EIA Geomembrane Sustainability through Longevity – 42 plus years of Continuous Service

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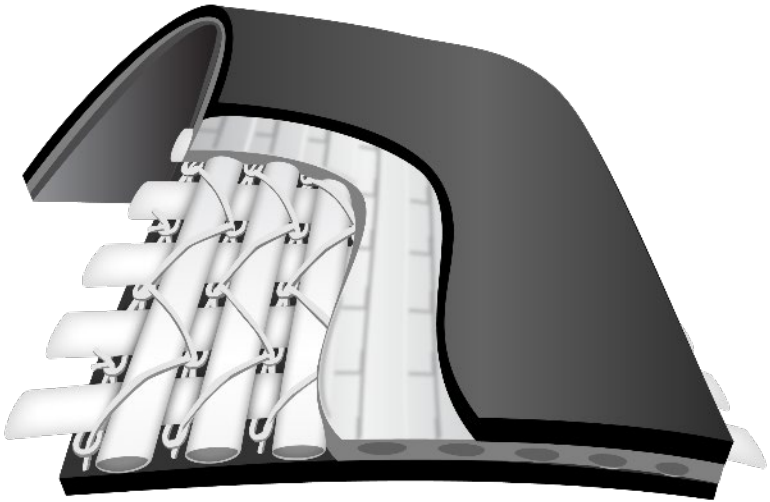
ASCE and its members are dedicated to ensuring a sustainable future in which human society has the capacity and opportunity to maintain and improve its quality of life indefinitely, without degrading the quantity, quality, or the availability of natural, economic, and social resources.

EIA Geomembranes

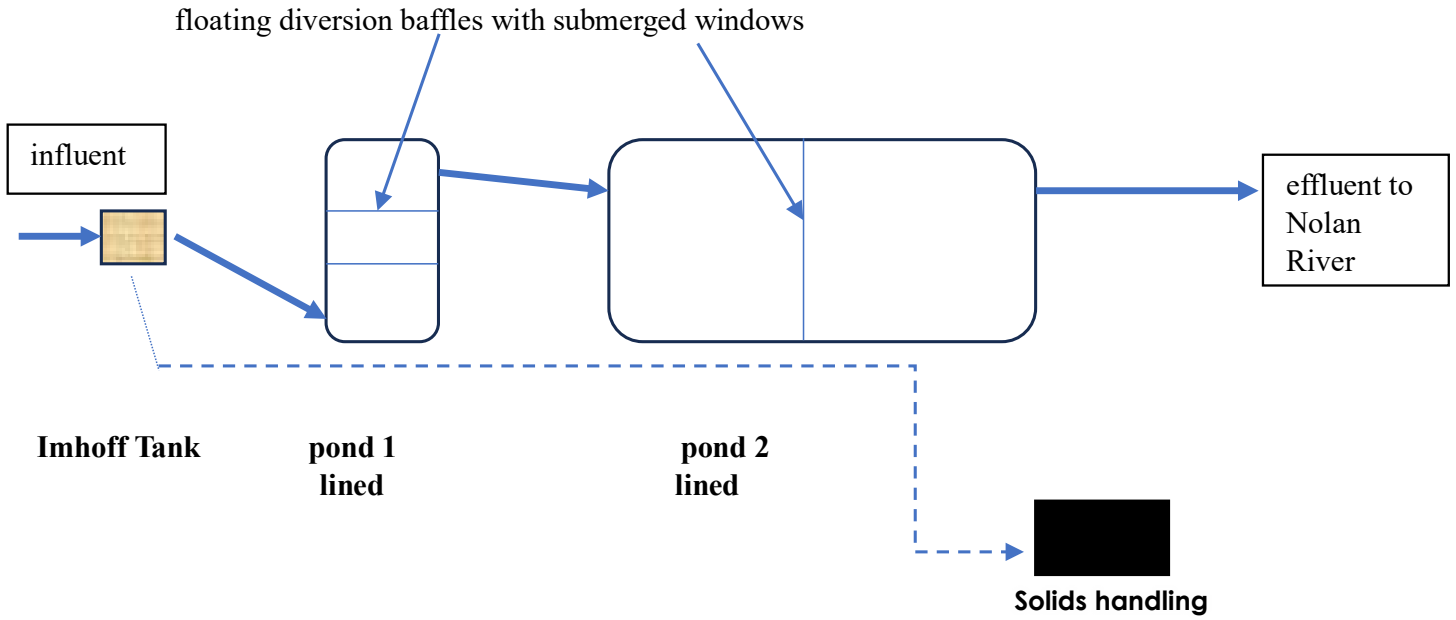
- First Commercial product introduced in 1970's.
- Preceeded by geomembranes lacking weathering and chemical Resistance.
- Pioneer EIA's formulated to specifically have long term outdoor exposure and high chemical resistance.
- Manufactured primarily as a reinforced, coated fabric product.
- Same formulation currently in service worldwide.



