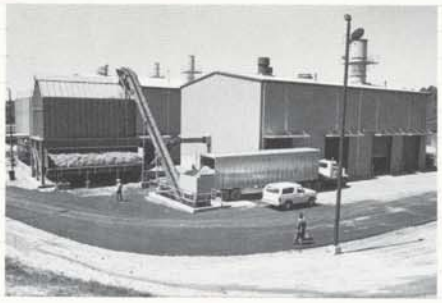
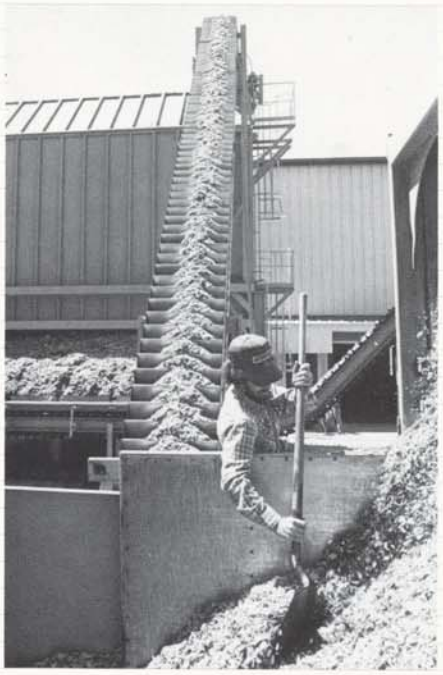
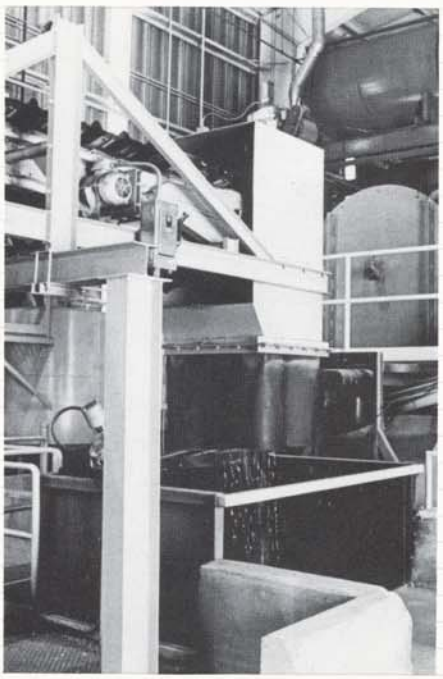




