KENNEC

TDA IN LANDFILL SYSTEMS

Use of TDA in Landfills

- Protective Cover Material (above Typical LCRS)
- Landfill Gas Pipe Protection
- Landfill Bio-Reactor System
- Drainage Layers in Landfill Covers
- Landfill Gas Extraction Trenches
- Daily and Intermediate Alternative Cover

KENNEC

Why use TDA for Landfill Gas Systems?

- High Permeability/Free Draining
- Cost savings
- Recycling (100 Tires = 1.5 cy)

KENNEC

What is Type A TDA?

Type A TDA – Typical, Three inch minus,

- 1 Ton = 1.4 cubic yards
- 1 Ton = 100 tires (PTE)
- In Place Density = 45-58 lb/ft^3
- Permeability › 1 cm/sec for many applications

Uses – Drainage material, septic leach fields, Vibrations dampening layers under light rail tracks. Gas collection media, Leachate collection material

KENNEC

What is Type B TDA?

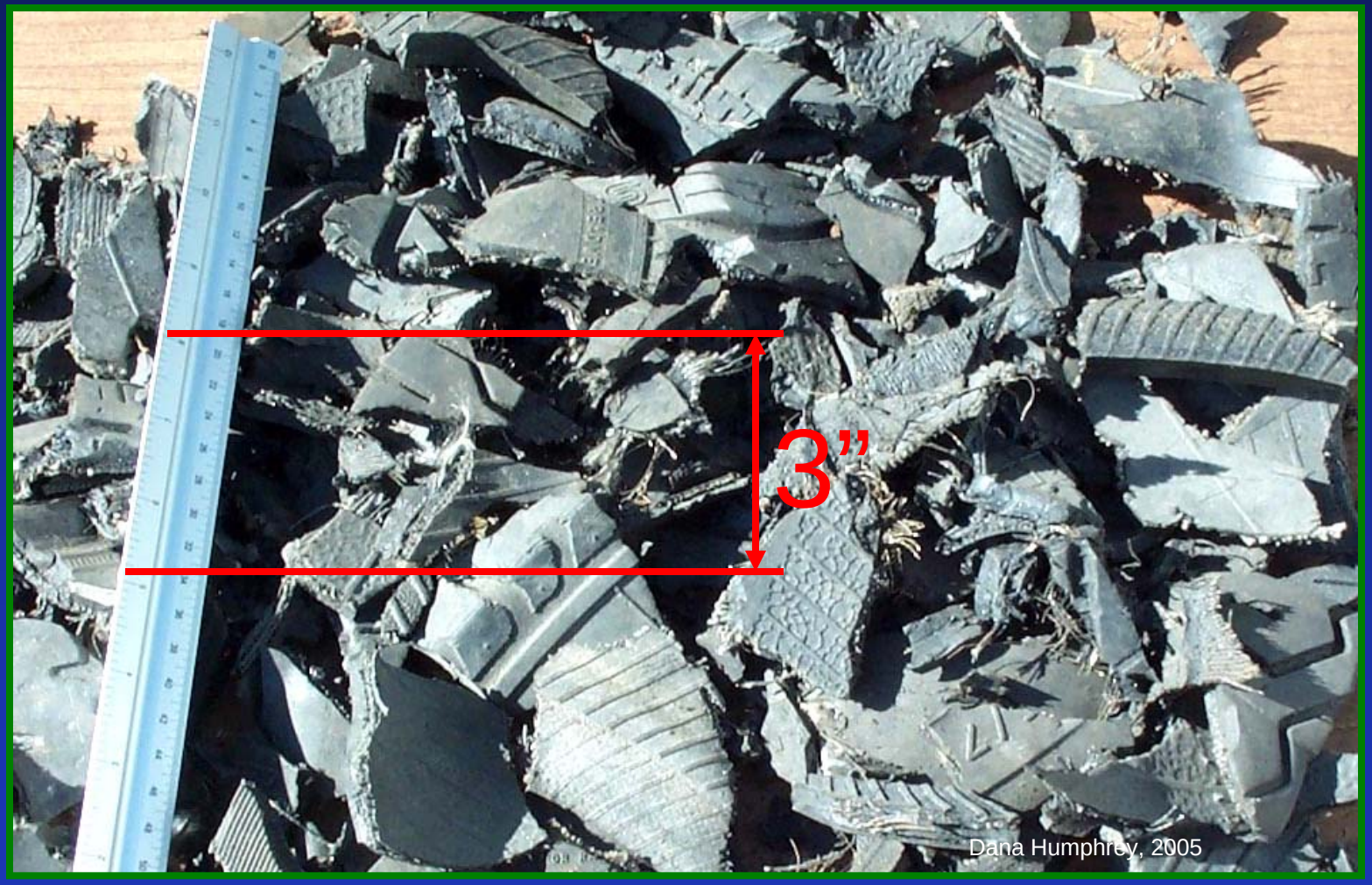
Type B TDA – Typical, 12 inch minus,

- 1 Ton = 1.5 cubic yards
- 1 Ton = 100 tires (PTE)
- In Place Density = 45-50 lb/ft^3
- Permeability › 1 cm/sec for many applications

