

## GSE White Geomembranes

### GSE Advantage Products

GSE GundSeal • GSE Conductive • GSE White • GSE PermaNet • GSE BioDrain System

#### A LIGHT-REFLECTIVE GEOMEMBRANE

There are several compelling reasons why your next lining project should incorporate the revolutionary GSE White geomembrane:

- Minimize wrinkles caused by expansion
- Minimize risk of damage to liner which can result from wrinkles
- Improve damage detection
- Reduce thermal expansion
- Minimize radiant heat buildup and reduce worker fatigue
- Improve visibility in low light applications

All of these benefits are in addition to the mechanical properties provided by standard black GSE geomembranes.

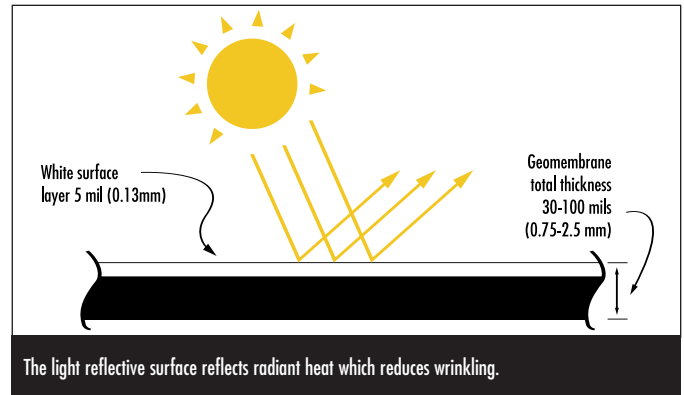
#### A PATENTED INNOVATION

GSE White is a coextruded, high density (HDPE) or linear low density (LLDPE) polyethylene geomembrane which incorporates a UV-resistant light-reflective surface layer fully integrated with the primary black geomembrane layer. All the excellent physical properties of GSE's standard black geomembrane remain the same. Only now, the white surface mitigates liner temperature extremes and facilitates visual inspection. The benefits of a white surfaced liner for the engineer, contractor and owner are significant. All GSE products incorporating a coextruded light-reflective surface are protected by GSE's United States patent(s).

#### REFLECTIVE SURFACE REDUCES HEAT BUILDUP ON THE LINER TO MINIMIZE WRINKLING

Tests have shown that using GSE White versus standard black sheet reduces heat buildup on the liner by as much as 50%. A black liner can reach temperatures of 160° F or more. Depending upon the temperature differences during the day, a HDPE geomembrane may exhibit thermal expansion of 1% or more. The installer must allow an extra length of liner during hot installations to account for subsequent geomembrane contraction as the liner cools. Liner that is installed without sufficient slack may experience bridging at the toe of the slopes, at tank corners, at sumps and along ditches. Experienced installers will allow for wrinkles in the liner to avoid overtensioning the liner when it cools.

Although the liner installer will ensure that the geomem-



brane liner system meets the engineer's specifications, subsequent earthmoving contractors may have only infrequent experience with geomembranes. A wrinkled liner surface can be distorted by bulldozers pushing soil cover. Industry experts attribute most liner leakage to post-installation damage which occurs after the geomembrane installer has completed the specified work.

GSE White can be installed with fewer, smaller wrinkles because the liner will exhibit less expansion and contraction. The true benefits accrue to the owner. GSE White results in a better installation, improved post-installation performance and fewer headaches.

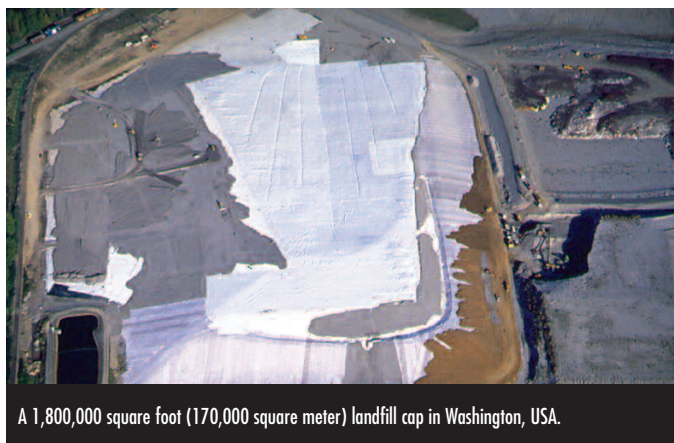
Another benefit of lower liner temperature is decreased moisture evaporation from underlying soil layers. Studies have concluded that high liner temperatures can cause moisture in the underlying soil layer to condense on the bottom side of the liner. This evaporation can lead to desiccated clay layers, and to condensation buildup and migration under the liner with a potential for liquid build-up and saturation at the base of slopes.



