning of the activated sewage sludge method of sewage disposal.

In 1915 the Milwaukee Sewerage Commission's laboratory began studying the newly discovered activated sludge process. As a result of these studies the Sewerage Commission formally adopted the activated sludge process on December 31, 1919. In 1921 the Wisconsin Legislature passed a second act which created the Metropolitan Sewerage Commission which was charged with providing intercepting sewers to connect municipal sewers to the sewage plant so that all sanitary waste produced in the drainage district of Milwaukee would be treated at a central location. The central location chosen was Jones Island which, at that time, was mainly inhabited by fishermen.

In 1923 construction was begun on the world's first large scale activated sludge plant at a cost of about \$15 million for the plant and about \$20 million for the main sewage lines. This would service an area of 96,000 acres and a population of 575,000. They estimated they would treat enough sewage to produce 100 tons of dry solids per day, or 35,000 tons per day. In 1974 this plant was named a national historic engineering site by the American Society of Civil Engineers because the design of the plant was years ahead of its time.

O. J. Noer Enters The Scene

In May 1923 the Sewerage Commission established a fellowship at the University of Wisconsin, College of Agriculture, under the direction of Professor Emil Truog to investigate uses of activated sludge as a fertilizer. O. J. (Oyvind Juul) Noer was named as the fellow to carry out the work.

In 1923 the typical analysis of the Milwaukee sludge was 6.2 per-



cent total nitrogen with 5.17 percent being water insoluble, 2.36 percent P_2O_5 , and 0.13 percent K_2O . O. J. found in his literature review of the sludges available at that time that these sludges, as far as available nitrogen was concerned "resembled very...closely in its general characteristics...the so-called high grade organic nitrogenous fertilizers" and that it gave superior growth results compared to manures and chemical fertilizers of the day.

The first experiments with the Milwaukee sludge were conducted on field crops and vegetables such as corn, potatoes, sorghum, cabbage, cauliflower, tobacco, tomatoes and muskmelon. The sludge was used alone and in mixes with other fertilizers. The results showed the sludge as a good fertilizer, but not as good as some others.

O. J. then experimented with sludge on lawns and found it was superior at one-third the cost of other fertilizers and that it had two advantages; 1) there was no danger of burning, and 2) there was no odor. From lawns Noer turned to golf courses. The first golf courses he ran tests on were Blackhawk Country Club and Maple Bluff Country Club. Later on he ran tests at the Lynx Country Club, Blue Mound Country Club, Ozaukee Country Club and Milwaukee Country Club. The results were excellent. In nursery establishment, in top dressing mixes and in straight applications the results proved the sludge superior to other fertilizers. There

was good greening, healthier turf, no burning, and the sludge was easier to handle, resulting in savings in cost and labor.

In 1925 the fellowship for O. J. Noer was continued and more studies were conducted at greenhouses and additional golf courses. O. J. was hired by the Sewerage Commission at that time and was given a monthly salary of \$250 plus travel expenses. The sludge performed extremely well in the greenhouse. During the construction of the "new" Tuckaway Country Club the sludge was used alone and mixed with potash and phosphorus fertilizers. The sludge was also used on other golf courses like Olympia Fields, Skokie Country Club, Midlothian Country Club, and Calumet Country Club in cities like St. Paul, Chicago, St. Louis, Detroit, Cleveland, and others. Rates commonly used for the sludge was 28 pounds per 1,000 square feet in the fall and 46 pounds per 1,000 square feet in nursery establishments. All returns were the same. The greenkeepers were "delighted" with the results.

The final conclusions of the Sewerage Commission pertaining to the sludge in 1925 were:

- "1) It was a satisfactory source of organic nitrogen and was readily accepted.
- 2) It was at least as good and cheaper than fertilizer materials used in commercial greenhouses.
- 3) It was an ideal fertilizer for golf courses and commonly accepted as such."

A "Trade Name" Is Found

By 1925 the Sewerage Commission decided to sell their sludge and wanted a name to sell it under. They decided to hold a contest to find a name. Thirteen prizes were offered with first prize being \$250, second \$50 and third \$25. The contest was advertised for six months in the *National Fertilizer Magazine*. The contest ended on September 1, 1925 with 233 names submitted. First prize was awarded to McIver and Son of Charleston, South Carolina, for their entry "Milorganite" standing for **Milwaukee-Organic-Nitrogen**.

