

portant piece of equipment on the golf course. Maybe the term important could have been changed to efficient. In either case, Firestone Country Club simply could not operate without tractors. □

#### List of Tractor Attachments Used at Firestone CC

##### Quantity

- 2 Rotary Mowers
- 2 Flail Mowers
- 2 Leaf Sweepers
- 3 Trailers (2- and 4-wheel)
- 5 Aerifiers (3 types)
- 2 Slicers
- 2 Back Blades
- 1 Front Blade
- 2 Earth Excavators
- 1 Front End Loader
- 1 Backhoe
- 1 Roto-tiller
- 1 Plow
- 1 Turf Quaker
- 1 Seeder
- 2 Verti Cutters
- 1 York Rake
- 1 Sickle Bar
- 3 Blowers
- 1 Auger
- 1 Gin Pole
- 4 Mowers

#### Soil Warming Technique Uses Heat from Power Plant

Waste heat from electrical power generating plants may someday be used to increase vegetative production by warming the soil. This idea is being explored by scientists at The Pennsylvania State University who report that such a system could increase production by 30 to 40 percent.

As conceived at Penn State, soil warming is achieved by circulating hot water through a buried pipe network located in soil irrigated with treated municipal wastewater. The circulating hot water is cooled and returned to the power plant for reuse.

Involved in the study are Dr. David R. DeWalle, associate professor of forest hydrology, Dr. Daniel D. Fritton, assistant professor of soil physics, and Dr. Louis T. Kardos, professor of soil physics — all with Penn State's College of Agriculture. The study was funded through the Institute for Research on Land and Water Resources at Penn State with a grant from the National Science Foundation.

For each unit of electrical energy generated, two units of waste heat

are driven off and wasted, the Penn State scientists said. Estimates are that by 1980 a volume of condenser cooling water equal to about one-fifth of the annual water runoff in the U.S. will be needed to remove this waste heat from steam electric power plants.

The Penn State study shows that soil warming competes with heat dissipation methods currently used, such as wet and dry cooling towers operated by power plants. When the soil warming system becomes real-

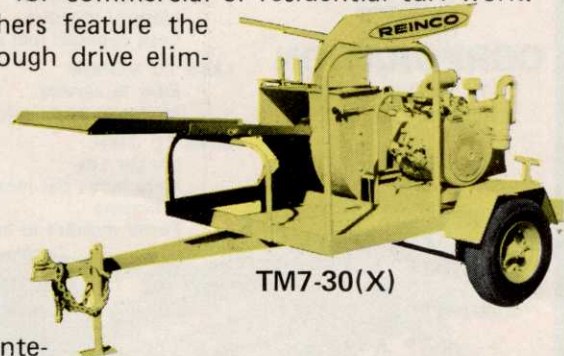
ity, increased crop production could become a by-product of waste heat disposal.

Such a soil warming system is economically feasible, the scientists said. The electrical power needs of a city of one million people could supply waste heat for some 4,500 acres of land. The cost would add 2.6 percent to the consumer electric bill compared with ocean cooling and 0.9 percent when compared with the popular wet-cooling towers.

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