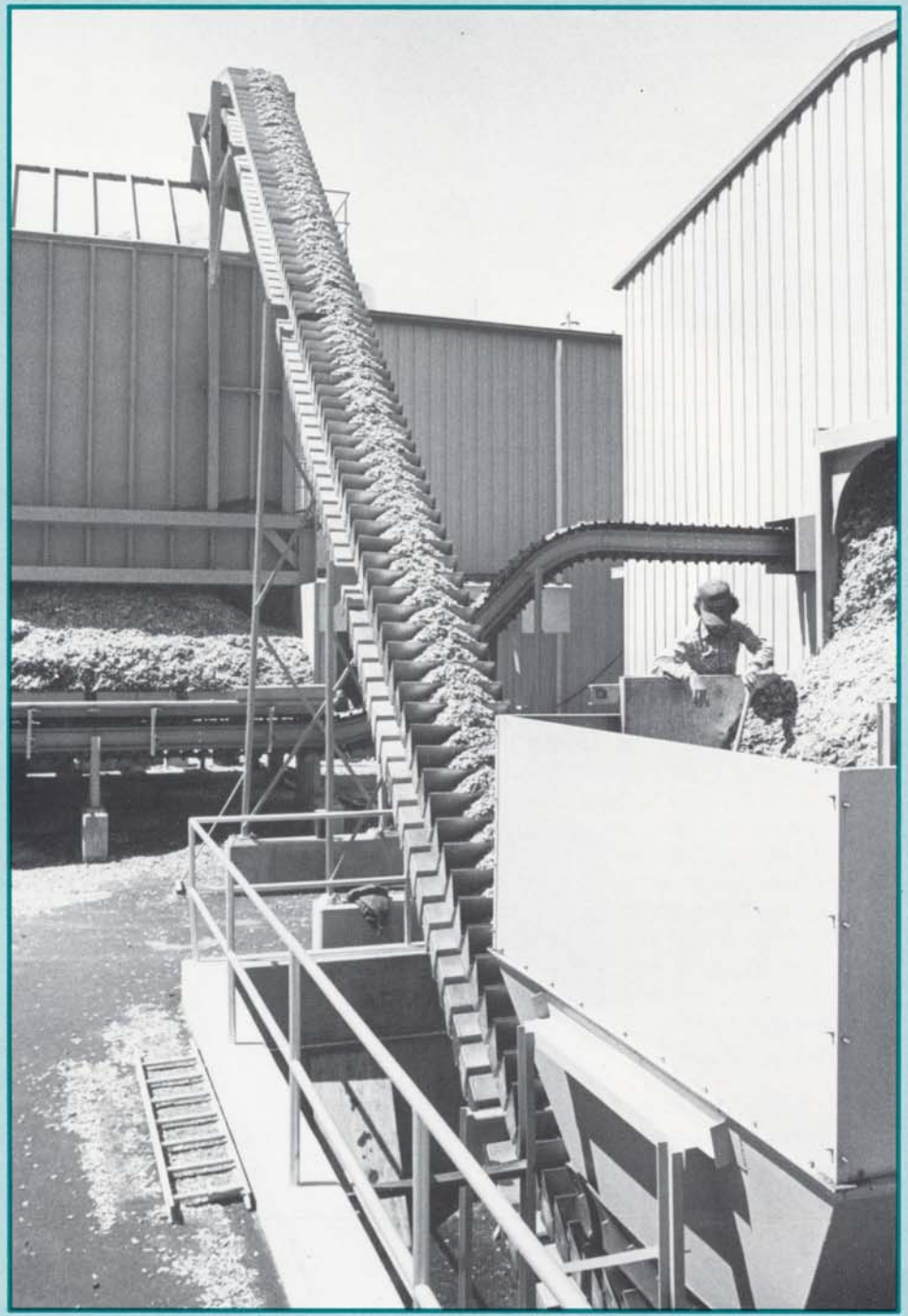
INDUSTRIAL
Facility Report
#160

Clayton County, Georgia



SERPENTIX CONVEYOR CORPORATION

Continuous Path Conveyors Help Make Forest-to-Flames Chip Hauling Plan Work



PART OF CLAYTON COUNTY, Georgia's forest-to-flames materials handling system includes two Serpentix Continuous Path Conveyors. Chips of loblolly pine trees harvested in the forest are coneyed up a 45-degree incline by a 71'6" metal pan conveyor to the 170 ton chip supply bin. The chips then go on the convoluted belt of the second (107'4") Serpentix. It carries the chips up a 45-degree incline into the incinerator building at right.

In the early 1970s, Clayton County in Georgia faced an almost insurmountable problem: the county needed to double the water treatment capacity for a rapidly expanding population, yet comply with what appeared to be incompatible and highly restrictive federal and state requirements.

The Clayton County Water Authority (CCWA) took the first innovative steps in a journey that spanned more than a decade. During that time, it developed solutions to problems that currently plague authorities many times larger than CCWA.

Plant expansions, modifications and concept changes through 1984 saw the completion in early 1985 of the Flint River sewage treatment complex in Clayton County.

Design capacity of the complex is 19.5 million gallons per day (MGD) and includes the Flint River Water Pollution Control Facility (WPCF), a 9 MGD plant expanded to 15 MGD, and the R. L. Jackson WPCF; a 1 MGD facility expanded to 4.5 MGD.

