

HDPE - Geomembrane Leak Detection



Leak detection in GeoMembrane type products is a highly effective and cost competitive method to assess HDPE and PVC liner integrity and can locate very small tears in these liners are used in a variety of industries such as solid waste (landfills), water containment facilities, mine heap leach stacks, and leachate ponds.

hydroGEOPHYSICS (HGI) uses the electrical resistivity geophysical technique to determine the location of leaks in GeoMembrane liners. The method works equally well in single and double line ponds or heap leach stacks. HGI has innovative solutions to address different problems that these liners present. Specially designed marine cables are often deployed on the bottom of the ponds and in instances where the ponds are too big for cables we have several floating array systems that can be pulled across the pond. This same equipment was used to map the entire Panama Canal from the Atlantic to the Pacific in 2008 by HGI.

The premise behind the technology is simple: "Where The Water Goes - The Electricity Flows". In undamaged areas the liner acts as a barrier to the flow of electrical current and in areas that are compromised the electrical current readily flows through the tears. Specialized equipment collects data across the entire pond and a color-contoured map is created to pinpoint leak locations.

Where the Water Goes -->
The Electricity Flows.

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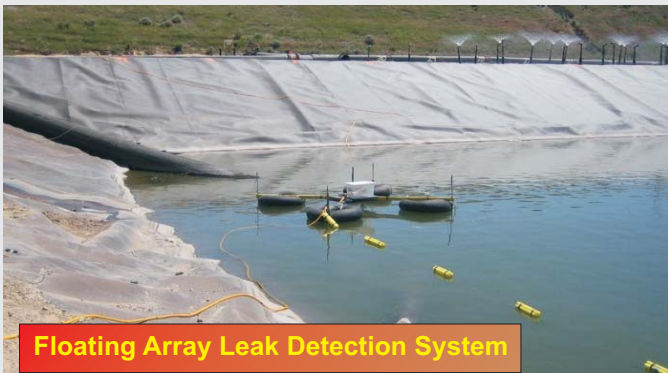


GeoMembrane Leak Detection



A variety of survey designs are available for GeoMembrane Leak Detection. For ponds HGI has designed floating electrode arrays, submersible cables and electrodes, and a stand alone submersible electrode combined with GPS. For heap leaches and landfill geomembrane liners slight modifications of traditional resistivity surveys are used.

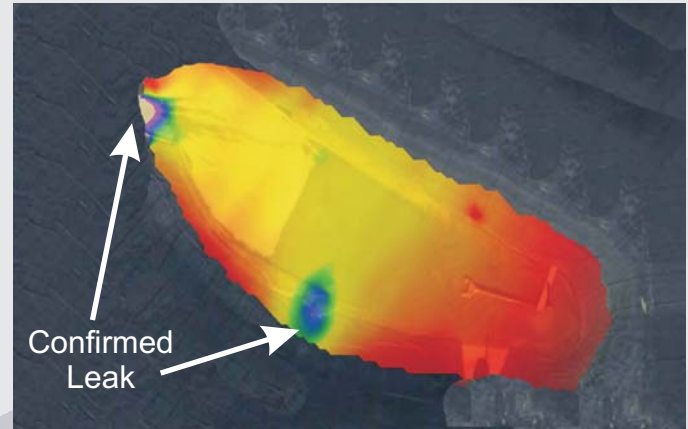
In the mining industry GeoMembrane lining integrity is essential and HGI's Leak Detection techniques have been tested and proven for over twenty years through successful Leak Detection surveys throughout the industry.



In the more complicated scenario where there is a leaking double-lined leachate pond an electric field is created by placing individual transmitter electrodes equal distances apart around the perimeter of the pond on top of the top-liner submersed in the fluid. One additional transmitting electrode would be located within the sump between liners. Each of the pond transmitting electrodes uses the sump electrode to complete the electrical circuit. By having separate transmitters, different perspectives of liner integrity are available for analysis. Following transmitter electrode installation the resistivity method is applied to the pond by using either marine cables deployed along the pond bottom or in some extreme cases an unmanned floating electrode system can be easily pulled from one side of the pond to the other. The engineering of the floating array allows for the creation of a vector map with geo-referenced direction and magnitude oriented plots detailing potential liner leaks. See figure in second column for example results.

Similar procedures as outlined above can be applied to single-lined ponds as well heap leach pads. References from previous clients are available upon request.

Example results of a leak detection survey shown below with purplish hues signifying leak locations and reddish hues indicating that the liner is intact.



The benefits of liner integrity testing using geophysical methods include:

- ✓ Pin-point accuracy in locating multiple leaks in liners
- ✓ Significant cost savings in comparison to replacement of liners
- ✓ Quick turnaround times to get operations in compliance with local environmental regulations.

hydroGEOPHYSICS, Inc. is a dynamic, innovative geophysical consulting and services company specializing in the multi-dimensional characterization and monitoring of fluid flow through geologic materials and formations. Head quartered in Tucson, AZ with a branch office in Richland, WA, HGI offers a wide range of geophysical services for environmental and engineering projects, as well as groundwater, mineral, and energy exploration and production.

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