With a name in hand the



Seed establishment — 1500# Milorganite and 500# superphosphate versus none. Milwaukee C.C. 1924.

Sewerage Commission began taking orders for Milorganite in late 1925. Commercial production of Milorganite began about August 1, 1926. By the end of 1926 about 5,500 tons were in storage with orders for 2,500 tons.

To help stimulate sales the Sewerage Commission ordered 5,000 booklets and 10,000 circulars to be printed describing Milorganite. Also, an exhibit was arranged at the International Golf Show held in Chicago from March 21 to March 26, 1927. These activities along with the luck of introducing Milorganite as a turf fertilizer just as the game of golf was experiencing a boom in popularity did the trick. In 1927, 23,555 tons of Milorganite were sold. By the mid-1930's production was about 50,000 tons, selling for up to \$20 per ton, and production could not keep up with demand.

In 1929 the Milorganite sales staff consisted of a sales manager, Mr. V. H. Kadish, two stenographers and O. J. Noer on yearly contract. This was the year the Sewerage Commission decided to retain O. J. Noer as a "fertilizer salesman" to promote the sale of Milorganite in special markets such as golf course, parks, cemeteries, lawns, etc. At that time most Milorganite went to fertilizer companies for blending with little going to special markets. As O. J. worked promoting Milorganite these proportions changed to where today most Milorganite goes to special markets.

O. J. continued his turf research. To aid with the studies he set up the Sewerage Commission soils lab in the mid-1930's. This lab was the first lab established exclusively for turf and is still in use today as a free service to Milorganite

customers. It was through his work with this lab that O. J. found the right sampling depth of turf soils. He found that surface applied phosphorus, potassium, calcium and magnesium moved slowly through the soil profile and that a two inch sample depth gave the correct amount of available nutrients to the turf since that is where most of the roots were found. Also, during these studies he found that thatch had a great influence on turf nutrition and called for the thatch to be included in the samples.

Other important work by O. J. includes tests conducted at Brynwood Country Club and Memphis Country Club. At these locations clippings were collected for the season and analyzed. With these he found the basic ratio of nutrient removal of 3-1-2 instead of the 1-4-2 which was originally thought correct. From these studies came the basic Milorganite recommendations still used today. These recommendations have stood the test of time and still fit well even in most of our low nitrogen programs.

As Milorganite became more popular, the demand for skilled agronomists and turf specialists from the department became greater. With this demand came the addition onto the staff of Charlie Wilson in June 1955 (Charlie retired in 1978), Jim Latham in 1960 (Jim retired in 1984) and Bob Welch in 1962. These people, along with O. J. Noer have established the tradition of high quality agronomic advice that most turf managers remember, respect and associate with Milorganite.

Over the years the face of Milorganite has changed. In 1926 Milorganite was sold in bulk. In



Charlie Wilson on algae-free plot. Brynwood C.C. August 1958.

1936 it was sold in 25, 50 and 100 pound bags. In 1955 it was sold in 40 and 80 pound bags. In the 60's it was sold in 50 pound bags, in the 70's in 20 kg bags, and presently in 40 pound bags. The logo changed in 1982 from the shield to what it is today. The prices have also changed. In 1926 Milorganite cost \$14.00 per ton, in the late 1930's it was up to \$20.00 per ton, in 1951 \$37.50 per ton and in 1968 \$52.50 per ton, but despite these perceived large increases, the raise in the price of Milorganite has stayed behind the rate of inflation.

Research Continues

Since 1926 research has continued on Milorganite under O. J. Noer until his death, by the Milorganite staff and at universities from coast to coast. Besides showing again and again, even today, that Milorganite is a superior fertilizer, other unique qualities have been discovered about it. These include: Milorganite reduces dollar spot incidences and suppresses cadmium resistant stereotype dollar spot, it reduces the number of harmful nematodes in the soil, it reduces the incidences of pythium blight and certain snow molds and it is an excellent source of iron and other micronutrients.