Solving the myriad problems involved in completing the Flint River complex placed Clayton County in a unique position among the nation's municipally operated facilities. The water authority: **(1)** operates one of the largest totally forested year-round land treatment spray irrigation systems in the United States; **(2)** developed a water recycling program to help extend its water supply which has been historically short during dry periods; **(3)** developed a highly saleable product from the sewage effluent; **(4)** created a market for the fast-growing loblolly (Pinus Taeda) pine tree, a former problem for the Georgia Forestry Department; **(5)** improved the local environment by eliminating the discharge of its sewage effluent into a system too small to assimilate an ever-increasing waste load; **(6)** developed a forest-to-flames materials handling system designed around two Continuous Path Conveyors manufactured by Serpentix Conveyor Corporation.

The CCWA relied heavily on the consulting engineering firm of Robert & Company from start to finish of the Flint River complex.

Although the Flint River WPCF was upgraded from 3 MGD to 9 MGD in 1972, water authority officials realized that its new 9 MGD capacity could not handle the growth that was sure to come. A 19 to 20 MGD capacity would be necessary by the early 1980s.

In addition, complicating factors faced the authority in a federal act entitled Public Law 92-500, along with a disturbing ruling from the state of Georgia.

The state ruled that the Flint River plant's capacity could **not** be extended **past** 10 MGD because the stream receiving its treated effluent (the Flint River) was not large enough to assimilate the solids (in the effluent) above that level.

This was further complicated by the geographical profile in Clayton County. Half of the coutry's surface area drains into the Flint River, then continues into the Gulf of Mexico. The remaining surface area drains into other streams, running creeks, lakes, etc., and eventually into the Atlantic Ocean.

Public Law 92-500 mandated that a municipality or authority **must** clean up stream pollution from its existing plants, and that any additions to enlarge those facilities **must** provide a higher degree of treatment than currently employed.

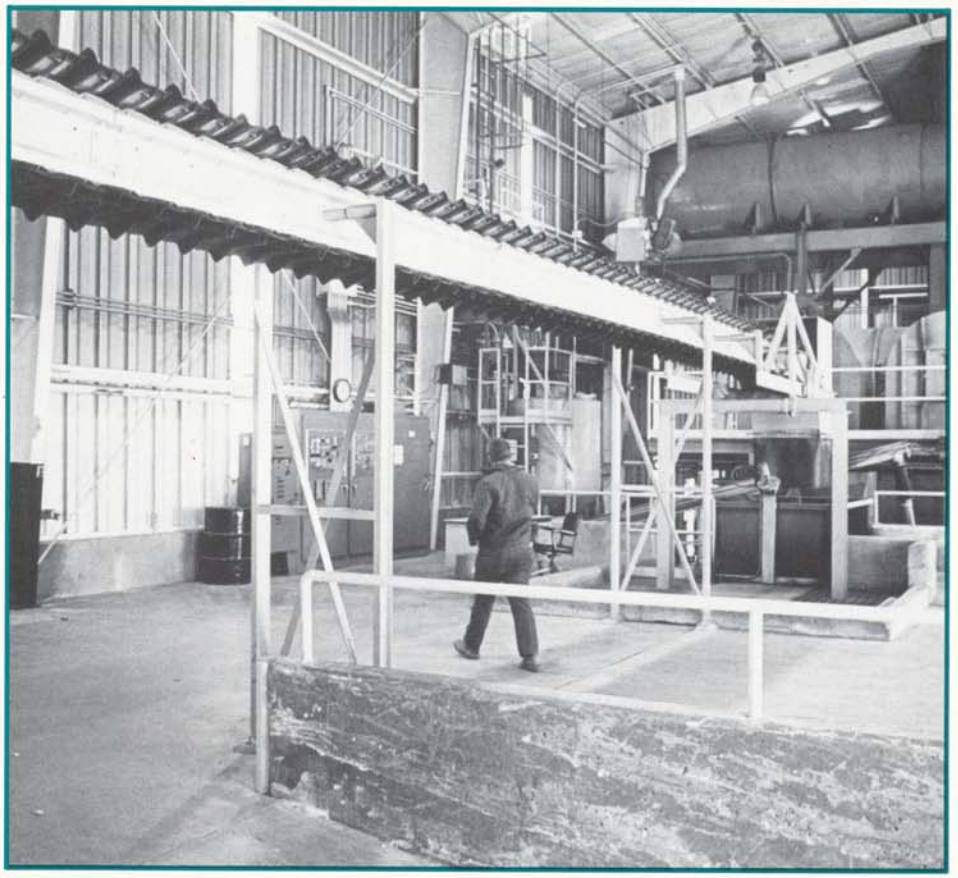
Based on those criteria, the CCWA staff and Robert & Company launched studies for the design of a plan to comply with both federal and state mandates, have a modest initial cost, yet have reasonable operating and maintenance costs. After considering its options, officials chose a land treatment program.

