Deep Water Leak Location Survey – Highly Sensitive and Very Effective

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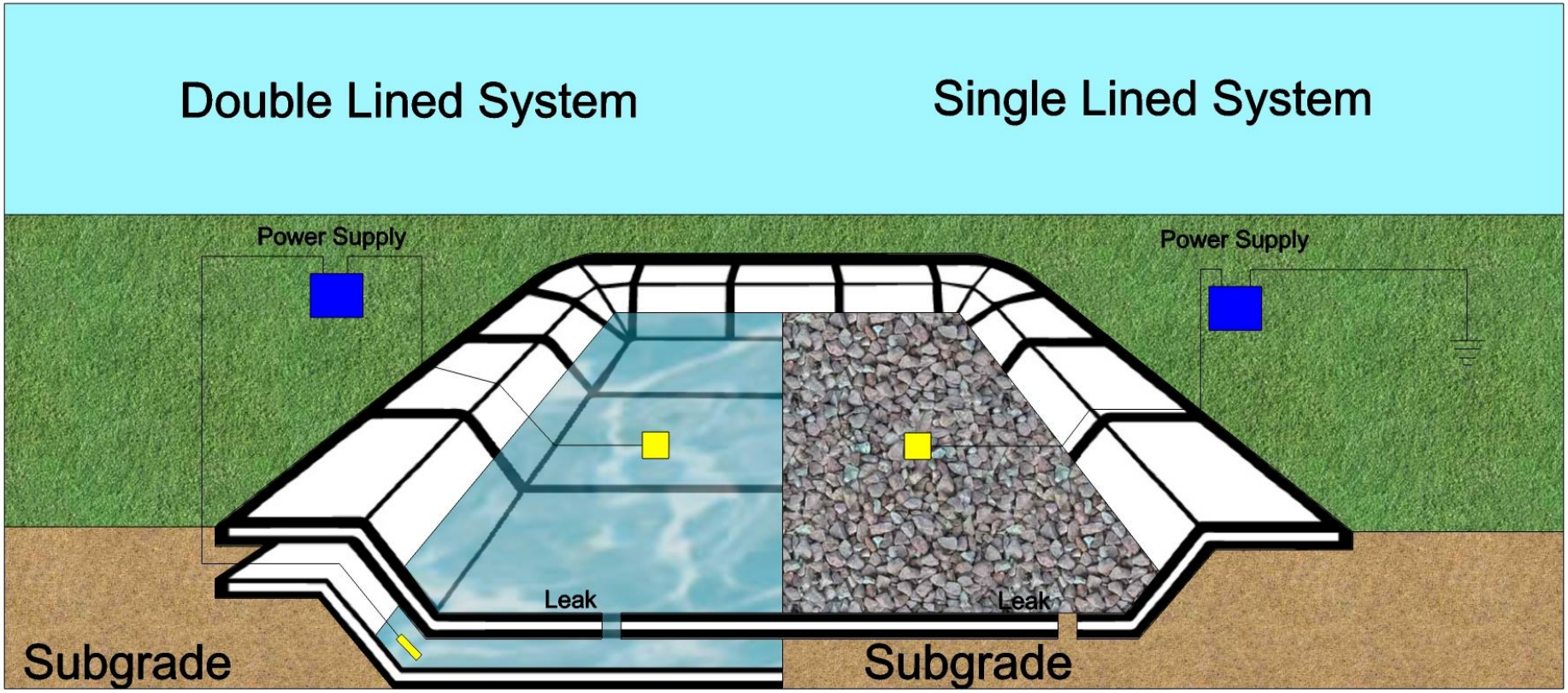
Basics of the Technology



Hazardous or Over 30” Deep

Deep Water Method – In Action

Typical Facilities Benefiting from Deep Water Surveys

- Wastewater
- Power Plants
- Landfills
- Mining
- Agriculture
- Process Ponds
- Oil – Frac Ponds
- Golf Courses
- Decorative Ponds
- Anything Too Deep/Hazardous

Covered Survey Method (ASTM D7007)

Types of Surveys

- Wading or Shallow Water Survey
- **Deep Water Survey**
- Survey of vertical walls
- Survey of sumps and vaults

