



Leachate Recirculation System Pays for Itself

System cuts leachate trucking and treatment costs by \$11,000 per month

The trucking and treatment of leachate represents a significant cost to landfill operations. It also contributes to truck traffic into and out of the landfill, which is always a major concern among residents along the route.

When all the costs associated with trucking and the treating of leachate are considered, the real expense can be as high as \$0.20 per gallon. Included in these costs are labor, vehicle depreciation, fuel and the leachate treatment costs. At a time when cities and counties are attempting to reduce expenses, leachate recirculation is a way of dramatically lowering the cost of landfill operations.

Recirculation in Subtitle D landfills has become an increasingly accepted way of dealing with leachate. Because the landfills are lined, the leachate is contained and should not contaminate groundwater. The wetting of the biological material in the landfill has a composting effect, which significantly reduces the volume of the trash. Recirculation also improves leachate quality and increases

landfill gas production. Post-closure time to stabilization is also decreased significantly.

The question is how best to recirculate the leachate for maximum benefit and minimum cost. One approach is to pump collected leachate into a tanker truck, drive to the top of the landfill and spray the leachate on the surface. This is very labor intensive and increases odor problems. Daily cover materials may prevent the leachate from entering the cell and ponding or runoff can occur. It is also difficult to control even dispersal using this method. Uneven dispersal can result in channels that allow the leachate to return to the bottom of the landfill without the desired uniform wetting of the trash and blowouts on the side slopes.

A second approach involves pumping the leachate into wells, trenches or slotted pipe. Once again, this can result in uneven dispersal and outbreaks where leachate runs out at the surface on top of the landfill or on the slopes. Return channels that go straight to the bottom of the landfill are also a problem with this method.

To achieve even dispersal and optimum long term wetting of the trash requires a widely distributed subsurface network of pipes with a controlled rate of leachate flow throughout the fields. This method provides even leachate distribution, eliminates odor problems, increases gas production and eliminates the expense of trucking and treating leachate.

A Case Study

Col. Ellis Bingham, USA (Ret.) is responsible for operations at the 140-acre Fauquier County, Virginia landfill. To enhance the landfill usability and reduce expenses, Col. Bingham established specific objectives for a leachate recirculation system.

Landfill Owner Objectives:

- Reduce expense of leachate trucking and treatment;
- Reduce labor requirement;
- Eliminate breakouts;
- Increase airspace available through bio-reactive process and compaction of the biomass; and
- Increase gas production for power generation.

To reduce trucking and treatment costs, the Fauquier County Environmental Services began recirculating leachate by pumping it from an 880,000-gallon collection pond using the pump on an out-of-service fire truck. The leachate was pumped to the top of a closed cell and distributed using slotted pipes. This method was very labor intensive and did not provide even leachate dispersal. Breakouts on the side slopes and surface ponding were common occurrences and required constant attention and repair.

In February 2003, a Leachator Pumping Systems Leach-Rite recirculation pressure dispersal system was installed in a closed cell at the landfill. The system allows Fauquier County Environmental Services to reintroduce collected leachate to the landfill using an automated pumping system combined with a subsurface field of piping designed for even and controlled dispersal. By recirculating the leachate, Fauquier County is able to eliminate a large portion of the expense of trucking and treating.

The system is currently providing recircu-

lation of about 5000 gallons per day with a design target of 6000 gallons per day. There have been no outbreaks or hot spots at this recirculation rate. The system has been so successful that a recent contract has been let with Leachator Pumping Systems to extend the system over another cell that has just been capped.

The benefits of leachate recirculation to the Fauquier County landfill include a cost savings of \$0.11 per gallon of leachate that does not have to be treated (\$0.085 for treatment, \$0.025 for transport). This means the landfill saves \$11,000 per month in leachate treatment costs.

Leachate dispersal into the landfill biomass accelerates stabilization of the trash and will result in additional airspace recovery over time as the biological material decomposes. Leachate recirculation also increases methane production. The methane produced will be used to power generators that will provide electricity to PEPCO and will produce revenue for Fauquier County.

Leach-Rite Recirculation Pressure Dispersal System

Leach-Rite is a complete recirculation pressure dispersal system for the even and controlled sub-surface application of leachate. This engineered system includes all the components to provide optimum results and ease-of-operation.