#### BETTER DAMAGE DETECTION IMPROVES PERFORMANCE

The light-reflective surface layer of GSE White is approximately 5 mils (0.13 mm) thick. If any damage to the liner

should occur, the black primary layer of the geomembrane will be exposed, thus making visual inspection more reliable. The improved visual inspection capability is especially important for exposed applications such as tank liners and secondary containments which do not have the protective benefit of cover soil or concrete.



A 1,800,000 square foot (170,000 square meter) landfill cap in Washington, USA.

### UV RESISTANCE

Carbon black is used in polyethylene geomembrane products to ensure long term resistance to ultraviolet light (UV) exposure. A more expensive process is used to create a UV-resistant white resin. Hindered amine light stabilizers (HALS) were selected as powerful UV inhibitors for the GSE White surface stabilizer. Accelerated laboratory testing of white geomembrane indicates a possible service life in excess of 18-50 years depending on altitude, latitude and other environmental factors.

### COEXTRUSION TECHNOLOGY

GSE's coextrusion process fully integrates the light-reflective surface of GSE White with the standard black primary section of the geomembrane. The white surface is part of the extrusion process and not a laminated layer; it is molecularly bonded and cannot be separated from the black portion.

GSE White boasts the same mechanical properties as standard black GSE geomembrane. In addition to creating a white surface, GSE's coextrusion process is also used to create textured and electrically conductive surfaces and combinations of all three enhancements.

A conductive bottom layer for spark-testable liner performance and state-of-the-art engineering design can be

added. The GSE Conductive information sheet describes this patented conductive geomembrane. GSE White is also available with one or both sides textured to create higher frictional characteristics for slope applications. Finally, GSE Conductive White is available with the non-conductive side textured.

### INSTALLATION ADVANTAGES

Ensuring the quality of factory-produced geomembrane is much easier than ensuring quality in field conditions. Geomembrane installation technicians often must work in direct summer sunlight and withstand liner temperatures building to in excess of 160° F during long construction days. Worker fatigue is a common problem which reduces productivity and can affect quality. By reducing the liner temperature, crews are more productive, and installation quality and safety improves.

Other installation benefits inherent with GSE White geomembrane include reduced movement of panel overlaps and minimal "fishmouths" along seams. Additionally, where black welding rod is used to seam patches, it is much easier to determine if all required destructive seam tests have been performed because each location is clearly visible.



GSE White geomembrane waterproofing membrane for the LA Metro subway system, California, USA.

### COMBINED BENEFITS FOR OVERALL QUALITY

GSE White offers significant benefits for a wide range of civil and environmental applications. Consider how a GSE White liner could improve your next project. If you have any questions please give us a call, and we will help you decide if GSE White is appropriate for your application.

AP008 White R03/16/06

This information is provided for reference purposes only and is not intended as a warranty or guarantee. GSE assumes no liability in connection with the use of this information. Please check with GSE for current, standard minimum quality assurance procedures and specifications.

GSE and other trademarks in this document are registered trademarks of GSE Lining Technology, Inc. in the United States and certain foreign countries.

<b>North America</b>	GSE Lining Technology, Inc.	Houston, Texas	800 435 2008	281 443 8564	Fax: 281 230 8650
<b>South America</b>	GSE Lining Technology Chile S.A.	Santiago, Chile		56 2 595 4200	Fax: 56 2 595 4290
<b>Asia Pacific</b>	GSE Lining Technology Company Limited	Bangkok, Thailand		66 2 937 0091	Fax: 66 2 937 0097
<b>Europe &amp; Africa</b>	GSE Lining Technology GmbH	Hamburg, Germany		49 40 767420	Fax: 49 40 7674234
<b>Middle East</b>	GSE Lining Technology-Egypt	The 6th of October City, Egypt		202 2 828 8888	Fax: 202 2 828 8889