



GSE
ENVIRONMENTAL™

FACING THE CHALLENGE

Leaks happen – no matter how careful you are during liner installation. An accidentally dropped tool, an oversized rock, or poor installation techniques can cause tears and holes too small for the eye to see. Most damage occurs from machinery and the impact of covering the liner with soil and backfill, but exposed applications are continually subject to damage as well, usually from wildlife, equipment, or, even, vandalism.

Leaks cost your company, whether it's money, time, or damage to your reputation.

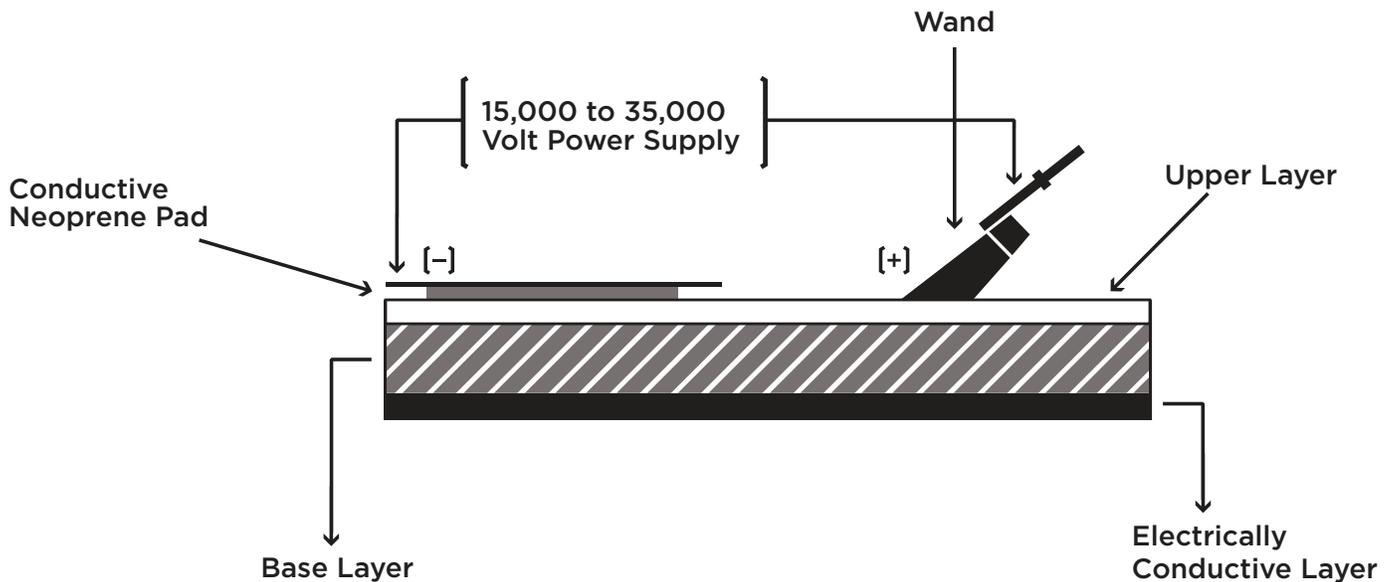
Finding leaks easily and repairing them before problems develop can help mitigate the risks of a shutdown, public scrutiny, heavy regulatory fines, legal fees, or remediation costs; however, QA teams face some tough challenges to detecting leaks with traditional liners.



LAYING THE GROUNDWORK

GSE faced the challenges of leak detection head-on. We set the bar by developing the first electrically-conductive geomembrane, allowing the entire surface of the liner to be Spark tested and eliminating many of the challenges associated with traditional liners. But even that had its limitations. So, we raised the bar higher and sent our innovation team back to work. The result is the next generation of conductive lining products — GSE Leak Location Liners — high performance, co-extruded, high-density polyethylene (HDPE) and linear low density polyethylene (LLDPE) geomembranes specifically designed for use in applications where you can't afford a leak.

But we didn't stop there. GSE collaborated with industry experts to develop a revolutionary installation technique, which isolates the conductive flap in a fusion-welded seam, eliminating the nuisance of false positive signals for leaks, a problem experienced in the past. With GSE Leak Location Liner, you can thoroughly test both exposed and covered applications, allowing for the most cost-efficient and reliable leak detection method in the industry.