Uses – Lightweight fill for embankments, Lightweight fill behind retaining walls, Gas collection media, Leachate collection material

KENNEC

Size of TDA

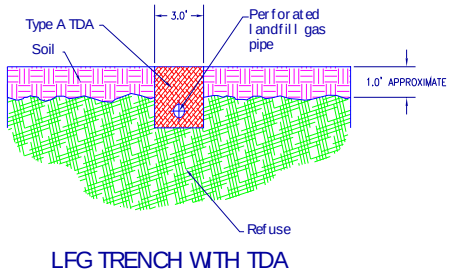


Where can you use TDA in a Landfill Gas System?

- Landfill Gas Collection Trenches, Replace Gravel Type A TDA
- Gas Collection System, Trench-less Type B TDA
- Gas Collection System, Pipe Protection, Type B TDA
- Gas Collection System, Gas Sump, Protective Cover Material (PCM), Type B TDA

KENNEC

Landfill Gas Collection Trenches, Replace Gravel w/Type A TDA



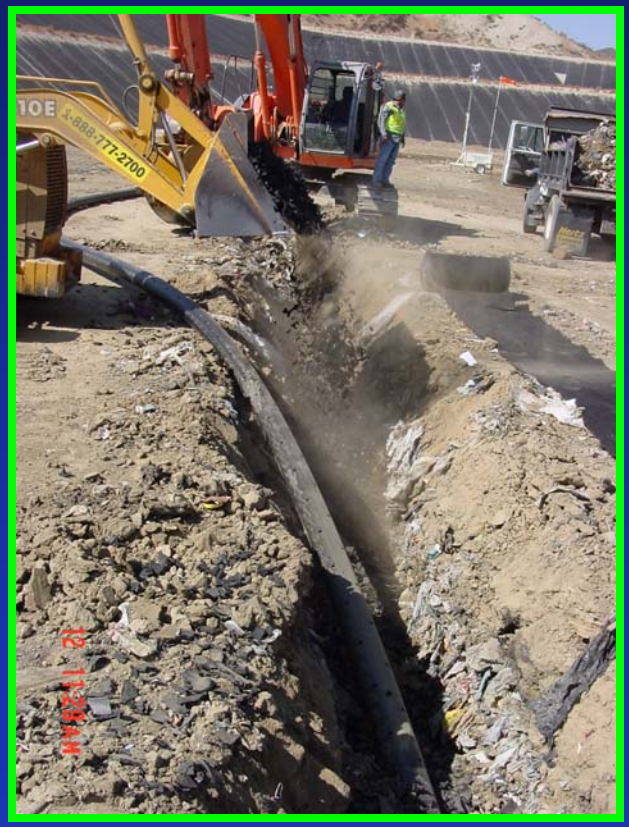
LFG TRENCH WITH TDA

- Type A for Gravel Replacement
- Oversize Auger for Vertical Wells
- Geo-textile separator between TDA and Soil or Fine Material

KENNEC

LFG TDA Trenches Typical Construction

- Typical excavation & relocation of refuse
- Typical equipment, End Dump, Excavator, Skip loader, Air monitor



KENNEC

LFG TDA Trenches
Typical Construction

- Remove refuse/soil place pipe bedding, place pipe, cover with TDA
- Geo-textile separator between TDA and Soil or Fine Material

