

# ENVIRONMENTALLY AND FINANCIALLY Sound technologies For landfill management



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In 2015, about 137.7 million tons of municipal solid waste (MSW) were delivered to the 1,956 municipal landfills throughout the U.S. According to the Environmental Protection Agency (EPA), that represents a 26% increase in annual tonnage compared to 1990. And despite efforts to promote recycling, our citizens' appetite for adding waste to landfills seems unabated. Each person in the U.S. generates approximately 4.5 pounds of MSW daily.

In Canada, the numbers are even higher, with about 7% more trash per day per person. In fact, according to a 2017 article in the Canadian Geographic magazine, Canada leads the developed world in per capita production of garbage. There are currently almost 2,000 operating landfills across Canada that accept MSW. Landfills in Canada are regulated by provincial environmental agencies and environmental protection legislation.

Today's modern MSW landfills are well-engineered and highly regulated facilities. "Landfills have seven main tasks that need to be completed during their lives," said Matt Slater, VP of Business Development for Terramac. "It begins with the construction of the bottom liner and continues through monitoring the ground water after it has been capped. All of these steps require a machine that can handle the job without disturbing the integrity of the environment and the landfill cell."



- 1. Initial construction of the bottom clay liner
- 2. HDPE plastic liner to contain liquids
- 3. Textile Mat to protect liner
- 4. Granular Layer to funnel Lechate
- 5. Soil Protective layer

- 6. Building the cells including filling & compaction of cells and the daily cover
- 7. Lechate collection (water run off)
- 8. Methane gas collection
- 9. Completing the final cap which includes seeding

Many of these steps are designed to not only build the framework for the landfill, but also to protect the environment from contaminants, which may be present in the solid waste being disposed. These contaminants, called leachate, are formed when rain water filters through wastes placed in the landfill. When this liquid contacts the covered solid waste, it leaches, or draws out, chemicals or constituents from those wastes. Protecting ground water and surrounding soil from leachate releases, as well as maintaining public health standards through odor and rodent control, are always top of mind.

However, municipalities and private landfill operators are also under pressure to keep up with increases in rising demand for their facilities — to find ways to increase the intake of MSW and at the same time lengthen the usable life of their landfill. That will require more efficient methods as the daily deposits continue to increase. A new breed of technologically-advanced solutions exist to help landfill operators extend the life of their landfill while reducing any potential adverse impact on the environment.

### **Control More Air Space**

Perhaps, the most precious commodity and overriding challenge in a landfill is air space. The amount of space is directly related to the capacity and usable life of the landfill. If you can decrease the daily use of the air space, usable life of the landfill can be extended. The current practice of developing cells where each day's trash is compacted into a predetermined area, typically 50 feet long by 50 feet wide by 14 feet high, gets the job done and meets the requirements.



Terramac RT9 applying the ADC slurry.

Using traditional heavy equipment, compressing 2,500 tons at 1,500 pounds per cubic yard does reduce the volume. Each day of the operation when the MSW deposit is finished, it is covered with six inches of dirt, a process that takes many passes and man-hours to complete while taking up more and more of the allotted space.

New technologies have been introduced that can slow the use of the controlled land. Landfills can effectively conserve air space by reducing the six-inch dirt cover to around ¼ of an inch with the practice of using an Alternative Daily Cover (ADC) – a 24 to 1 increase in recovered area. Industrial spraying applicators like APEX XA are specially mounted to versatile, low-impact crawler carriers like the Terramac<sup>®</sup> RT14R to spray a thin layer of material specifically designed for landfill application. The use of these slurries and other alternative covers can be adjusted to meet state-required use requirements and effectively recapture landfill air space worth hundreds of thousands of dollars in additional annual revenue potential. By utilizing a low ground pressure rubber tracked carrier, the ADC can be applied to all parts of the cell without jeopardizing the liner.

Granted, these space saving techniques do not literally translate into dollars in a landfill's pocket right away. But they do increase the number of years the site could remain open by approximately 25% on average. This effectively allows landfills to operate for a longer period on the same site compered to investing in new cell construction or preparation of new landfill locations. Moreover, much less land would be needed as a result.

" One Midwest landfill that switched to ADC has been able to stay open an additional five years because of the freed-up space generated by the switch from dirt."

- James Loneman, SWX Corporation

#### Lowering the On-ground Pressure

Each landfill cell has two crucial stages in minimizing environmental impact – at the very beginning and much later, at the end of the cell construction cycle.

A landfill's major purpose and one of its biggest challenges is to contain the trash so that the trash doesn't cause problems in the environment. The bottom liner prevents the trash from contacting the outside soil, particularly the groundwater. In MSW landfills, the liner is usually a type of durable, punctureresistant synthetic plastic (polyethylene, high-density polyethylene, polyvinylchloride). It is usually 30-100 mils thick. The plastic liner may also be combined with compacted clay soils as an additional liner. The plastic liner is typically surrounded on either side by a fabric mat (geotextile mat) that will help to keep the plastic liner from tearing or puncturing from the nearby rock and gravel layers.



