

FEATURE

Landfill operators should thoroughly consider several factors before choosing a daily cover material.

Going

UNDERCOVER

BY Christopher D. Hardin

The U.S. Environmental Protection Agency (EPA) requires the daily application of cover over landfilled solid waste for several reasons. According to the Code of Federal Regulations, “owners and operators of all municipal solid waste landfill units must cover disposed solid waste with 6 inches of earthen material at the end of each operating day, or at more frequent intervals if necessary, to control disease vectors, fires, odors, blowing litter and scavenging.” Since the promulgation of these requirements under EPA’s Subtitle D regulations in 1991, the benefits

LESS BLOWING IN THE WIND: Daily cover reduces blowing litter and improves a site’s overall appearance.

Photo courtesy of Southwestern Sales Co.

of using daily cover have been corroborated by many years of landfill operation. The benefits include:

• **Disease vector control.** Daily cover helps curb the number of disease-carrying birds, insects and rodents. The placement of daily cover reduces food sources for these animals, the presence of breeding environments for birds and rodents, and prevents the emergence of insects from the waste.

• **Odor and air emission control.** Daily cover prevents exposure of the waste surface to the wind, thereby reducing the amount and extent of odors and air emissions.

• **Litter control.** Daily cover reduces blowing litter and improves the overall site appearance.

• **Groundwater and surface water protection.** Daily cover minimizes the infiltration of rainwater and runoff into the waste mass, thereby reducing leachate generation and the potential for surface water and groundwater contamination.

• **Fire prevention.** Daily cover reduces the contact of potentially combustible materials to air and ignition sources, and provides a temporary firebreak to

prevent the spread of flames.

• **Vehicle access.** Soil daily cover provides a more stable surface for landfill vehicles to travel across and helps to provide a soil matrix to enhance compaction and landfill stability.

Material Selection

In addition to meeting the regulatory and the minimum performance requirements listed above, landfill owners and operators must consider several other factors when deciding on the best type of daily cover for their sites. The factors include:

• **Readily available material.** The material used for daily cover must be easily obtained from on-site areas, known as "borrow areas," or consist of materials stockpiled at the site. Furthermore, whatever materials are used, the application equipment will need to be available on a daily basis.

• **Cover properties.** The daily cover material must have a particle size, moisture content and other material properties that are consistent with overall site operations. For example, a fine particle, such as clay soil, is not conducive for use

as daily cover of a landfill with higher than average precipitation or a site that recirculates leachate.

• **Application.** There are many materials besides soil that can be used as daily cover, but the application can be difficult in certain locations or require skills that employees don't possess. A realistic consideration of the ease of cover application is an important part of operations planning.

• **Types of waste.** The kind of material that will be covered must be considered when selecting a cover. Food waste, asbestos waste, medical waste, dead animals and construction/demolition debris all require different cover thicknesses and intervals.

• **Climate.** Weather conditions — including average and peak rainfall, temperature, strength and direction of prevailing winds, and the possibility of drought or hurricanes — must be considered when evaluating options for daily cover.

• **Overall cost.** The base unit cost of the daily cover material often can be estimated by consideration of labor rates and equipment operation



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Photo courtesy of Landfill Service Corp.

Daily cover helps curb the number of disease-carrying birds, insects and rodents.

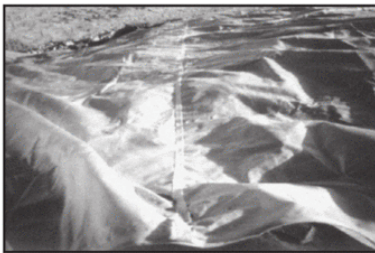
expenses. The hidden cost of materials includes storage, difficulties encountered during placement and a lack of performance during periods of intense rainfall, winds or drought. Balanced consideration of the labor, material

and hidden costs will yield a realistic estimate of the overall cost.