KENNEC

LFG TDA Trenches Typical Construction

- Geo-textile separator between TDA and Soil or Fine Material

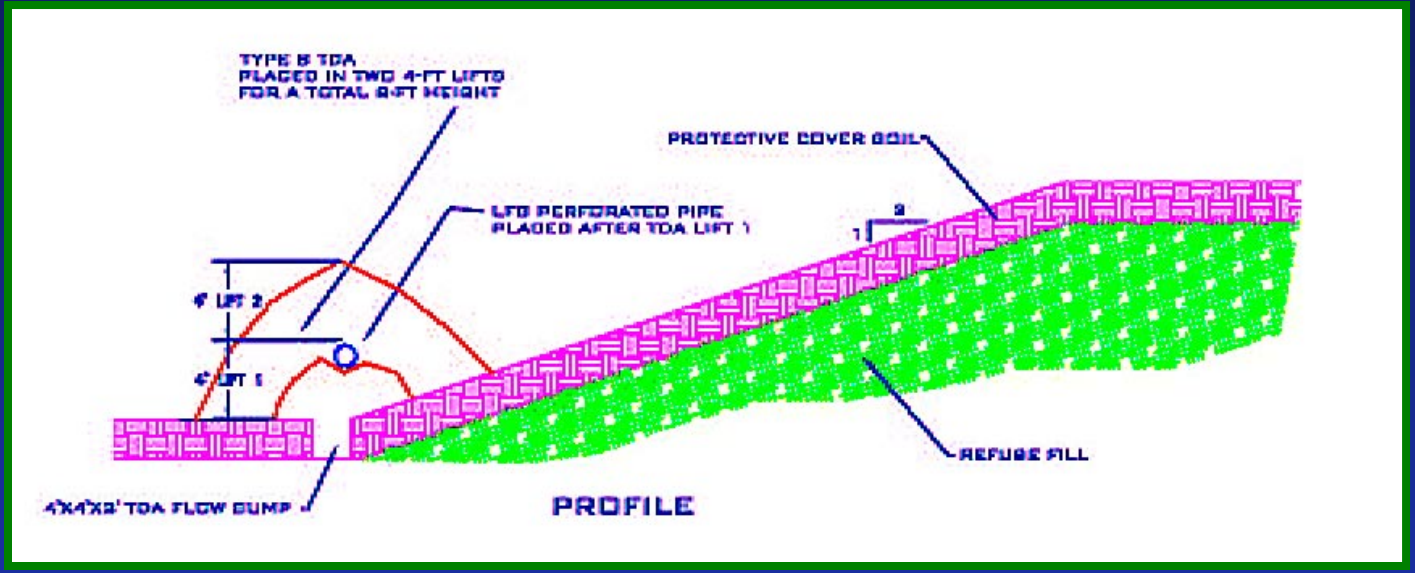
KENNEC

LFG TDA Trenches Typical Construction

- Geo-textile separator between TDA and Soil or Fine Material
- Replace cover material, fill operations as usual, draw from system when appropriate

KENNEC

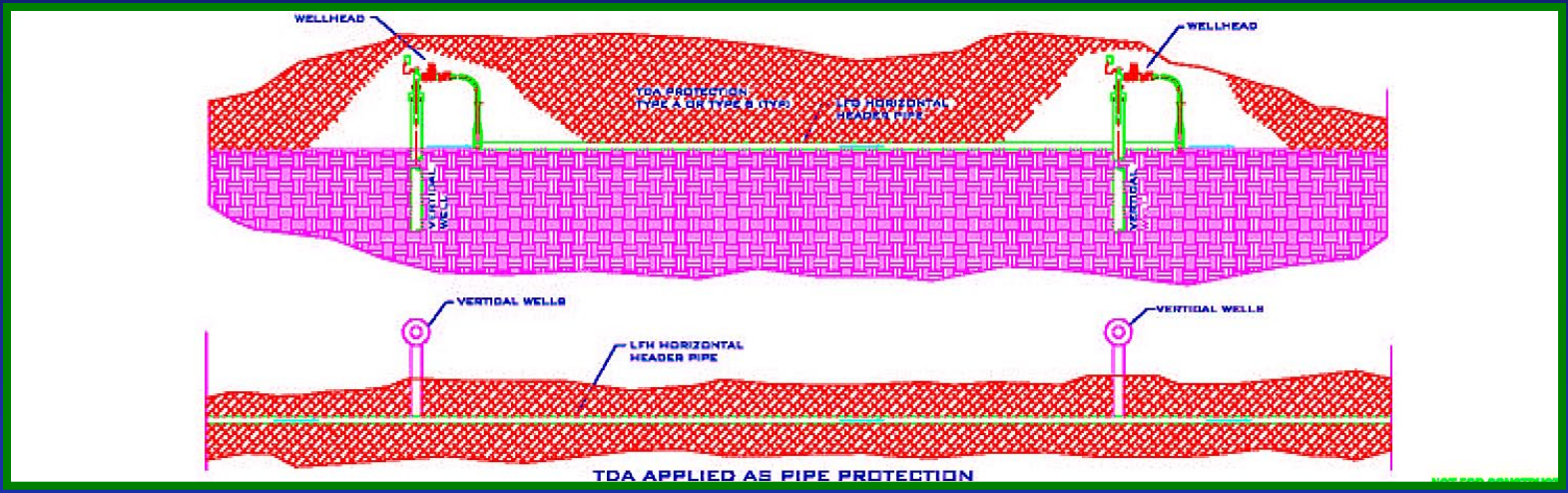
Gas Collection System, Trench-less, Type B TDA