By mid-1982, construction was completed on the E. L. Huie, Jr., Land Treatment Facility; a 3600 acre plant just south of the metropolitan Atlanta area. It allowed combining the flows of the Flint River and R. L. Jackson plants to provide a 19.5 MGD capacity, expanding the Flint River plant from 9 MGD to 15 MGD in November, 1980, and increasing the R. L. Jackson plant from 1 MGD to 4.5 MGD.

The treated effluent is used for land irrigation, providing the equivalent of 2.25 inches of rain per day on 2400 acres of the 3600 acre Huie site. This effluent is applied by 18,000 sprinklers which operate on a seven day cycle.

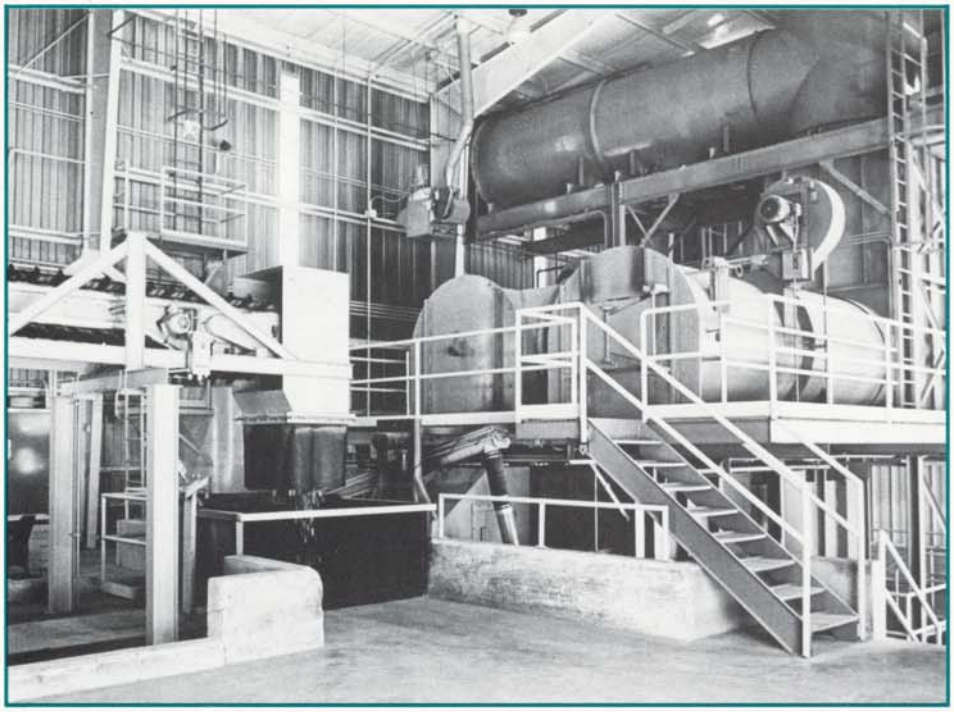
The solids separated from the Flint River WPCF effluent at the two plants are disposed of through a patented process for converting sludge into pellets. The pellets are then sold as a soil conditioner and fertilizer.