Maximizing Airspace

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tant roles in how airspace is used at a landfill, but these factors are only the beginning. Optimal use of landfill airspace is achieved through the effective management and placement of daily pit cover. Based on multiple landfill test pit



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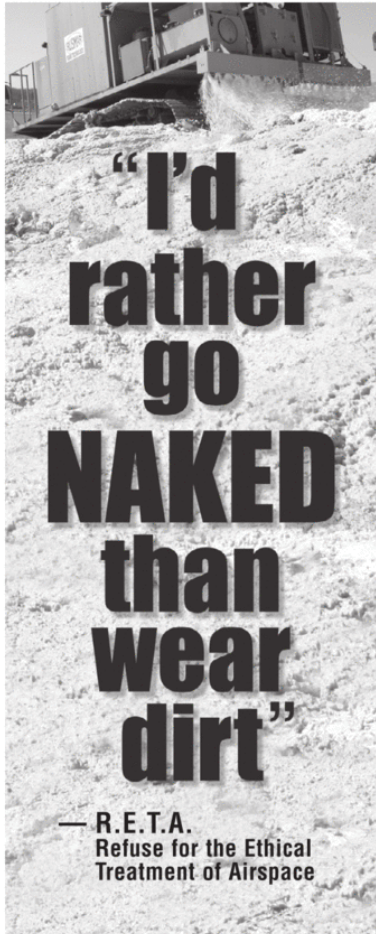


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Weather conditions must be
considered when evaluating
options for daily cover.

excavations, the actual depth of daily cover typically ranges from 12 to just more than 16 inches. These daily cover thicknesses were observed on landfill sites with aggressive waste compaction programs and average waste/cover soil densities of at least 1,400 pounds per cubic yard.

Most landfill operations track the density of their combined waste and cover soil volume by using a combination of regular surveys and tonnage information from the scale house facility. Few landfill operations regularly assess the amount of daily cover that is being placed in the landfill on a qualitative basis (by test pit observations) or quantitative basis (by checking the soil volume removed from the borrow area). Since daily cover material and placement is a cost to most landfill operations, it is a good practice to carefully track daily cover volumes to maximize the airspace that is taken up by waste

materials that are paid for at the gate.

Best Practices

The wide variety of landfill operations, site conditions and changing conditions suggests that a list of best management practices is the best way to assist landfill operators with the selection and use of daily cover materials. Here are some general rules of thumb:

- **Use clay and low permeability soils for liners, not for daily cover.** A common problem for landfills in non-arid areas of the country is seepage of leachate from side slopes. This problem is typically caused by operators placing silty and “clayey” daily cover soils in the outer 100 feet of landfill side slopes. If a landfill is used for recirculation or located in an area of significant precipitation, then sand soils or more granular materials should be used for daily cover.
- **Develop fill sequence plans.** Have the design engineer work with the

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landfill operator to develop practical fill sequence plans that show haul roads, approximate slopes for waste placement and compaction, and the overall progression of the waste placement operation. A simple cost-benefit evaluation indicates typical fill-sequence plans that cost \$3,000 to \$5,000 can easily increase the amount of waste in a 1-acre area of cover soil/waste with a lift thickness of 6 to 10 feet by 1,000 to 2,000 tons.

- **Manage the placement.** Simple practices like pulling back or breaking up the previous day's cover prior to placement of new waste and trimming the waste surface prior to placement can significantly decrease the amount of space taken up by daily cover. Cover placement also is enhanced by sloping waste lifts back into the center sections of the landfill to promote compaction and prevent soil layers that drain leachate to the side slopes.

- **Train equipment operators.** Since daily cover often is placed late in the day, it is common practice for the least experienced equipment operator to be involved in this important activity.

To maintain the daily cover layer at thicknesses that preserve airspace, it is essential that the equipment operators know how to trim the waste surface and place daily cover soils in a consistent 6- to 8-inch lift.

- **Consider alternative daily covers and soil optimization.** Properly applied alternative covers such as tarps, foams, shredded tires, auto shredder fluff and soil cement mixtures are excellent ways to reduce the amount of cover soil and increase the waste mass in a landfill. All of these materials have increased labor and equipment costs that need to be considered to determine if an alternative cover is technically and financially feasible. Other ways to increase the percentage of waste include measuring the volume of soil daily cover obtained from the borrow area and tracking the overall waste density.

- **Conduct more frequent surveys.** Most landfill operations schedule annual surveys of the site and use information from the scale facilities to track the volume of waste coming into the landfill. Some landfills track

the amount of daily cover by counting the truckloads of cover soils from the borrow area.

A site easily can lose track of the ratio of daily cover to waste volume unless more frequent survey and technical evaluations are conducted. Additional surveys of the landfill and borrow area, updated fill sequence plans, and tracking the volume of soil removed from the borrow area are great ways to increase the efficiency of the waste placement and compaction operations.

Using the combined skills of operations personnel, design engineers and even business managers/accountants, the landfill operator can optimize the use of landfill airspace and cut costs in simple and unexpected ways. ■

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Christopher D. Hardin, P.E., is a geotechnical engineer for Long Beach, Calif.-based SCS Engineers who specializes in landfill operations and design.

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