EIA Geomembranes

- One of the Oldest installations of (EIA) geomembrane
- Great Onyx Job Corps Center, Mammoth Cave, Kentucky USA
- Pond based wastewater treatment system
- Installed in 1984
- Continuous operation

1984 WWTP Expansion



Mammoth Cave National Park

Impoundments

- Pond 1: 100'x 200' (30 m x 61m)
- Pond 2: 300'x200' (91m x 61m)
- Elevated berms, approx 10' 3 m) depth
- 3:1 slopes
- Submerged inlets, overflow effluent structures
- Optional Bypass lines
- Discharge to tributary of Kentucky's Green River

Mammoth Cave National Park

Geomembrane

- Geomembrane; 30mil Reinforced EIA
- Field panels approx. 15,000 SF (1,400 sm)
- Field seams hot air welded
- Perimeter trench anchoring
- Exposed geomembrane, no cover
- Seam layout independent of slope direction

Mammoth Cave National Park

Post Installation

- Next 39 years operational with no significant events.
- Water level seasonally modified as storage/discharge occurred.
- Minimal facility maintenance with exposed geomembrane.
- Perimeter edges protected.

2016 Geomembrane Evaluation

Geomembrane sampling

- 32nd year of operation
- Field sample retrieved
- Top of slope facing north, pond 2, sheet sample

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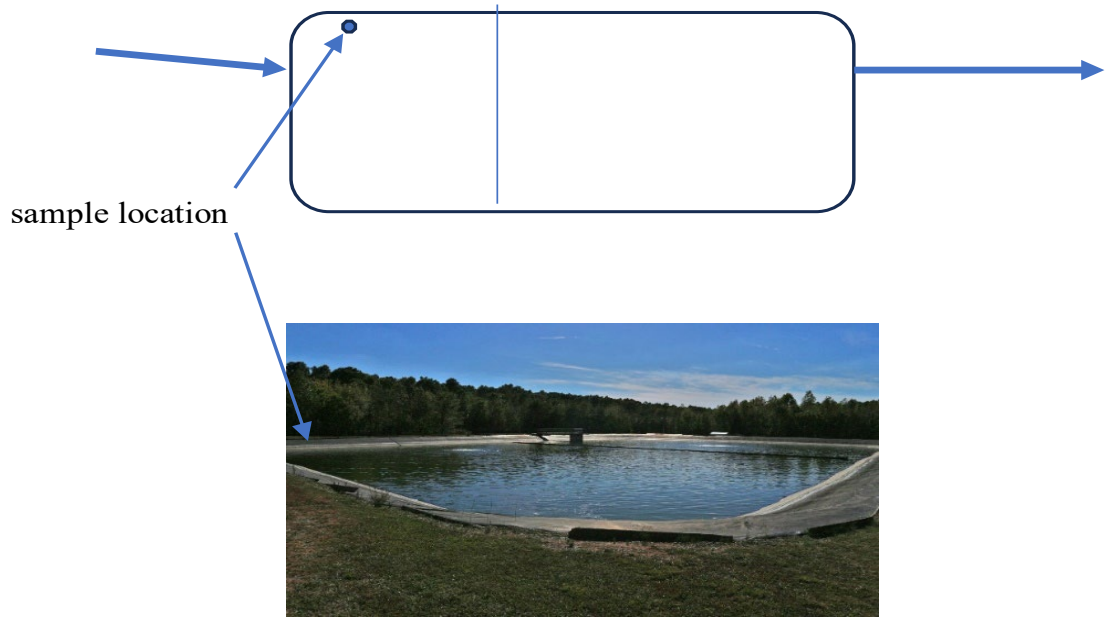
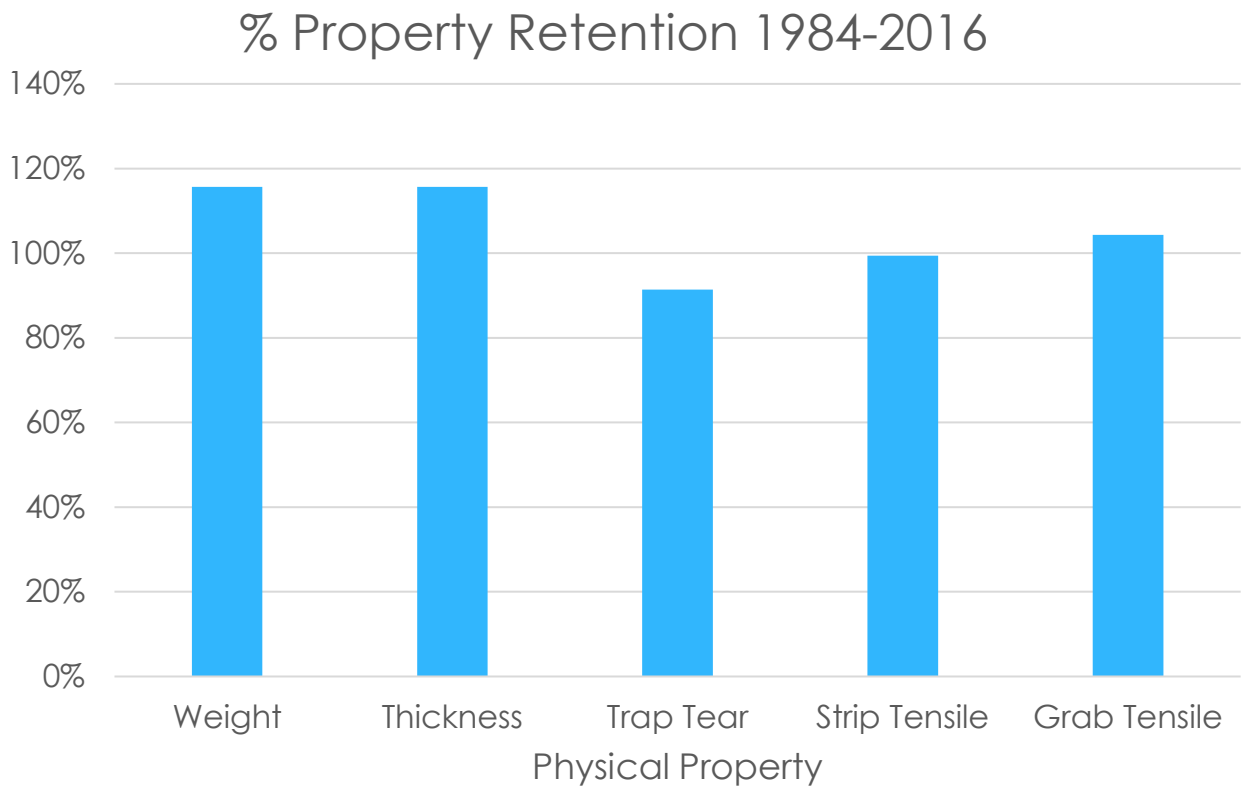


