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SUCCESSFUL NEW INNOVATION FROM GEOTEST

GPS FLOATING REMOTE DIPOLE TESTING UNIT

The newest testing innovation developed by Geotest's in-house Research and Development Program is the GPS Floating Remote Dipole Testing Unit that complies with ASTM D7007.



This was successfully employed with a recent project that Geotest had been appointed to survey. Vast quantities of the contained material at the facility

was being lost through the geomembrane into the leak detection and removal system. This was presenting difficulties to the client as they were not able to utilize the facility to the required level and be in conformance with environmental restrictions.

Due to the nature of the facility, the contained medium was not able to be removed from the installation to allow for traditional leak detection testing methods. Geotest was engaged to survey the suspect area with the newly developed technology as the contained material was too deep and unsafe to be entered.

The floating dipole integrated traditional testing methods associated with the ASTM D7007, however with the GPS can be conducted in multiple dimensional planes to effectively map readings over the area and easily identify concerns.

Geotest were successfully able to locate voids in the area that were underneath the contained material in several locations, leading to the repair and restoration of the liners integrity.

By recording the data from the remote dipole and analyzing it through a computer program, the entire survey area was mapped in 3 dimensions to provide a full visual representation of the concerns identified. This provided assurance to the client that the facility once repaired was able to function to its required level.

METHOD OF USE

The survey area must be electrically isolated from the surrounding earth with no conductive objects like sumps or gantries located in the area. As with the traditional ASTM 7007 dipole method, a high voltage DC power source is applied to the medium above the geomembrane and grounded to the earthing system underneath.



Measurements of voltage potential are measured by the floating dipole in two dimensions as the device moves throughout the contained medium. The data is recorded with high clarity using a sophisticated GPS mapping system in real time as the survey occurs. Once complete, the data is fully analysed, refined and mapped onto a three dimensional contour graph, giving exact locations and expected severity of any concerns identified. This allows full provision of quality assurance documentation to the client and additional survey oversight for full confidence of the installation integrity.

SUMMARY

The Geotest GPS Floating remote dipole can be used in circumstances where a contained material cannot be removed for testing purposes being contaminated or a toxic substance. This survey technology provides an option to clients that are faced with geomembrane integrity concerns for an installation that is currently in service. By using the GPS remote system, full confidence can be obtained for suspect areas with visual representation of the anomalies mapped in three dimension for analysis.

DIPOLE TESTING METHOD

The Dipole Testing Method is used with earthen or water covered geomembranes, typically to verify that an installation has not been damaged during the backfilling process. This method has a sensitivity of 6.4mm in diameter for soil covered geomembranes and 1.4mm in diameter for water covered geomembranes.



METHOD

For an earthen covered geomembrane, the survey area is required to be electrically isolated from the surrounding earth. Ideally an isolation trench should surround the testing area, with the geomembrane exposed. Before the survey can be carried out conductive objects such as metal sump pipes, access roads and standing water are required to be removed.

For a water covered geomembrane, conductive objects are similarly required to be isolated in the installation as these will provide false readings. The electrical conductivity of the water must also be known to calibrate sensitivity levels for the survey meter.

A high voltage DC power source is applied to the medium above the geomembrane and grounded to the conductive surface underneath. Measurements of voltage potential are taken using a dipole probe in a grid pattern throughout the surface of the survey area. Void locations can be pinpointed by a characteristic sine wave pattern in the voltage field across the location of a leak. Data collection and voltage mapping are often used with this method to provide quality assurance documentation and additional survey oversight.

Several Dipole types may be used to survey the installation depending on site specific conditions, these include specialist testing probes for highly conductive covering materials, remote GPS survey technology for geomembranes that are not easily accessible by an operator and multi-dimensional testing dipoles.

SUMMARY

The sensitivity of the Dipole Survey Method is highly dependent on site conditions such as the moisture content, depth and mineralogy of the cover material for soil-covered geomembranes and the electrical conductivity of solution-covered geomembranes. The dipole survey method is the only method that can be used to confirm integrity of an installation after being covered by materials.