Even today the Milwaukee Metropolitan Sewerage District is sponsoring or supporting research on topics such as dormant applied fertilizers, nitrate runoff from slow release nitrogen sources, the effects of iron and other micronutrients in Milorganite on turf stands, the effects of Milorganite on *Poa annua* invasion, and the development of fine grade sprayable Milorganite. These studies are being conducted at



Welch buys last old bag and Hal Cahill buys the first of the new bags.



Woodward and Latham. Carefree, Arizona. April 1965.



1957 Label.



1981 Milorganite bag out of date.



Evan Trumko, Gene Gerblitz, Tom Wolf, Barbara Carlson, Charles Gillette.

universities around the country including the University of Wisconsin.

Finally, MMSD is, and has been a major contributor to the O. J. Noer Research Foundation which was founded in 1959 to honor O. J. Noer. Through the Noer Foundation the MMSD supports research which is of great importance to the turfgrass industry.

Why Other Sewerage Districts Don't Make Milorganite

Many districts, such as Chicago have tried, and many are trying, but none have succeeded in creating a product as consistent and high quality as Milorganite. The three major reasons Milorganite stands alone are: 1) the cost of building such a plant today would be too expensive, 2) no other city has the right combinations of industry to produce as high of quality product as Milorganite and 3) no other group has developed a technique of producing a constant sized granular, dust-free product like Milorganite.

Support to Wisconsin Golf Course Superintendents

Ever since O. J. Noer's time special attention has been given to Wisconsin's golf course superintendents by the 'Milorganite people. This is particularly true with the co-sponsoring of the Wisconsin Golf Turf Symposium with the Wisconsin Golf Course Superintendent's Association since 1966. Already work is well underway for the 1986 symposium.



Kirley and Noer inspecting turf fertilized with 80# Milorganite per 1000 sq. ft. Arawak, Nassau, January 1962.

Milorganite in the Present

Today the Milorganite sales staff consists of 7 people. They include Don Gurda, Marketing Manager; Bob Welch, Manager of Promotion and Agronomy; Jim Spindler, Field Agronomist; Tyler Brown, Distribution Manager; Barbara Carlson, Traffic Clerk; Gerrie Barker, Secretary; and Shelly Biro, Billing Clerk. At the bagging/loading facilities there are 9 people: Bob Reilly, Packaging Supervisor; Norman Solberg, Shipping Clerk; and 7 people running the bagging machines and loading the product. These are the people who continue the tradition of fine service and product.

Milorganite is sold in all 50 states, Puerto Rico, Canada and other countries by some 130 distributors and 5 brokers and manufacturer representatives.

Milorganite has again become a very popular fertilizer because of such attributes as its non-burning character, its ability of adding organic matter to sandy soils (particularly greens), its ability to be spread at low nitrogen rates without causing freckling, its superior source of iron and other micro-nutrients, its disease suppression characteristics, its ability to be used as a bulking/feeding material at seeding time and much more.

The Future

At present, the Milwaukee Metropolitan Sewerage District is in the middle of a \$1.6 billion water pollution abatement project which will be completed in the early



O. J. Noer and Bob Williams inspecting rear vision mirror on broadcast spreader. Bob O'Link, June 1960.

1990's. Included in this project is a new \$80 million Milorganite plant and bagging/shipping station. Also, new offices for the Milorganite sales staff will be included in the new administrative offices.

The future could also include Milorganite sprayable for greens, Milorganite blends (particularly with potassium), plastic bags and different size bags. All these and other developments are oriented towards making Milorganite more usable in today's modern turf management and retail sales.

The Milorganite office will also be computerized to make transactions more efficient. The staff may also see the addition of two more people to give better customer support.

So, with a tradition of excellent turf support and a future aimed at maintaining and improving an excellent product, this should assure that Milorganite will be around to celebrate its 120th anniversary.

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1982 State fair top.



Milorganite storage barn.



Milorganite storage 1979.



Trucks from Milwaukee-area municipalities picking up "free" Milorganite, offered by MMSD when warehouse stocks were too dangerously and high. Early 1981.



