ENSURING LEAK-PROOF RESERVOIRS WITH GEOELECTRICAL LEAK DETECTION SURVEYS ON EXPOSED OR COVERED GEOMEMBRANES

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WHAT IS ELL?

- Basically, an electrical leak location is comprised of several methods to verify 100% of the integrity of an installed geomembrane. It is also the only way to detect damage after the installation of the drainage/protection layer.

WHAT ARE ELL OBJECTIVES?

- Detect and locate damage in an installed geomembrane (exposed or covered)
- Locate damage in order to facilitate repair, as opposed to a conventional Head Pressure Test
- Validate the performance of the installer and contractor, and isolate responsibility of the installer and general contractor
- Ensure site design was adequate, including the types of geosynthetics, construction methods, and natural materials specified in the design
- Lower leakage risks (contamination, loss of valuable product)
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WHAT ABOUT QC (QUALITY-CONTROL) OR CQA (CONSTRUCTION QUALITY ASSURANCE)

- Quality Control (QC): Internal quality verification by the liner installer
- Construction Quality Assurance (CQA): Third-party verification that specifications have been followed, double-checking the following specific elements:
  - Efforts focused on seams in both cases
  - Only applicable on exposed geomembranes
  - ELL can be part of CQA as an additional way of reducing leakage risks

ASTM-D7002: WATER PUDDLE

Ensuring leak-proof reservoirs with geoelectrical leak detection surveys on exposed or covered geomembranes
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WATER PUDDLE: TYPICAL LEAKS

Special sessions on Geosynthetics, ICID Conference in Marrakech, November 25, 2021

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ASTM-D7007: DIPOLE

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WATER PUDDLE: STATISTICS

- 1,030 leaks detected over 10 years of surveys, ranging from 1 mm² to 400 cm²
- Average of 5.38 leaks/hectare on HDPE, PVC, and bituminous geomembranes
- 11 out of 76 projects had more than 20 leaks/hectare
- Out of 40 projects that had constant third-party CQA on-site, 37 had leaks

DIPOLE: STATISTICS

- 931 leaks detected over 10 years of surveys, ranging from 1 mm² to 240 m²
- Average of 4.46 leaks/hectare on HDPE, PVC, and bituminous geomembranes
- 13 out of 90 projects had more than 20 leaks/hectare
- Out of 47 projects that had constant third-party CQA on-site, 22 had leaks
- More than a third of the projects showing defects had at least one large leak (>50 cm²)
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CONCLUSION

* Only two (2) of the several ELL methods were presented in this paper. It is possible to refer to ASTM D6747 for a guide of all standardized methods
* The use of exposed and covered ELL can locate pretty much any damage done during transportation, storage and construction
* For the long term efficiency, CQA is a major factor (durability of seams)
* If there are problems with a lined work once it is in service, it is often possible to do a dipole survey if the material layer above the geomembrane is not too thick (technically < 1m)

THANK YOU

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