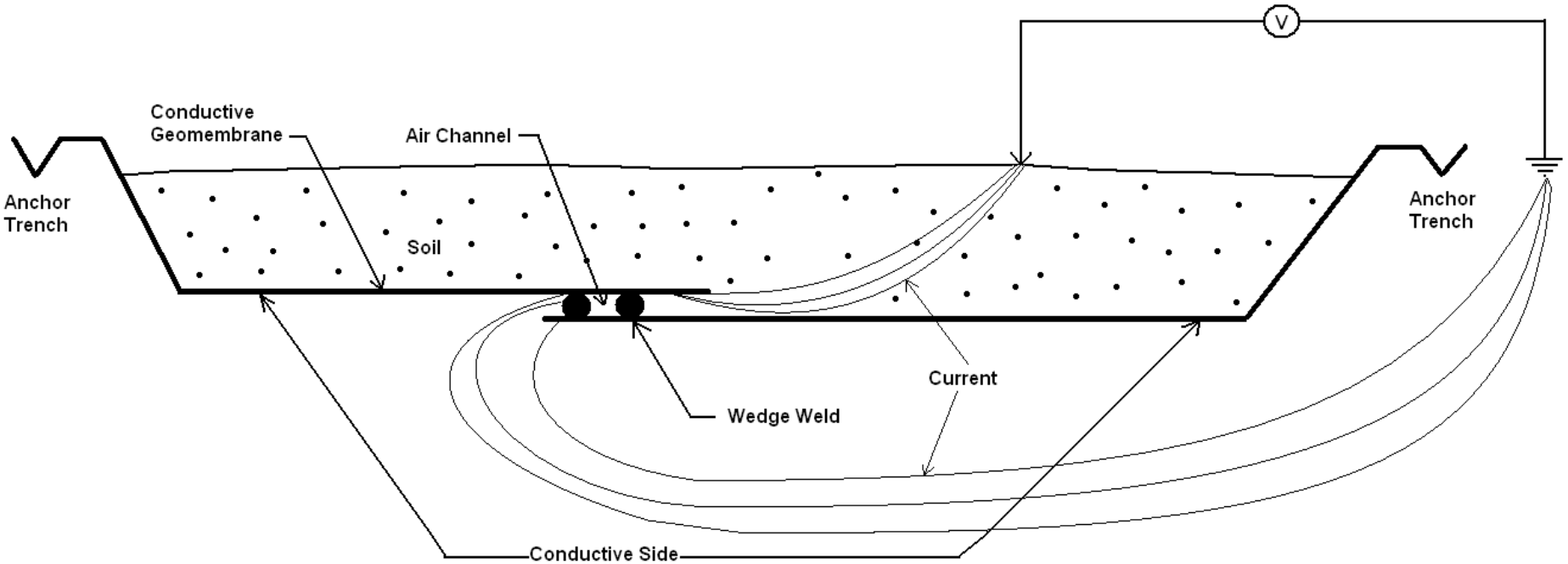
What can be tested?

- Only the area covered with water can be tested using the Deep Water survey method.
- Can be single or double lined.
- If double lined, what needs to be between the liners?
  - Water
  - Soil
  - GCL
  - Conductive Geotextile or Liner

What cannot be tested?

- Conductive Liner that is not welded properly.
- Unlined ponds. (Clay lined does not work.)
- Liner on top of liner without anything between. (Unless bottom liner has plenty of holes in it.)

Conductive Liner?



Preparation for Deep Water Surveys

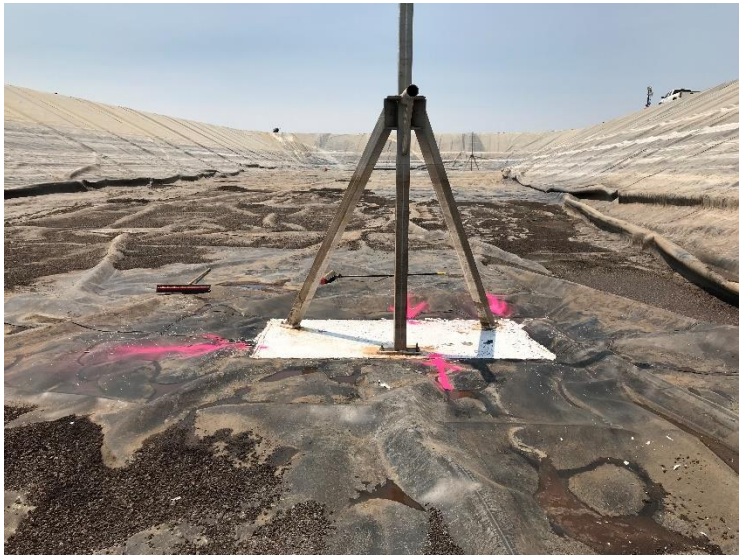
Potential Issues with Preparation

- Lack of bare geomembrane border around survey area
- Too much sediment
- Large grounding sources – aerators, etc.
- Pumphouses
- Steel piping
- Water filled PVC or HDPE risers or pipes
- Concrete pads perforating the geomembrane
- Electrified leachate pumps in landfills

