

Landfills

GEOMEMBRANE QUALITY, CONSISTENCY SERVICE

Geomembrane quality begins with base resin selection. GSE's resins are blended with premium carbon black, antioxidant additives and UV stabilizers to ensure long life—even in exposed conditions.

GSE's manufacturing facilities include state-of-the-art extrusion lines. GSE utilizes two unique geomembrane extrusion systems. With flat-cast and round-die extrusion capabilities, GSE can meet stringent tolerance requirements as well as produce patented, coextruded products.

GSE geomembrane materials must pass a battery of quality control checks before being shipped and installed. From the base resin checks to 100% on-line holiday spark-tested to laboratory quality assurance testing, all GSE geomembrane is thoroughly inspected.

Installations require extensive planning to ensure on-time delivery and coordination with the earthmoving contractors. No other company offers more experience installing geomembranes and related geosynthetic products. In addition to maintaining the largest installation work force in the industry, GSE works with high-quality local installers around the world to ensure a global network of liner installation capability.



GSE HDPE geomembranes are the world's environmental lining material of choice.

LANDFILL CELL LINERS

Today's state-of-the-art landfill utilizes a range of geosynthetic products to maximize design efficiency, integrity and performance while minimizing overall cost. For environmental protection, the essential landfill component is the primary geomembrane liner.

By itself, the primary liner contains hazardous leachates and protects valuable groundwater resources. However, for a landfill liner system to function optimally, it needs to incorporate more than a smooth surfaced geomembrane.

Steep side slopes have become standard in landfills as

a means to increase capacity and revenue. Steep slopes present problems for smooth liners because cover soil may not stay in place and, with overburden, the liner itself can slip down the slope and increase stress on seams and the sheet itself. To solve this problem, GSE offers coextruded textured geomembranes.

The geomembrane liner provides containment for landfill leachates. For leachate collection, geocomposite nets provide high in-plane flow. The geocomposite is composed of GSE HyperNet HDPE geonet with geotextile bonded to one or both sides to keep cover soil from clogging the geonet. GSE FabriNet geocomposite is placed directly on top of the primary liner. The geotextile clings to textured geomembrane to lock the geonet in place, especially on slopes.

Many landfills require a leak detection system to ensure the integrity of the primary liner on a continuous basis. This system consists of a secondary HDPE geomembrane below the primary liner which is overlaid with either a geonet or a geocomposite net. If the leak detection system is placed directly below the primary liner, a geonet is used. If an intermediate soil layer or primary clay layer is used, then a geocomposite net is utilized.

Landfill cell liners are massive and critical projects. The geosynthetic liner system represents a small fraction of the overall cost but virtually 100% of the protection. Don't settle for mediocre quality. GSE provides everything you need for the highest quality installation and the largest selection.



8.5 million square feet (790,000 square meters) of GSE HD* used in a canyon fill in Pennsylvania.

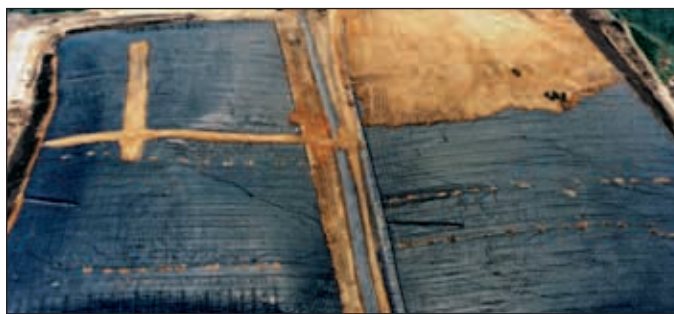
LANDFILL COVERS

A major long-term concern when employing a landfill cover is differential settlement caused by decaying and shifting waste. The geomembrane cover must facilitate deformation caused by differential settlement without failure of the con-

tainment. To meet this requirement, GSE UltraFlex is made from a unique, linear low density polyethylene resin (LLDPE). Its utility and durability has been proven in over 50 million square feet (5 million square meters) of landfill cover applications.

LEACHATE PONDS

Leachate is collected from landfill cells and typically stored in lined ponds for treatment or evaporation. The liners in these ponds are generally exposed to the elements. HDPE lining systems exhibit the highest degree of durability under extreme environmental conditions including sunlight, freezing and abrasion.



Typical landfill cap using GSE HDPE geomembrane in Florida.

HIGH-END ENGINEERING

To achieve true state-of-the-art landfill design, incorporate GSE’s coextruded geomembrane capabilities. GSE White is a patented, coextruded HDPE geomembrane, which provides significant benefits for the landfill owner, engineer and contractor.

The white surface has two primary functions. First, it reflects sunlight which minimizes radiant heat absorption and heat buildup to effectively minimize liner temperature. This results in less expansion of the liner. With less expansion, wrinkles are minimized. Another benefit of lower liner temperature is decreased moisture evaporation from underlying clay layers.

The second benefit of a white surface is improved visual inspection. If the thin white surface is damaged, the black portion of the sheet shows clearly. Post-installation damage is much more likely to be observed and repaired. See the GSE White information sheet for more information.

If a post-installation leak test is required, consider the benefits of GSE’s patented, spark-testable GSE Conductive.

A large landfill installation can be tested for pinholes or other construction-related damage to 100% satisfaction without the added expense of flooding or the uncertainties of other leak testing methods. Specialized areas such as sumps and pipe penetrations require special products and installation techniques. To ensure complete containment protection, use GSE Conductive since it can be electrically spark-tested at any time to find even the smallest punctures resulting from pipe laying or other incidental damage.