Bob Welch and Fred Popp with Maples — Tufts Board. Brynwood C.C. June 1970.

How Milorganite is Made

Process Begins

Production of the fertilizer begins in the coarse screen house at the purification plant, where the sewage passes through one inch screens, removing rags, sticks and similar debris. Seven to ten tons of such material is removed daily.

The sewage then moves through grit chambers to get rid of sand and gravel and flows into the fine screen house, where eight revolving steel drums equipped with fine mesh screens and nylon brushes remove 20 to 30 tons of fruit peelings, garbage grinder debris and the like.

Next comes the activated sludge process, where tiny Milwaukee organisms go to work. They are called aerobic bacteria, protozoa and actinomycetes.

"Actinomycetes—these are the rascals that cause the delightful smell you get from new plowed earth," Charlie Wilson said fondly.

Air Bubbles Up

The screened sewage is then mixed with return sludge which inoculates the screened sewage with the microscopic organisms that begin the process. This is called mixed liquor. From this point on air bubbles up through the flowing mixed liquor constantly. The mixed liquor flows into aeration tanks that are 15 feet deep, 22 feet wide and 445, 472 or 770 feet long for a retention time of about 4½ hours. Here the aerobic (air loving) bacteria feed on the solids and multiply to keep the process going. From the aeration tanks the flow goes into sedimentation tanks which are 98 feet in diameter and 15 feet deep. The air is taken away from the liquid, the bacteria die and settle to the bottom of the tanks.

Part of the treated sludge is eventually sent back to keep the bacterial process going. The rest is heated to 1,400 degrees to remove the water and the Milorganite is left. It takes 625 gallons of the original raw material to produce a single pound of fertilizer.

The effluent discharge flows over weirs into Lake Michigan. It is almost as clear as drinking water and 99.9 percent free of bacteria.

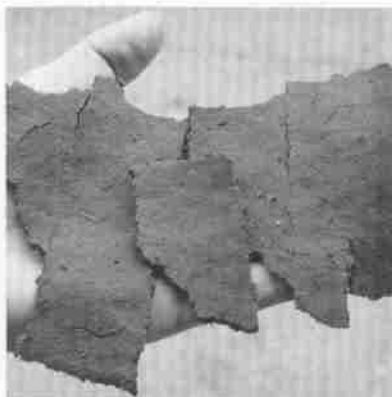
Purer Than Sugar

Milorganite itself is biologically purer than sugar, cereals or numerous other foodstuffs, Wilson said. Like surgeons' and dentists' instruments, it has been sterilized by steam. This kills weed and vegetable seeds as well as bacteria.

There are those, Wilson admitted, who object to Milorganite's slight aroma.

"We call it new mown hay odor," he said. "We could change it, but if we did the bacteria wouldn't like it."

*Interview with Charlie Wilson from the Milwaukee Journal Sunday, April 20, 1969.



Milorganite before drying.



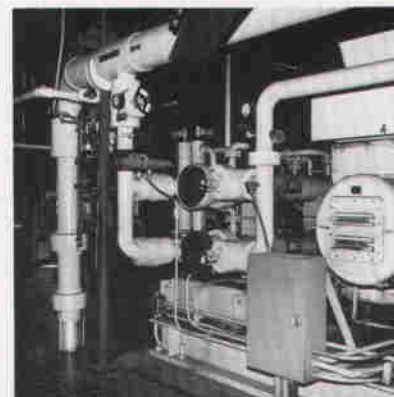
Vacuum filters.



Milorganite going to dryers from filters.



The dryers.



Jones Island Dryers.



Jones Island Dryers.



Jones Island Dryers 1981.



Jl Nov. 82 Dryer house.

Milorganite Poem

MILWAUKEE MAKES MILORGANITE FAMOUS!!!

Milwaukee is the land of cheer
German cooking, ale and beer;
They eat and drink from Morn till night,
And then they make MILORGANITE!!!

Their ball team is quite their pride,
It's fame has traveled far and wide.
The grandstand has a place in sight
Where they can go and make MILORGANITE!!!

After the game they go to dinner,
It does not matter whose the winner;
And after sleeping through the night,
Start making more MILORGANITE!!!