Spark Testing Diagram

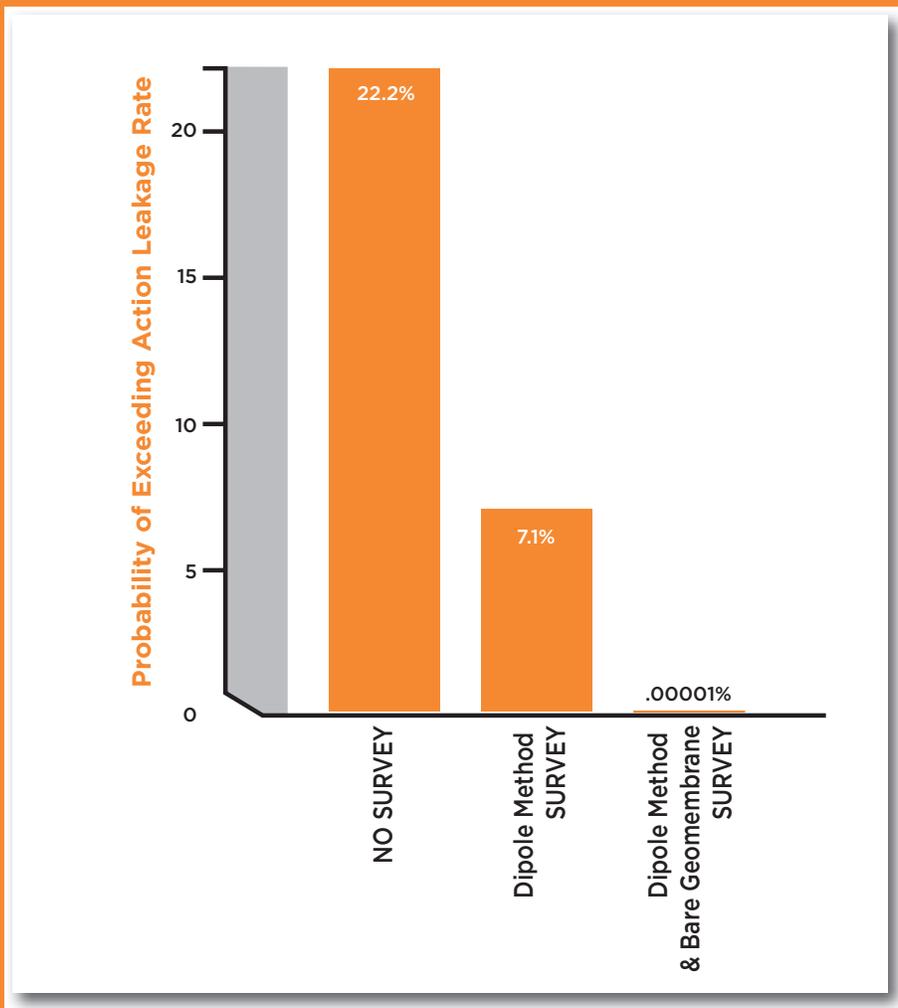
FINDING THE LEAKS

While there are several methods to detect leaks in a geosynthetic liner, research has shown that the most effective methods are Electrical Liner Integrity (ELI) surveys which use an electric current running through two conductive layers, separated by a non-conductive barrier (the liner).

The Spark Testing Method is used on exposed applications and can be performed at anytime during or after installation. It is able to detect even the smallest holes, and Spark testing can be performed more quickly and thoroughly than any other method.

The Dipole Method is used once the liner is covered with water or soil. This test is critical to effective leak detection because most damage occurs when cover material is placed on the liner. Once the liner is covered, you can no longer perform the Spark Test.

According to a landfill leakage and quality assurance study (Beck, 2012), if no geoelectric survey is performed, there is a 22.2% probability of exceeding the ALR (Action Leakage Rate), and only a 7.1 percent probability exists if the Dipole Method is used. However, if both an exposed geomembrane test and a Dipole Survey are performed, the probability is reduced to .00001%.





TRI Environmental performing a dipole liner integrity survey on a landfill expansion cell in China using a double dipole and a high precision GPS data logger.

“GSE has the most diverse product line in the industry and offers the highest level of technical support.”

Roger Krabel,
Clean Air And Water Systems, LLC.



LAYERS OF RELIABILITY

High Performance Leak Location Liners are made with the finest raw materials to enable exceptional elasticity, environmental stress crack resistance, and excellent multi-axial elongation performance. With proper testing and maintenance, Leak Location Liners are engineered for resilience against extreme temperatures and harsh conditions, providing extended ground protection against hazardous waste and chemicals, year after year. A textured surface is available on one or both sides for applications that require increased frictional resistance, and the surface characteristics of the texture can be varied on each side of the geomembrane to maximize interface shear performance.

“GSE could just rest on our laurels and continue to produce the same products. But you have to always adapt and change. We learn what’s needed and we solve the problem.”

MIKE SINGLETON,

North American Finance Director, GSE



DO YOU CARE IF IT LEAKS?

No matter what industry you are in or what application you build, you have one objective: protect the environment and your investment. At GSE, our overprotective nature drives us to continuously develop new products and services to address owner and engineering needs, increased governmental regulations, and public concerns.

GSE's Leak Location Liner continues our history of innovative product development, providing the maximum protection against leaks by enabling thorough testing of exposed and covered applications, thus ensuring that the environment and surrounding communities are safe and your investment is secure.