Key components include a pump designed to handle leachate, a control panel, a hydraulic unit with control valves, filters and a manifold, emitter tubing for leachate dispersal and air valves to control draining. The emitter tubing is laid out in zones that can be activated individually. The emitter tubing is buried in a bed of gravel about 5 feet deep in the landfill and in contact with the trash.

The pump extracts the collected leachate from the sideslope riser, pond, lagoon, tank or wetwell and distributes it below the surface of the landfill through a zoned system of buried emitter tubing. The system's patented electro-hydraulic unit controls the rate of flow based on the leachate available, temperature and time. It selects and alternates the emitter zones of leachate dispersal to achieve maximum recirculation without over-wetting the landfill cell mass. The amount of leachate that must be recirculated and its rate of accumulation determine the area and number of required zones of emitter piping required. For the initial cell at Fauquier County landfill, the design target was the recirculation of 6000 gallons a day.

The system offers ease of operation and will perform its tasks automatically or can be manually overridden. The control panel senses and monitors system functions to protect the environment and the Leach-Rite pumps and equipment.

At Fauquier County, leachate is pumped from the landfill holding pond to the remote zone manifold hydraulic unit. The hydraulic unit, an assembly of specialized valves and filters, distributes the leachate to four fields based on parameters set in the control panel. Operation can be automatic or can be overridden at any time.

The pump delivers leachate to each filter in the hydraulic unit. To prevent solids from blocking the filters and lines, the filter back-flushing schedule is triggered at the beginning of each dose cycle. One filter valve closes, blocking flow of the leachate to that filter. This automatic flushing of the system dramatically reduces maintenance. The accumulated impurities are discharged back into the landfill. The closing and opening procedure of the filter and the back flush valves cause a change of flow within the unit to provide filtered leachate from one filter to back flush the other filter. The backflush procedure lasts approximately 15 seconds then the back-flushing valve closes. Leachate will be pumped through clean disc filters, then through the flow meter and finally through the outlet manifold to the dispersal field supply line. During extended dose times, the disc filters are re-backwashed to assure optimum operation.

The pump is sized to provide a calculated dose rate for each system, which is protected by an electronic overload relay located in the Control Panel, providing under and over-current protection as well as loss-of-phase protection.

The dispersal field supply line conveys the leachate to the absorption zone in the landfill that is being dosed. It is discharged below the surface through a patented chemical resisting, pressure compensating, self-cleaning dispersal poly-tubing emitter. The emitters are located every 2 feet in the tubing and allow 0.65 gallons per hour per emitter output. Each emitter maintains a constant flow over a pressure range of 7 to 70 psi. Because the leachate is distributed at an ultra low rate, large quantities of leachate may be economically distributed over a large area during controlled periods without saturating the landfill.

Leachate will typically contain solids that can clog the emitters and prevent the leachate

from being output to the landfill. To eliminate this problem, the dispersal lines are automatically scoured (forward flushed) every 25 dosing cycles. This function is activated by the controller, which opens a field flush valve, allowing the flushed leachate to be returned to the landfill. The flushing cycle produces a high velocity cleansing/scouring action by the leachate along the inside walls of the emitter tubing, PVC manifolds and emitters. The construction of the dispersal tubing is unique in that the internal diaphragm and labyrinth provide for an exact amount of leachate to be discharged from each of its emitters.

The dispersal field return line conveys the leachate from the dispersal absorption zone (used to "flush" or clean the tubing) back to the landfill. Each zone has an air release valve housed in a small valve box at the highest point of the return manifold pipe in each zone. The valve closes when the leachate pressure arrives at the valve during each dose. The air release valve allows air to reenter the tubing after each dose, allowing the tubing to drain. This also prevents the uphill tubing from draining leachate into the downhill tubing and overloading downhill tubing.

In Summary

Fauquier County Landfill is saving approximately \$11,000 per month by recirculating leachate that would otherwise have to be transported and treated. Recirculation of the leachate using an automated, low maintenance pressure dispersal system is an effective and efficient method of returning the leachate to the landfill and is much less labor intensive than trucking and spraying the leachate. Subsurface dispersal eliminates odor problems associated with spraying. The quality of the leachate is also improved by recirculation, which increases the bio-reactive process in the treated cell and increases gas production. The bio-reactive process stabilizes the waste more rapidly than a "dry-tomb" conventional landfill and as the trash decomposes, the trash is compacted and valuable airspace is available for later use. The gas produced will be used by the county to power generators to produce electricity. ■

LEACHATOR

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