I state without equivocation,
This chore has keen cooperation;
It's manufacture is an art,
Where everybody does his part.

Old men, young men, perfumed ladies,
Boys and girls and even babies;
Grunt and strain and do what's right,
To pile up more MILORGANITE!!!

You make it — we sell it — if it's not good —
Author — unknown then it's your own fault!!! daily production — 205 tons!!!



"STRIKE THREE!!"



MILWAUKEE'S GEMUETLICHKEIT TRIO



JONES ISLAND SEWAGE PLANT

Milorganite and the Environment

In the 1970's great concern was expressed about the heavy metals, particularly cadmium, in Milorganite. At one point in late 1979 a citizen subcommittee to the Citizen's Environmental Assessment Base Committee urged the Milwaukee Metropolitan Sewerage District to halt Milorganite production. The commissioners of MMSD seriously considered stopping the production of Milorganite. However, before production was stopped the staff of the Milorganite Sales Department demonstrated the situation was greatly exaggerated and production continued. To protect MMSD from possible legal action the commission ordered a notice put on the bags to inform Milorganite users of the cadmium situation. Later, Mike Malk, Manager of Solids Utilization, showed the commissioners of MMSD that Milorganite sales saved the taxpayers of Milwaukee more than \$5 million annually and that any other form of sewage disposal would cost much more.

In order to ease any further objections, MMSD ordered several key industries in the Milwaukee sewage treatment area to pretreat their wastes to remove the cadmium and recycle it. Since then the cadmium levels have dropped to well within the Federal Environmental Protection Agency's recommendations.

ABOUT THE AUTHOR...



Jim Spindler has worked for the Milwaukee Metropolitan Sewerage District as a Field Agronomist since February, 1985. He joined them with a B.S. degree in Agronomy from the Delaware Valley College of Science and Agriculture (1979) and a M.S. in Forestry from Michigan Technological University. Jim has a broad base of experience in agriculture. From July 1982 through September 1984 he served as the Agriculture Coordinator of the Mahalapye Development Trust as a Peace Corps volunteer in Mahalapye Botswana, Africa. Previous to that, he worked in the landscape maintenance business in Philadelphia, landscape construction in Prairie View, Illinois and park maintenance in Roxbury Township, New Jersey. Jim has extensive professional interests that include membership in the WGCSA, O.J. Noer Research Foundation, American Society of Agronomy, Soil Science Society of America, Crop Science Society of America and the Regenerative Agriculture Association. His personal interests and hobbies include hiking, camping, cross-country skiing, golfing, cooking, gardening and keeping tropical fish.

MILORGANITE

A WISCONSIN ORIGINAL



1926 to 1986

Beautifying America naturally for sixty years

Milorganite is a Registered Trade Mark of Milwaukee Metropolitan Sewerage District

A Bit of History. . .



The name "Milorganite" didn't come easy. When the JI plant opened in 1925, the District realized that to sell the expected 36,000 tons a year of dried sludge it would need a "Trade Name". Here, from the MMSD Annual Report for 1925, is how they went about it.

"In order to determine a proper Trade Name and at the same time secure as much publicity as possible, thirteen cash prizes were offered to those who cared to submit names.

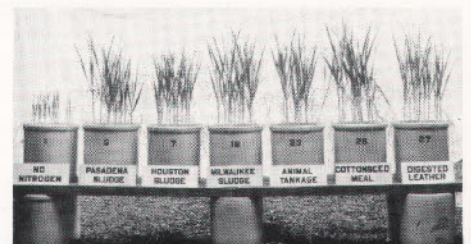
"These prizes consisted of

\$250.00 first prize, \$50.00 second prize, \$25.00 third prize, five prizes of \$10.00 each and five of \$5.00 each.

"The contest was advertised for six months in the National Fertilizer Magazine, and on September 1st, when the contest closed, there were 233 names suggested.

"The first prize was awarded to McIver & Son of Charleston, South Carolina, fertilizer brokers, for suggesting the name of "Milorganite", which embraces the words

Milwaukee — organic — nitrogen, and this was the Trade Name selected as being most appropriate."



MMSD sludge shows up best where it counts — plant growth.