Thickened activated sludge is pulled from holding tanks into the pelletizing building and is processed through six belt filter presses. The polymerized sludge, further thickened to 75 percent solids by mixing with recycled pellets, is then fed into two dryers.



FROM THE SUPPLY HOPPER THE CHIPS feed onto a standard Serpentix Continuous Path Conveyor (lower left photo) for transfer into the incinerator building (top photo). Carried almost the full length of the building, the chips are discharged into a ram feed hopper for transfer to the incinerator.

LOBLOLLY CHIPS ARE TRUCKED TO THE Flint River WPCF in special vans. Loaded into a receiving bin (photo at left), the chips are loaded onto a metal pan Serpentix conveyor and conveyed up a 45 degree incline for discharge into an outside 170-ton supply hopper.



WOOD CHIPS REACH THE END OF THE line inside the incinerator building where they are discharged into the ram feed hopper from the Serpentix conveyor.

Each dryer can dry 1.5 tons of pellets per hour, using natural gas as fuel. This presented CCWA with another basic problem. Natural gas prices skyrocketed in the late 1970s, increasing almost five-fold.

The subsequent search for an alternate fuel source by the authority came to a successful end following a suggestion from the Georgia Forestry Commission (GFC) that the fast-growing loblolly pine tree be harvested by the authority for conversion to fuel.

The GFC pointed out that as the nutrient-laden wastewater from the Flint River WPCF is applied to the land, the already fast growth of the loblolly is accelerated. Furthermore, the tree makes for very poor timber because its fast growth makes it very soft. This makes it unsuitable for any other use except for pulpwood or paper production.

Why not chip it up and use it as fuel in the pelletization program? CWA investigated other sites where whole tree, green wood was used for fuel. They found that there is no odor, very little ash and the wood gives off a great deal of heat.

The decision was made to purchase and install a specialized incinerator in a new sludge drying building for burning green chips. The necessary equipment for harvesting the loblolly pine was also purchased.

This included a machine capable of reducing a 20-inch diameter tree to chips the size of a silver dollar within eight minutes and blowing them into a truck. The chips are then taken to the incinerator building where they are manually unloaded for burning.

The system worked very well. There was an abundance of chips and they could be burned at a much lower cost than natural gas. But, fine tuning was necessary to insure that rain, mud, cold temperatures or equipment breakdowns would not impede the delivery of harvested chips to the incinerator.

This was critical since natural gas had to be used whenever inclement weather or other problems bogged the system down, preventing the use of the chips for fuel.

The answer was the design and equipping of an imaginative automatic materials handling system. This system included two specialized vans equipped with oscillating floors to facilitate unloading of the chips onto a Serpentix metal pan conveyor.

Transported up a 45 degree incline, the chips are unloaded into a 170-ton supply bin which holds a five day chip supply for the incinerator.

The bin, also equipped with an oscillating bottom, transfers a measured supply of the chips onto a second Serpentix Continuous Path Conveyor. It discharges into an automatic loading bin which feeds the chips into the incinerator.

The metal pan conveyor has a center line length of 71′6″. It transports ½″ to 2″ size wood chips from the receiving bin to the supply bin. Utilizing 32″ wide metal pans, the Model I Serpentix transports 20 tons of chips per hour up the 45 degree incline at speeds of 50 feet per minute.

Total elevation gain from receipt of chips to discharging them into the supply bin is 39′3″.

The oscillating floor of the supply bin loads wood chips onto the other 107′4″ Continuous Path Conveyor at a rate of two tons per hour. After receiving chips from the supply bin, the 20-inch wide Serpentix belt makes a 45 degree climb for a 9′3″ gain in elevation. It then transports the chips to a ram feed hopper near the end of the incinerator building for transfer into the incinerator.

CCWA also operates two other plants. The Shoal Creek plant is a 325 acre land application facility with a design flow of 1.1 MGD and an average daily flow of 200,000 gallons. The fourth plant is the Northeast Clayton County Water Facility which is rated at 800,000 gallons per day. It was expanded to 3 MGD in 1985. ■