- High Permeability
- Cost savings
- Recycling (100 Tires = 1.5 cy)

KENNEC

Gas Collection System, Pipe Protection, Type B TDA



- Header Pipe Protection
- Cost savings
- Recycling (100 Tires = 1.5 cy)

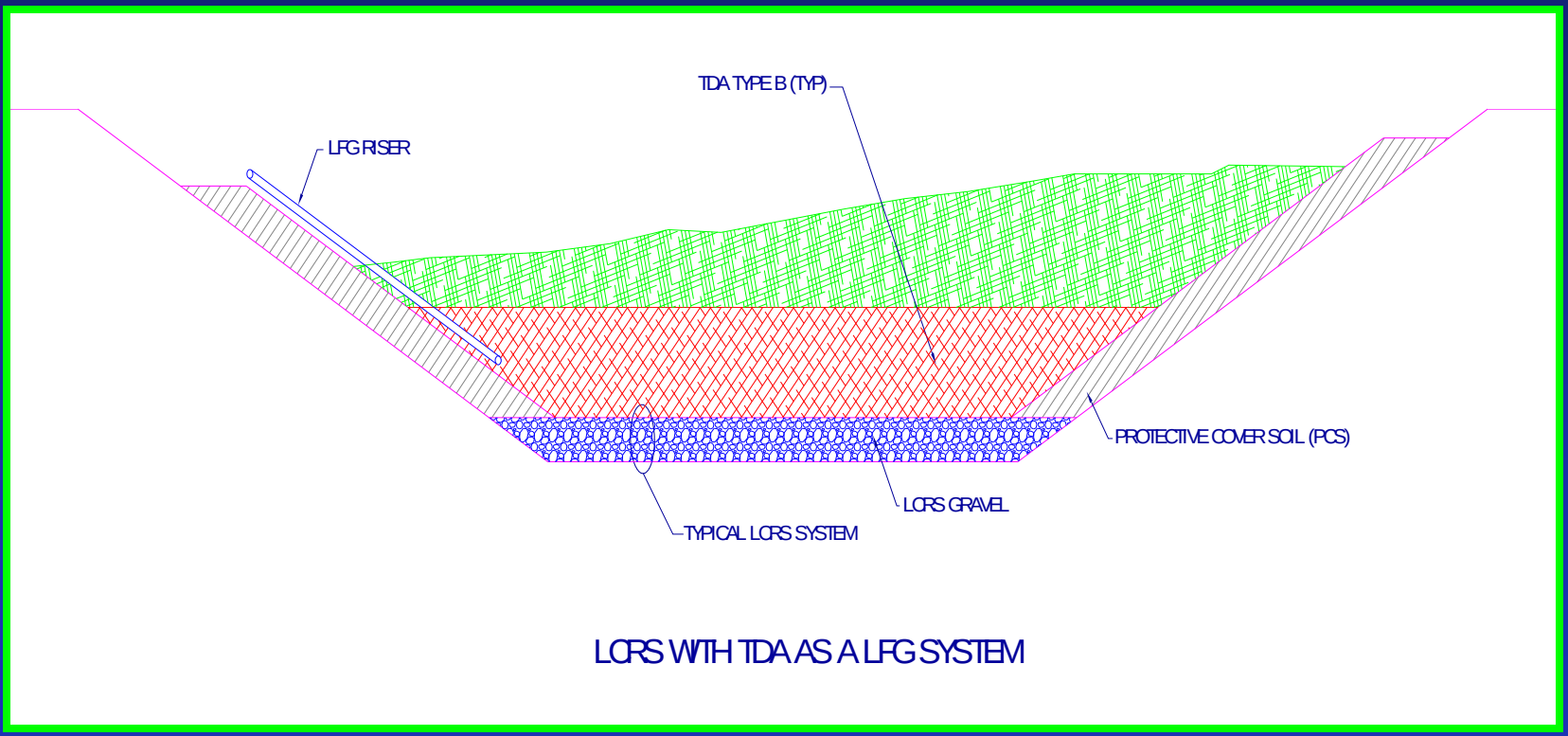
KENNEC

Gas Collection System, Pipe Protection, Type B TDA