Perimeter Isolation

No Isolation – No Bare Liner

Grounding Examples

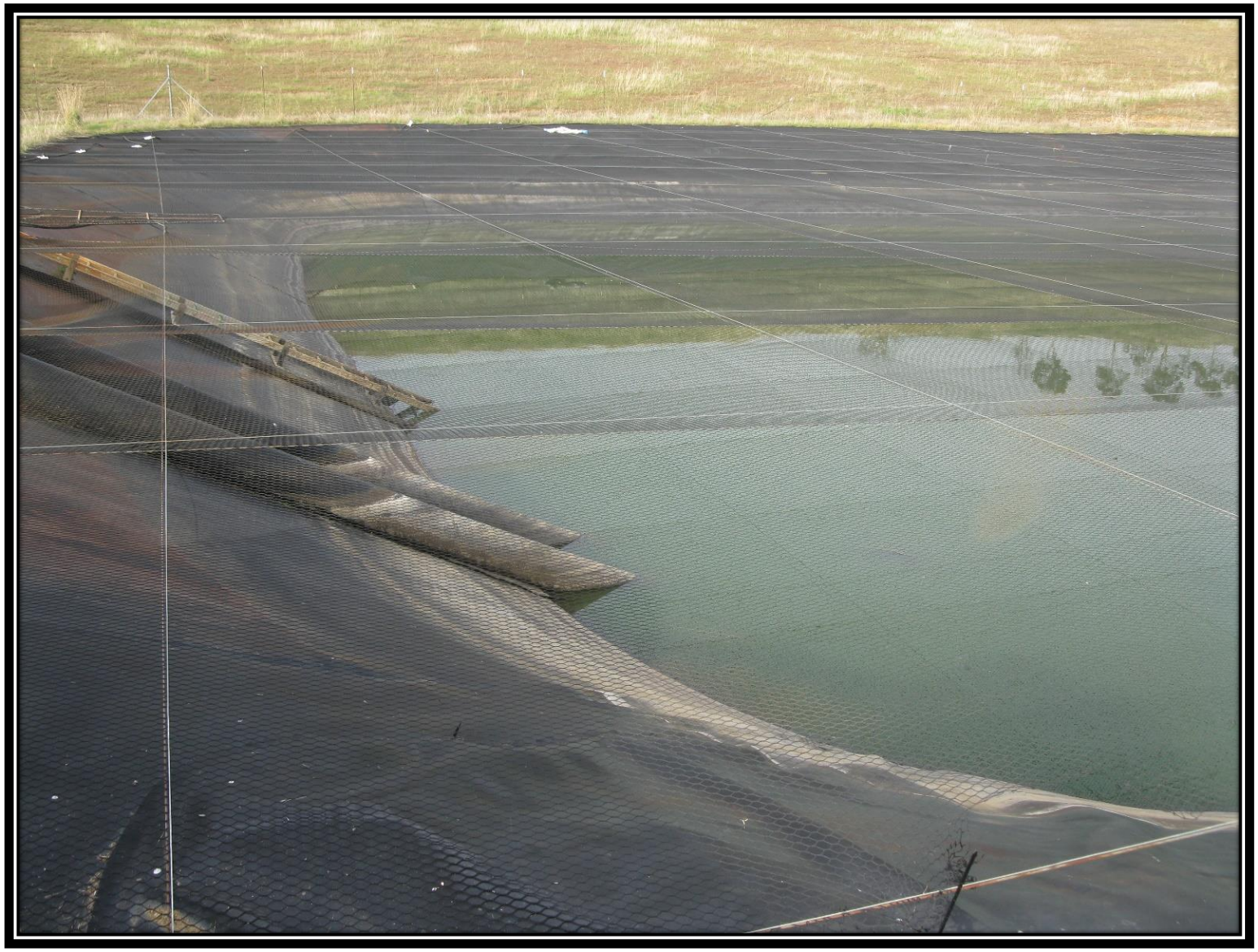


Fully Grounded

Too many in the way of the survey.

Vegetation – Not Ideal

Netting – Not Ideal



Ice is a Problem

Deep Water Survey Conditions- Ideal

Deep Water Surveys

Advantages

- Performed under hydrostatic load
- Locates tortuous leak paths in seams and patches
- Most sensitive method for locating smallest leaks
- Can be used for in-service impoundments

Limitations

- Only the portion of the geomembrane that is underwater can be tested.

Preparations Essential for Optimal Results

- Proper Isolation
- Adequate Moisture in Conductive Layers
- Proper Survey Grid Spacing
- Proper Temperature – Above Freezing
- Removal of Compromising Elements Including Sediment

Designed and Built for Leak Testing

- Conductive Elements Under Layers to be Tested
- Continuity of Ground Path
- Possible Steep Slope Solutions – Conductive Liners and Conductive Geotextiles
- Proper Welding of Conductive Geomembranes (If used)
- Isolation of Cell Structures / Limiting Perforations

Time Comparison of Various Survey Types

- Bare Liner Surveys – 3.5 to 5 acres/man/day
- Wading or Shallow Water Surveys – 2.75 Acres/Man/Day
- **Deep Water** (30” + depth) Surveys – 2.5 Acres/Man/Day
- Soil Surveys – Average of 3.0 to 5 Acres/Man/Day Depending on Sensitivity

Cost Comparison of Various Survey Types

- Bare Liner Surveys – 10 acres (baseline) 1.00
- Wading (Shallow Water) Surveys - x 1.17
- **Deep Water** (30” + depth) Surveys x 1.21
- Soil Surveys – Depending on Sensitivity x 1.04 to 1.29

Typically, Leak Location Surveys Comprise Less Than .5 – 1.0% of the Total Cost of a Project (ex. – Project Cost of $10,000,000 x .005 = $50,000 (CHEAP INSURANCE!)

Questions?

Thank You For Attending!

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Designing Double Lined Containment Systems Using Flexible Geomembranes

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1.0 PDH

Presenters:

Brian Fraser, Layfield

Matthew Kemnitz, Leak Location Services

Rohit Sati, Layfield

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