By requiring contractors to use auger tractors, the Metropolitan Sanitary District of Greater Chicago (MSDGC) is speeding up the drying of the immense quantities of sludge produced by their wastewater treatment plants.

To turn and agitate the material, 19 "Brown Bears" are currently working at MSDGC's one primary and three secondary processing sites. Their turning action exposes material repeatedly to aid natural drying. Solids content, which varies from 14 to 20% as received from lagoons and centrifuges, is increased to 60 to 65%. Total production averages 500 dry tons per day, or 181,000 dry tons per year.

Augering and land application are now specified after a number of other methods were extensively tested. Compared to land reclamation, for instance, the augering/land application system was found to be 50% cheaper. Compared to heat-drying by hot flue-produced gases, which MSDGC used until 1981, costs which today would exceed $50 million per year for fuel alone are reduced to $6.6 million per year. Similar savings have been achieved over landfilling and incineration.

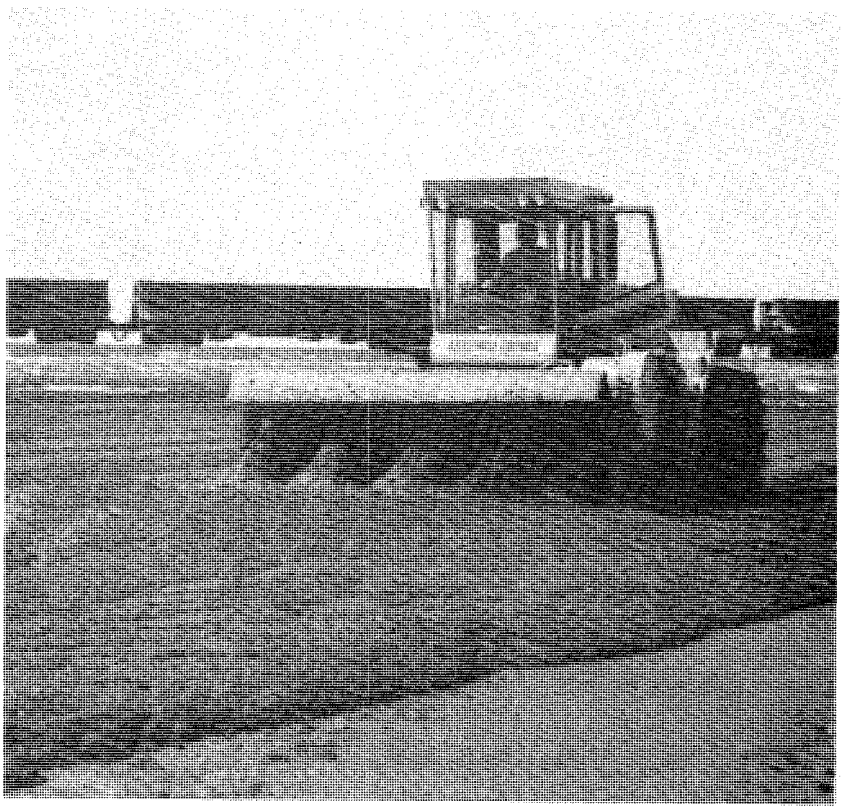
Chicago Speed Dries Its Sludge

Augers Provide Complete Mixing

The auger tractors are also more effective than other tools. Their production is 10 to 15 times greater than loaders or graders, according to engineers' time studies. An auger mixes 3,000 cubic yards per hour; a wheel loader 200 to 300 yards, figures show.

Augering continually flails the material, providing complete mixing and turnover. The augers continually expose wet layers to the sun. The windrows created provide natural drainage paths for rainwater runoff. MSDGC collects this water and sends it to plants for treatment. The need to make flat water-collecting surfaces with rototillers, discs, and lister plows is eliminated.

Accurate control of the augers' working depths saves the underlying surface of the sludge beds. It also minimizes incorporation of soil and rock. The machines' big pneumatic tires roll harmlessly over railroad tracks, curbing, and roadways, permitting the units to quickly self-travel between sites.



Sludge Routed to Drying Beds

Two types of wastes are handled: centrifuge-produced sludge (14 to 16% total solids concentration); and lagoon sludge (16 to 20% total solids concentration).

Quantities are huge. MSDGC processes wastes from the 5.1 million people living in Chicago

and its 120 suburbs. Flows average 1.4 mgd.

