

would compress the sludge to ensure such drainage.

The system has worked so well that a 25 foot sandwich shrank to 20 feet in height because of the water drainage during the first year. The area retained its stability and equilibrium through the winter snows and spring rains during the second year.

According to the professor, roughly 200 million cubic yards of paper mill sludge are produced annually, with much of it going into landfills throughout the U.S., but with no plans for later use.

He's now preparing a final report on the project for the Environmental Protection Agency, who supported the project along with the National Council of the Paper Industry for Air and Stream Improvement.

The specific design of Dr. Andersland's sand-sludge sandwich had five layers. First came a one-foot base of sand with suitable drainage arrangement, then a 10 foot layer of sludge dumped in by the truckload. On top of this was deposited another one-foot layer of sand, followed by another 10 foot layer of sludge. A final three-foot layer of natural soil capped off the sandwich.

A vertical boundary or dike of natural soil was put around the area to stabilize it until it drained and settled.

When the drainage was complete the lower layer of sludge had shrunk from 10 to 7 feet and the higher layer of sludge had shrunk from 10 to 8 feet, accounting for the total 5 feet of shrinkage in the 25 foot sandwich.

After one year, the supporting dike was removed at an almost vertical angle in order to ensure a "failure." Dr. Andersland wanted to determine whether the planned failure would lead to a general slide of the sand-sludge mass. But no further failure occurred despite snow and rain.

Dr. Andersland sees the method as useful for reclamation of paper mill waste in landfills, for incorporation in recreational terrain such as for golf courses, or sliding or ski hills. "Implications of the project for land conservation are enormous," he said.

"Gravel pits and waste areas are being filled with paper sludge which retains water because of its high organic content, so that the landfills stand useless and basically unchanged for decades. Sludge consists of water, plus solids that are about half cellulose fibers and half clay.

"Compacting the sludge according to carefully engineered procedures permits disposal of large quantities of sludge in each landfill," he said.

"Compacted sludge could be removed and taken to areas where lightweight fill is needed . . . Covering of a soil layer would restore the land to use."

Toro Irrigation Division To Hold East-West Meetings

The Irrigation Division of the Toro Company will hold two national distributor sales meetings early next year.

Robert E. Landesman, director of marketing for the division, said the

decision was made in line with distributor preferences determined by a survey conducted by district managers.

Distributors in Colorado, Oklahoma, Texas and West Coast states will meet for three days at The Inn, Rancho Bernardo, Calif., Jan. 31-Feb. 2. Distributors from all other states will be at Innisbrook Resort & Golf Club, Tarpon Springs, Fla., Jan. 24-26.

The program for each meeting will be identical: a full day each devoted to service, product application and sales of Toro's irrigation equipment.



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