



The Pioneer Of Geosynthetics  
S I N C E 1 9 7 2

## Green Surfaced Geomembranes

### BACKGROUND

Historically, landfill cover systems have consisted of at least three components; a geomembrane, a cover soil and a vegetative cover (grass). Covering the geomembrane with soil protects it from UV exposure.

The geomembrane is the primary component protecting the environment by keeping gas in and water out. Additionally, not all cover systems are designed for an indefinite lifespan such as those associated with future expansion, reclamation or bioreactor projects.

The idea of an Exposed Geomembrane Cover System (EGCS), a landfill cover without the requisite soil component, has been around for over 10 years. In fact, two of the first test cells with such a design were constructed in 1992 for the Delaware Solid Waste Authority. The use of EGCS is not yet widespread, but the cost advantages of this type of cover system, combined with the continued improvements in design as a result of test cell data analysis have combined to make this a more technically viable option.

### MATERIALS

Black surfaced geomembranes can be used for lining EGCS. However, the aesthetics of a large black cover on top of a landfill does not blend with most natural surroundings. In an effort to manufacture geosynthetics that not only protect the environment from potential contamination, but also are pleasing to the natural surroundings, GSE has developed GSE Green surfaced geomembranes. This material is available in a smooth or textured surface on one or both sides.



GSE Green geomembrane.

### ADVANTAGES

EGCS have continued to gain popularity due to the advantages they offer over traditional geomembrane/soil/vegetative cover systems. Among

the advantages are decreased costs associated with the following:

- Design
- Materials
- Construction
- Operation
- Maintenance

### ADDITIONAL BENEFITS:

- Increased landfill volume - through steeper slopes
- Removal of cover soil slope stability issues

Estimates of the realized cost saving for applications using an EGCS range from \$24,000 - \$56,500 per acre in construction savings alone<sup>1</sup>, not to mention the additional savings expected over the lifetime of the cover system. GSE Green is generally used on the following applications.

- Steep side slopes are required
- Available cover soil is cost prohibitive
- Future vertical expansion of the landfill may be required
- Landfill reclamation may be required in the future necessitating removal of cover system
- Landfill settlement may be dramatic such as with a bioreactor application



Completed 20 acre EGCS for a MSW landfill cover.

### REASON FOR INSTALLING AN EGCS

Some of these EGCS are temporary covers to be used until the landfill is expanded, the waste degrades (bioreactor applications) or cover with soil. The exposed covers are installed as part of the closure plan to reduce odors, eliminate gaseous emissions and prevent the intrusion of rainwater into the waste mass. Another reason to install an EGCS is to eliminate the possibility of a slope failure. The primary reasons for slope failure on a landfill cover are poor design, unusually heavy rain events or differential settlement. In the case of slope failure, additional time any money must be expended to replace the cover

soil - further increasing the costs. By installing an EGCS, this problem is eliminated - there is no soil veneer that can slough off.

**ADDITIONAL CONSIDERATIONS**

While the EGCS offers several benefits, outlined above, there are also a few situations to consider when installing an EGCS that are either of less concern or nonexistent when using cover soil. Among the considerations are wind uplift, increased velocity and volume of rainwater runoff, increased susceptibility to gas uplift and vulnerability to damage by animals or vandals. Properly designed vertical anchor trenches can mitigate problems associated with wind uplift. An aggressive drainage system can easily handle large amounts of rainwater in a short period of time. Proper design and installation of a gas vent layer beneath the cover can ensure that the gas is directed quickly and efficiently to the gas collection system so that large amounts of gas do not build up underneath the cover.



GSE Green used on a landfill cap.

**ENGINEERING SUPPORT**

The GSE Engineering Support Staff is comprised of multidisciplinary product professionals to support you across a range of project requirements. This includes knowledge in geomembrane, geosynthetic clay liners, geonet, geocomposite, nonwoven geotextile and concrete protection products and application solutions. Rely on our technical staff to help you solve your project issues.



GSE Engineering Support Staff.

**CUSTOM FABRICATION**

The GSE Custom Fabrication Group builds products to your exact specifications. We have extensive experience in prefabricated polyethylene products and components. A few examples of our custom fabricated products are Aqua Tanks, Quick Containment, concrete protection liners, boots, sumps, pads, pipes, daily covers, temporary containment, containment boom and other products to fulfill your fabrication needs.



StudLiner Sumps.

**INSTALLER NETWORK**

The GSE Installer Network leads the industry with the most experienced, large, and flexible crews available around the world to meet your installation requirements. Each installer is equipped with state-of-the-art welding and testing equipment to ensure a successful installation. Selecting a qualified installer with the right product knowledge is critical to your success. Let GSE connect you to the right installer to handle your installation project of any size from start to finish.

References:

<sup>1</sup>Exposed Geomembrane Cover Systems: Technology Summary, Gleason, Houlihan, Palutis