Terramac RT14R hauling dirt for daily cover.

However, many tears can occur during the initial trash drops due to the heaviness of the equipment employed. Reducing the ground pressure at this opening stage of any cell is important. And technology has given rise to rubber tracked crawler carriers designed to exert low ground pressure to minimize damage of liners below the surface while dramatically improving easy of maneuverability across rough, wet and uneven ground conditions exhibited by landfills. A rubber tracked carrier typically exerts less than 5.0 PSI unloaded, far less than rubber wheeled or steel track vehicle options.

The Terramac RT14R takes this technology one step further by employing a 360-degree rotating upper frame to allow dumping of loads of 28,000 pounds with a simple straight-in, rotate, and straight-out approach. Any added stress on the underlying membrane due to turning treads is eliminated. Driver fatigue is also reduced.



Terramac RT14 with load of dirt.

"Innovative equipment like the Terramac RT14R provide the operator the power and stability landfills require for full day operation while reducing overall stress on the landfill infrastructure," said Gerry Carney Jr., C.N. Wood Contractors' Equipment.

Rubber tracked carrier technology also pays dividends when a section of the landfill is finished. The cap is covered permanently with a polyethylene cap (40 mil) and then covered with a 2-foot layer of compacted soil. The soil is then planted with vegetation to prevent erosion of the soil by rainfall and wind. Employing low-pressure rubber track technology at this stage, and during periodic ongoing cap maintenance, helps further minimize any potential leachate releases. Additional post-closure care includes inspecting the cap, repairing any erosion, filling low areas due to settlement, maintaining vegetation and preventing trees from growing which can damage the liners. These tasks are all easy to accomplish with no disruption to the layers.

When landfill grounds are too muddy and slippery for hauling trash by traditional rubber tired vehicles, rubber tracked carriers' step in effortlessly to keep the operation and revenue flowing.



Terramac with hydroseeding unit spraying cover with grass seed.

#### Make Versatility the New Standard

Landfills have all types of heavy equipment running a specific task over, and over again, to get the job done. In addition, many landfill operators are looking to acquire machines capable of doing multiple tasks, especially those able to do heavy-duty work with a lighter footprint. And since so many tasks need to be completed on and around the cells to keep requirements met, quick change-out of accessories and versatility of being able to go almost anywhere at any time because of their low ground pressure."

Need to run up a steep landfill slope to drop extra dirt to fill a gap the steel tracked machine missed? No problem. Have a backfill situation in a muddy part of the site that needs to be addressed? Load and go. And, when it's time to close a cell the industrial/cover applicator can be ready to cover lots of ground efficiently.

"Rubber tracked carriers like Terramac are like the Swiss Army Knife for landfill operators," Chris Wilkes, LINDER said.



Terramac RT6 in muddy conditions.

becomes very important. The versatile bed of the Terramac machines allows a landfill operation to change out accessories as needed to handle those frequent but not daily tasks. Installing the Gas Reclamation Systems, or Methane Collection Systems, can be added and maintained with a versatile unit that can haul up the pipe and the tools to install or monitor the performance of the system.

Many operations are using rubber tracked carriers with low ground pressure to troubleshoot those tasks that are just part of the everyday landfill maintenance experience. It is a continual process to assure Storm Water Drainage is actively working and moving into the Sediment Ponds and Diversion Ditches so water does not come into contact with the garbage.

"The stability and traction of rubber tracked carriers like Terramac are ideal for so many uses and conditions," stated Eric Rice, Terramac product analyst. "Following hurricanes, they're the go-to solution for beach and levee restoration "They simple perform many tasks that the heavy rubber-tired vehicles and the larger steel-tracked heavy equipment just can't do."

Rubber tracked carriers are helping to lower the pressure on landfill operators by providing new management efficiencies with environmental and financial benefits.

*" Rubber tracked carriers like Terramac are like the Swiss Army Knife for landfill operators…"* 

- Chris Wilkes, LINDER

## TERRAMAC CRAWLER CARRIER SPECIFICATION CHART

	RT6	RT7R	RT9	RT14	RT14R
Carrying Capacity	12,000-Ibs	14,000-Ibs	18,000-Ibs	28,000-Ibs	28,000-Ibs
<b>Ground Pressure</b> (Fully Loaded)	5.3-psi	5.5-psi	6.4-psi	7.4-psi	8.3-psi
Cummins Engine Model	B4.5 Performance Series US T4F/EU Stage V	B4.5 Performance Series US T4F/EU Stage V	QSB 6.7 T4F	QSB 6.7 T4F	QSL9 T4F
Horsepower	155-hp @ 2200 RPM	165-hp @ 2200 RPM	225-hp @ 2200 RPM	310-hp @ 2200 RPM	320-hp @ 1800 RPM





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*Terramac manufactures a full line of rubber tracked crawler carriers proven to be beneficial for improving efficiencies in landfill management. For more information visit <u>www.terramac.com</u>.*