Enviro™ Cover System – Best Practice for Landfill Gas and Odor Control

By Mark Cadwallader, M.S

It was a typical early morning at the landfill, hardly any breeze and warm. A low lying fog rolls across the ground, its heavy moisture absorbing water-soluble, odor-bearing compounds in the fugitive emissions and taking them into the air. The foul smells were all set to greet neighbors of the site as they awoke that morning to go about their day. It would be an unwelcome reminder to those neighbors that they lived next to a “garbage dump”, not an engineered “sanitary landfill” as they were asked to believe. Such is the case every day at thousands of landfills around the world.

View of the City – New Orleans

But River Birch Landfill in New Orleans, Louisiana, USA is making that scenario a thing of the past. The landfill is using the Enviro™ Cover System for alternative daily cover, deploying a non-reusable polyethylene film to catch the odors on its underside and prevent their mingling with the air. The plastic film cover system also blocks the entrance of rain water, preventing the excessive generation of leachate that produces more odors from uninhibited garbage decay.

Premature generation of leachate leads to a high rate of fugitive gas and odor emissions because leachate aids in the waste degradation process. Accelerated by leachate, organic wastes decay into organic acids and other odorous compounds, many of which have very strong and foul odors.

Since River Birch started capping over its daily intake of municipal and industrial waste with the non-reusable plastic film, fugitive emissions from the working face have substantially decreased. This is because formation of odorous compounds is being delayed as well as contained underneath the film. Delayed development of landfill gas (LFG) from shedding of rainwater by the plastic film cover can delay gas generation until later when proper control and collection systems are installed.

Enviro™ Cover's impermeable barrier blocks gas and odors that rise with condensation as shown on the underside

The Enviro™ Cover System, an alternative daily cover material (ADCM), is intended to replace traditional daily soil cover. According to Dr. Vic Culpepper, Technical Director for River Birch Landfill, there are many benefits to using the plastic film cover system.

For example, since the Landfill runs a waste-to-energy gas recovery system, it is especially important to maintain "garbage-to-garbage" contact. Leachate and gas breaks are incompatible with efficient operation of the gas-to-energy program. And because the film cover on one day becomes the active working face on another day the structural barrier between the waste and the environment is destroyed by the placement of the next layer of garbage. This becomes important to preserve intimate contact between layers of digesting garbage - producing gas that flows freely to collection.

The ADCM film not only saves valuable airspace compared with soil cover, it sheds rainwater and contains odors and LFG. And the system has also proven to yield benefits to daily operations. The Model 800 Deployer applicator is very well liked by operators. "You can go anywhere in any kind of weather with it", says Ron Buterbaugh, Landfill Operations Manager at River Birch, "and we save at least an hour or two every day placing the cover".

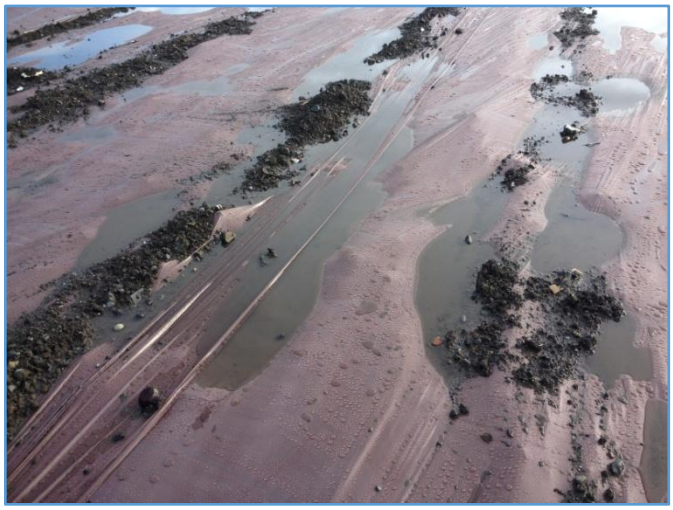
Traditional soil cover in conjunction with many municipal solid waste streams can result in the rapid build-up of odorous emissions. And because the typical approach is to come back to strip off the daily cover soil there can be a tremendous release of foul odors. Operations often return to a particular section in 3 – 4 weeks, which when stripped of cover soil for the next phase of filling releases very high levels of emissions and odors.