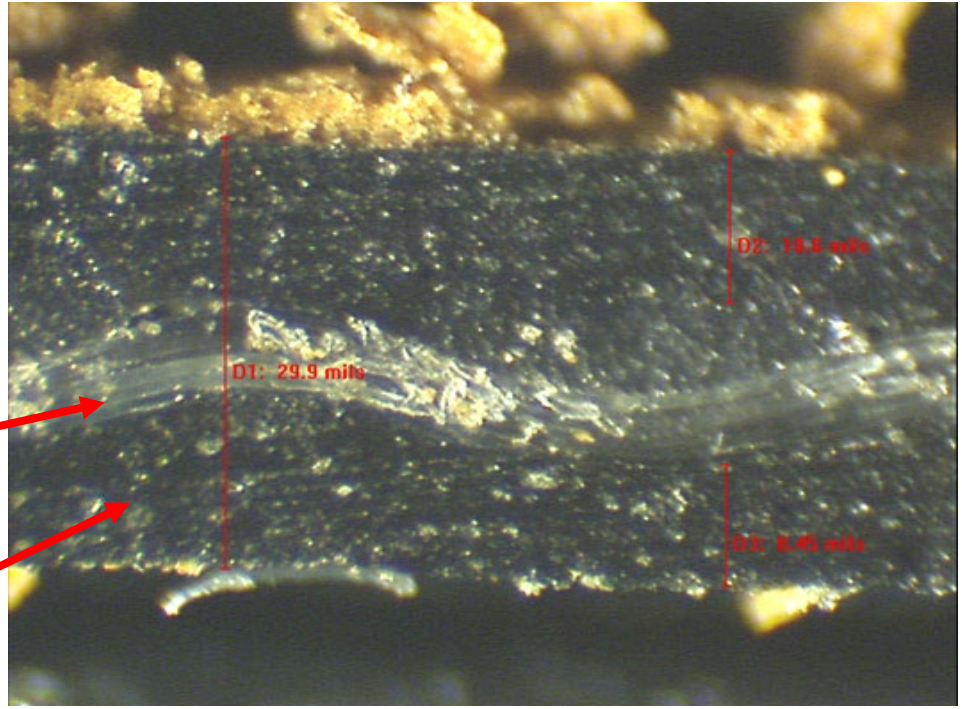
2016 Geomembrane Evaluation



2016 Geomembrane Evaluation

Geomembrane Testing

- Physical properties retained
- Inspection of geomembrane below water level showed no distressed or damaged areas. No evidence of leaks



50X magnification

Geomembrane Sustainability

42 years of Longevity at Mammoth Cave

Chemical/Environmental Resistance

- Broad Chemical Resistance
- UV Resistance, Low CTE

Survivability

- Physical properties: Yield Tensile, Seam Strength = Sheet, Puncture
- Prefabrication: Optimal layout

Mammoth Cave National Park

Pond 1

Pond 2

1984

2024

Geomembrane Sustainability through Longevity – 42 Plus years of Continuous Service

Thank you!

Chris Knirk