Gas Collection System, Pipe Protection, Type B TDA

Gas Collection System, Gas Sump, Type B TDA

Gas Collection System, Protective Cover Material, Type B TDA



LCRS WITH TDA AS A LFG SYSTEM

KENNEC

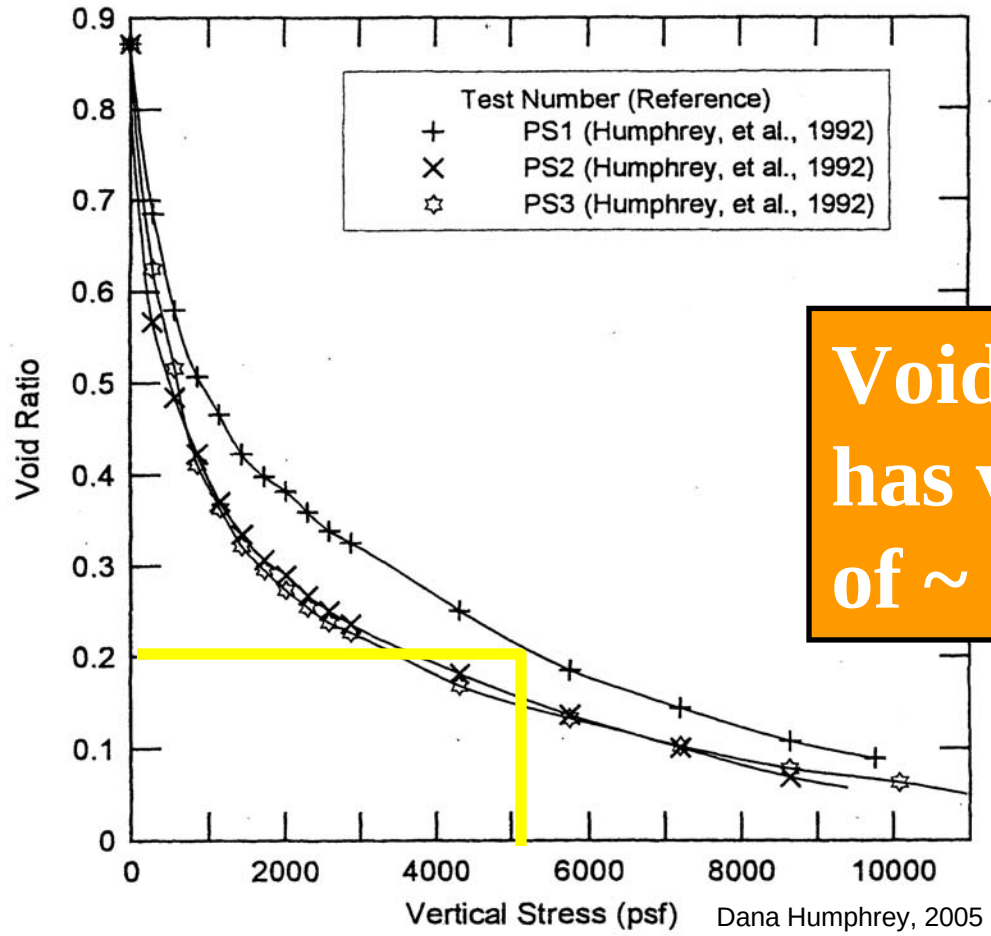
Why use TDA for landfill gas systems?