A double lined, multi-cell landfill.

ADDITIONAL INFORMATION

If you have an upcoming project, please give us a call. We will provide you with recommendations, an estimate for material and installation, and contacts for a GSE approved installer.

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Water & Wastewater Treatment

GSE PROVIDES A COMPLETE RANGE OF PRODUCTS AND SERVICES TO MEET YOUR WATER CONTAINMENT NEEDS

Water is the most precious and protected natural resource on earth. To meet containment and water treatment regulations, on-site water storage and treatment reservoirs are recognized as key in treatment facilities. GSE HDPE (High Density Polyethylene) and LLDPE (Linear Low Density Polyethylene) geomembranes and drainage products are proven to provide a cost-effective and efficient method of waterproofing earthen, concrete, and steel lined containment structures and reservoirs.

GSE has been providing lining and drainage system solutions to the water and wastewater industries since the early 1980's. We offer a complete line of products and installation services to meet your specific water containment and treatment needs.



White Surface HDPE Geomembrane liners utilized for Industrial waste processing ponds.

WATER & WASTEWATER CONTAINMENT APPLICATIONS

Thousands of industrial and municipal water and wastewater treatment facilities have relied on GSE materials, technology, and installation services in lining system applications. Many of the applications include:

- Water storage and treatment lagoons
- Sedimentation basins
- Grit chamber liners and flow control vertical baffles
- Floating covers for anaerobic digestion and odor control
- Geomembrane liners for corrosion protection of concrete structures
- Geomembrane liners to remediate leaking containment structures
- Factory-controlled prefabricated sumps, liners, piping systems, and pipe penetration connection liners

GSE QUALITY HDPE AND LLDPE GEOMEMBRANES

Polyethylene geomembranes are commercially available in

a range of resin densities. GSE uses only high quality polyethylene resins specially formulated to exhibit excellent chemical resistance, UV-resistance, strength, durability, and resistance to stress cracking. These properties are critical to containment in most water and wastewater containment applications. GSE HDPE geomembranes are best suited for high wear, exposure to harsh liquid conditions and exposed applications. GSE LLDPE geomembranes offer higher flexibility to withstand large differential settlement conditions.

GSE geomembranes are used extensively in these applications due to their proven performance as a cost efficient replacement to conventional clay and concrete lining systems. And compared to other geomembranes, such as flexible PVC, GSE geomembranes contain no plasticizers or fillers that may cause premature geomembrane cracking and reduced service life.

GSE geomembranes are:

- Rugged and durable
- Resistant to hazardous and harsh liquids
- Certified for potable water containment
- UV-resistant for exposed liner applications
- Flexible for ease of installation
- Installed quickly when compared to clay and concrete



HDPE liner deployed over concrete in a wastewater treatment aerobic digester.

GSE GEOSYNTHETIC CLAY LINERS PROVIDE AN ECONOMICAL ALTERNATIVE TO CONVENTIONAL COMPACTED CLAY LINERS

For water and wastewater containment lining applications that require compacted clay liners (CCLs), in addition to geomembranes, GSE also offers two types of Geosynthetic Clay Liners (GCLs), Bentofix® Fabric Encased GCLs and GSE GundSeal Geomembrane Supported GCLs. GCLs are commonly used in water and wastewater containment

applications, to replace conventional compacted clay layers and geomembrane/compacted clay composite liners.

Bentofix® GCL is ideally suited as a replacement for thick layers of compacted clay by simply rolling out a fabric encased bentonite layer on flat or sloping areas.

The GSE GundSeal GCL is used as a replacement for a composite liner, replacing both a low permeability clay layer along with an impermeable and chemically resistant geomembrane. Its one product installation saves installation time as well as improves composite liner hydraulic performance.

Whether the choice is Bentofix® or GSE GundSeal to provide an economical alternative to your compacted clay water containment requirements, GSE provides the widest range, most versatile, and highest quality GCLs in the world.



GSE GundSeal deployed as a composite liner in a food processing sludge lagoon.

REPAIR OF EXISTING LAGOONS AND LINED STRUCTURES

GSE geomembranes are suitable for lining of existing structures or to retrofit leaking liner systems, such as lagoon clay liners, cracked and weathered concrete liners, or corroded steel containment liners. The liners are simply installed over a prepared surface above the leaking liner by our skilled GSE Installation Services or approved installers.

PREFABRICATED LINING SYSTEMS

For smaller projects, such as collection sumps, small containment basins, grit chambers, and vertical flow control baffles, GSE provides prefabricated geomembrane panels for the client's own installation. GSE Plastic Fabrications is available to fabricate specialized size and dimensions to custom fit your containment structure.

SKILLED TURN-KEY INSTALLATION SERVICES

GSE HDPE and LLDPE geomembranes are installed very rapidly, much quicker than constructing a compacted clay, concrete, or steel liner system. GSE provides turn-key construction services through GSE Installation Services. We also have an extensive installation distributor network of approved GSE installers throughout the world. With GSE Installation Services or one of our approved installers, you can be assured of a quality and cost-effective geomembrane lining system installation.



HDPE Geomembrane liner utilized as a floating cover above industrial wastewater to facilitate anaerobic digestion and odor control.

ADDITIONAL INFORMATION

In addition to material supply and installation services, GSE also provides practical suggestions regarding the construction of water and wastewater containment projects. If you have an upcoming project please give us a call. We will prepare a scope of work outlining the necessary materials and installation support for the effective completion of a specific project. GSE has a staff of product managers, estimators, and project managers to assist with your project from conception through project completion.

AP025 WaterWaste R03/01/06

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