APPLICATIONS



**SOLID
WASTE**



MINING



**INDUSTRIAL
PONDS**



**HAZARDOUS WASTE
& CHEMICAL STORAGE**



**WATER
& WASTE WATER**



**COAL ASH
DISPOSAL**



**ANIMAL WASTE
STORAGE**



POWER

BENEFITS OF LEAK LOCATION LINER

- [→] The optional white surface reflects sunlight, lowering the liner temperature, which reduces wrinkles.
- [→] The combination of a white surface and black base makes it easy to visually detect scoring and other impact damage.
- [→] An optional textured surface is available, which helps stabilize the liner, reducing the risk of damage during placement of cover soil.
- [→] The electrically-conductive bottom layer allows for leak detection on exposed and covered applications, accommodating both Spark and Dipole testing, and significantly reducing the probability of exceeding the ALR.
- [→] The co-extruded conductive layer eliminates the need to apply water during testing in exposed applications.
- [→] In doubled-lined applications, the conductive layer eliminates the need to apply water to the sub-grade or leak detection layer prior to testing. (Figure 1)
- [→] Leaks can be detected on wrinkles and other non-conductive surfaces. (Figure 2)
- [→] When installed as specified, false positive signals for leaks are eliminated.
- [→] In many applications, the liner can be retested as often as necessary to ensure its integrity over time.

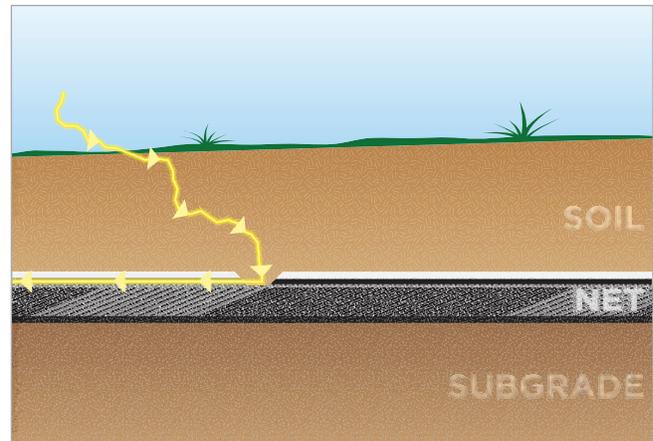


Figure 1

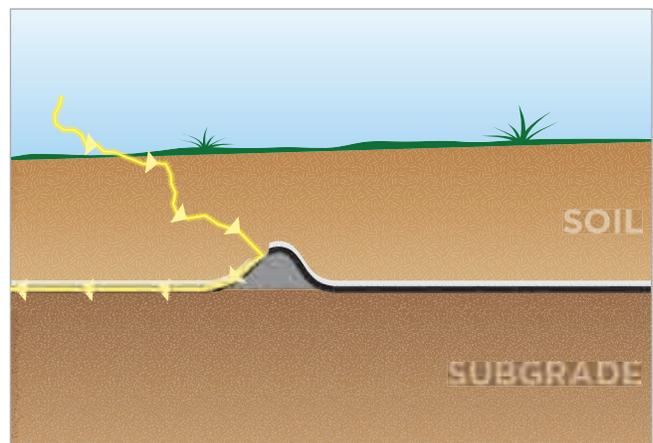


Figure 2

THIS IS WHAT WE'RE MADE OF

Being an industry leader takes substance, and our substance runs deep. That's why people around the world have turned to GSE to help solve their toughest engineering challenges. Our unstoppable commitment to innovation means we never stop collaborating with our customers to develop new products that meet their needs.

GSE lining products are known throughout the world as a mark of quality and reliability. Our customers depend on us to deliver geosynthetic lining products that withstand virtually every threat and danger imaginable, and we take that responsibility seriously, testing and retesting until we exceed industry standards – and everyone's expectations. It's just who we are.

ENGINEERING SUPPORT

The GSE Engineering Support Staff is comprised of multidisciplinary product professionals to support every aspect of your project design, from concept to installation. Rely on our project team to help you solve your design challenges. Our extensive network of industry experts offer comprehensive

- [→] Technical Support
- [→] Design Tools
- [→] Customer Service
- [→] Alternative Solution Development and Assessment
- [→] Project Management

WORLDWIDE LOCATIONS

Our business is global because our customers are global. Headquartered in the U.S. and with manufacturing facilities in Chile, Germany, Thailand, and Egypt, as well as engineering and sales professionals in numerous countries, GSE can provide local service to worldwide customers.

[→] HOUSTON - UNITED STATES

[→] SOUTH DAKOTA - UNITED STATES

[→] SOUTH CAROLINA - UNITED STATES

[→] BANGKOK - THAILAND

[→] SANTIAGO - CHILE

[→] HAMBURG - GERMANY

[→] CAIRO - EGYPT



GSE is a leading manufacturer and marketer of geosynthetic lining products and services. We've built a reputation of reliability through our dedication to providing consistency of product, price and protection to our global customers.

Our commitment to innovation, our focus on quality and our industry expertise allow us the flexibility to collaborate with our clients to develop a custom, purpose-fit solution.

For more information on this product and others, please visit us at GSEworld.com, call 800.435.2008 or contact your local sales office.

[DURABILITY RUNS DEEP]



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