- High permeability
- Cost savings
- Recycling

  1 TON TDA = 100 TIRES = 1.5 CUBIC YARDS of Aggregate Material not removed from existing natural resource pool

KENNEC

Effect of Vertical Stress on Void Ratio

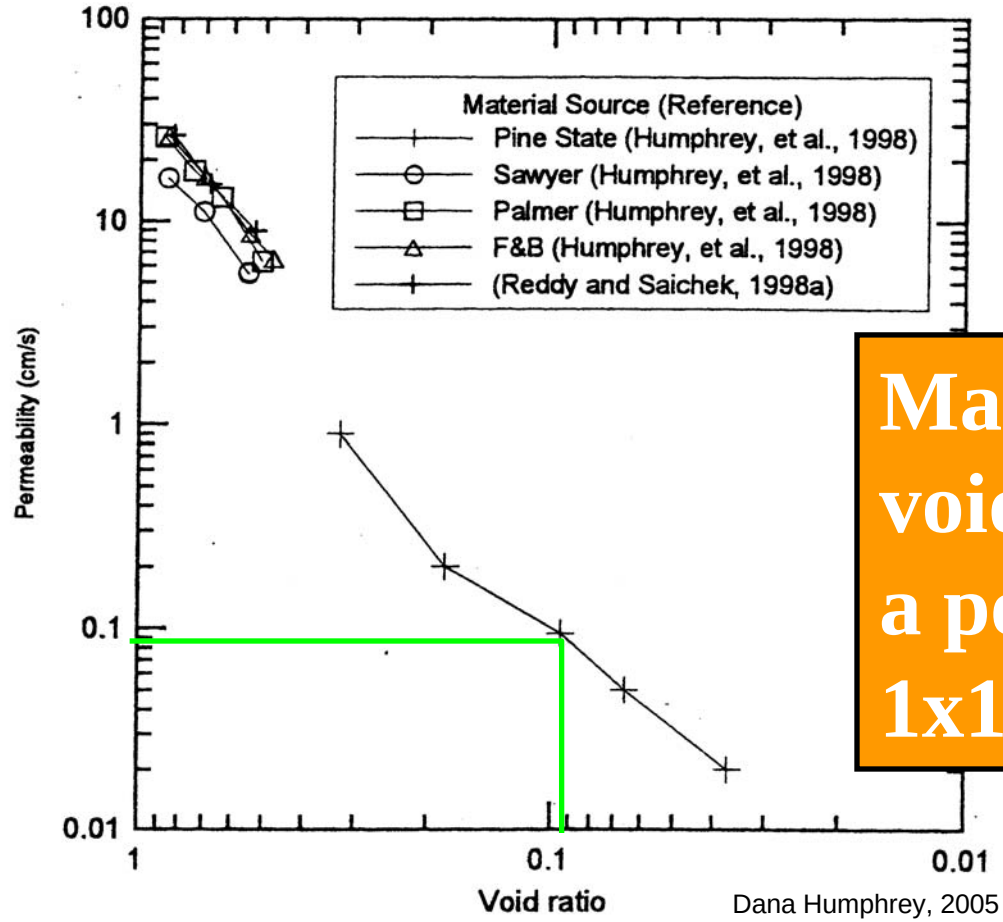


Dana Humphrey, 2005

Void ratio of 0.2 has vertical stress of ~ 5,000 psf

KENNEC

Relationship Between Permeability and Void Ratio



Dana Humphrey, 2005

Material with a void ratio of 0.2 has a permeability of $1x1^{-1}$ cm/sec

KENNEC

General Guidelines TDA LFG Applications

10 Feet vertical maximum section, multiple sections ok w/intermediate soil layer

free wire must be less than 1% by weight

Minimize Fines, Minimize Crumb Rubber

Average exposed steel on pieces less than 2”

More Information:

http://useit.umeciv.maine.edu/factsheet/fsts.htm

http://www.usetda.com (COMING SOON)

https://www.rma.org/publications/scrap%5Ftires/index.cfm?CategoryID=565

http://www.kennec.com/

KENNEC

KENNEC

TDA IN LANDFILL SYSTEMS