All centrifuge material is brought from the city's West-Southwest mechanical dewatering facility to the primary drying basins by a 28-car unit train, usually twice a day. Side-dumping distributes the contents into six dewatering cells from where it is spread out by the auger. The amount of centrifuge cake averages 175 dry tons per day, or 64,000 dry tons per year.

Lagoon material is pumped to the same primary drying area from MSDGC's West-Southwest plant, with its capacity of 1,200 mgd the largest single wastewater treatment facility in the world. Carried 5 miles by pipeline, this material ranges from 3 to 4% solids when received.

Eight to 10 days of detention time decants and concentrates the material to 16 to 18% solids. At this stage, it is removed, loaded, and truck-hauled to three drying beds with a total surface of 60 acres.

The drying beds rest on 6 in. of asphalt, which prevents the sludge drom mixing with earth and ground water, which would add to drying time, volume, and handling costs. The solid footing provided by the asphalt increases productivity over clay or dirt-bottomed drying areas. A study by the City of Phoenix, Arizona, shows efficiency gains of up to six times with a hard surface versus packed clay. The paving also prevents incorporation of rocks into the final product, thus making it more appealing for land application.

Brown Bears Auger All Material

The auger tractors handle all material, regardless of origin. Their agitation continuously breaks surface crusts created by evaporation. In summer, the peak drying season, mixing is accomplished every day or two. Continual drying results in larger and larger individual windrows, improving drainage and reducing penetration of rainwater. Continual turnover also exposes wetter material to the air and sun to speed drying.

From 2 to 5 weeks of augering in this manner doubles the solids concentration from 15 or 20% to 30 or 40% and reduces sludge volume in the same proportion. Approximately 2,600 tons of water per acre is evaporated from these beds annually.

When it reaches this specified reduction level, the material is truck-loaded and hauled to one of three 73.3-acre clay-based finish-drying satellite. Load-out is by tractor shovel; transportation by the same type of 32-yard dump trailers that brought sludge to the site.

At the satellite sites, 2 to 4 more months of augering and natural drying provide a further concentration to 60 to 65% solids. Some solids concentrations reach as high as 70%. Material here is generally turned once every 2 days.

Variety of Land Applications

Most of the end-product is distributed from these sites to public users. As soil conditioners and as a substitute for topsoil, the Illinois EPA permits allow a maximum of 6 inches depth.

As final cover closing a 200-acre landfill, EPA specifications permit a 5-foot depth. Not only does the material prevent blowing trash, but its solids level provides the same structural stability as clay. The site, when finished, will be made into a park, golf course, and forest preserve. So successful has this application been that it is expected that other landfills in the Chicago area will be handled similarly in the future under a program that will be ongoing for the next 30 to 40 years.

The dried sludge is also being used to contour expressway shoulders and backslopes for planting with trees and shrubs. Current users include the State of Illinois Highway Department, Illinois Tollway Authority, schools, colleges, park districts and cemeteries.

Augers Handle Pre-drying and Drying

The auger-equipped tractors are used in both the pre-drying and drying applications. Their four work areas are on the south and southwest sides of Chicago, 10 to 25 miles apart.

One of the final drying sites, which handles 20 tons per day, is completely surrounded by homes. Because the Sanitary District carefully monitors all phases of the operation, officials report there have been very few complaints over the years regarding odors or other problems.

Pre-drying sites at Vulcan, Lawndale Avenue, and Marathon generally use around 11 augers daily, the exact number and application varying by need. Final-drying at Stony is handled by three of the auger units, at Doty three units, and at Ridgeland two units.

Contracting Reduces Costs

Work bid by contractors who own the tractors covers ownership costs, maintenance, and operator salaries. Current contractors are Bechstein-Klatt Co., Tinley Park Il., with 15 augers; and Roy Strom Excavating & Grading Co., Maywood Il., with four. The Strom firm has an additional two units at MSDGC's Calumet treatment plant.

Officials at MSDGC say there are a number of advantages to contracting for sludge augering. Because the work is seasonal and weather-dependent, the cost of carrying employees year-around is eliminated. The contractor can contract for snow-plowing or other work when not augering sludge. In addition, operators are not put out of work during the off-season, and MSDGC does not have to keep the equipment idle during this time.

At the same time, contracting eliminates the need for specialized equipment to handle the work, reduces maintenance personnel requirements, and eliminates needless inventory of spare parts.

The MSDGC, as a public body, cannot take advantage of the depreciation of the equipment needed for sludge mixing. But contractors, as private businesses, can. Their costs are thus reduced and, in turn, so are MSDGC's.