The Enviro™ Cover System leaves a clean face compared to soil cover which exposes waste through "flagging" from the tracks of dozers, or through repeated stripping, which entrains waste for exposure.

Conversely, the film is left in place in contact with the waste for extended periods up to 4 weeks. It does not have to be stripped to provide the garbage-to-garbage contact for efficient LFG production. It simply becomes part of the waste while effectively blocking the surface infiltration of rain water and the surface exfiltration of landfill gas.

Another significant advantage reported by Dr. Culpepper is the 100% continuity of coverage with the plastic film. Frequently a daily cover soil leaves openings where cohesive clayey soils "stick" to vehicle tracks and "lift" off the waste exposing it intermittently through the cover. This is called "flagging", a common problem that is typically unacceptable to regulatory oversight.

The Enviro™ Cover System, using a low ground-pressure, tracked deployer of both film and ballast soil, deposits a continuous soil ballast along the film panels and overlaps, leaving complete and conforming coverage of the waste. The low ground pressure and rubber tracks even allow travel onto the deployed film cover without damaging the film or barrier, an important benefit if a repair is required.



At the surface, Enviro™ Cover provides an impermeable barrier between the waste and the environment

Dr Culpepper gains operational efficiency by enlarging the film-covered surface area and maximizing the period of time before placing waste over the area. This allows for increased rainwater shedding as more plastic film surface displaces soil surface. For example, New Orleans averages 64 inches of rainfall per year. Consider that just 3 acres of film surface will shed over 5 million gallons of rainfall annually (1), enough water to fill nearly 8 Olympic swimming pools! With the film eliminating rain infiltration, LFG and odor exfiltration is likewise blocked at the surface (between the waste and the environment) where the surface has a film cover.

Being able to leave the film covers in place at the Landfill leads not only to reduced rainwater intrusion, reduced emissions and odors, but to equipment cost savings. Light use of a tracked film deployment vehicle, the Model 800 Enviro™ Cover System Deployer, has displaced the use of multiple cover vehicles including off-road trucks, excavators, and bulldozers.

The Model 800 Deployer , deploying plastic film while it lays down soil ballast strips for anchoring the film and sealing the overlapped panels providing complete and confirming coverage

Operational costs have been relatively low using the Enviro™ Cover System. The Deployers are designed to provide rapid, efficient and optimal coverage, capable of covering over 3000 sq. ft. per minute, both up and down working faces with slopes as steep as 3 to 1. As mentioned by Mr. Buterbaugh, film deployment is not affected by adverse site conditions and weather.

River Birch Landfill in New Orleans has been an innovator when it comes to landfill gas production and control – controlling odors, converting LFG to purified natural gas, and selling the gas to a gas pipeline. The Landfill has made innovative use of an ADCM which goes beyond the traditional benefit of air space savings. The Enviro™ Cover System provides benefits far beyond what landfill operators are accustomed to in the application of daily cover – benefits related to a much improved surface barrier that is left in place as it buries the covered waste.

Above: Large surface areas film coverage applied with the Model 800 Deployer

1) Proceedings of Global Waste Symposium, October 2012, *"Better Cover Material Selection for Improved Odor Control and Leachate Formation",* M.W. Cadwallader, Phoenix, AZ.

Appendix

EQUIVALENT DARCY'S LAW FLOW RATE FOR POLYETHYLENE CALCULATED FROM GAS TRANSMISSION DATA MEASURED IN A LABORATORY

Methane Gas Loss Through Polyethylene Film

From Matrecon Laboratories, Oakland, Calif., 1991, ASTM E96

1.25 mil, permeation = 6.1 scm/acre/day

5 mil, permeation = 3.3 scm/acre/day

vs

soil/green waste covers >> 1,000 scm/acre/day