



WOODS-RUN CHIPS AS A ALTERNATIVE MATRIX FOR FILTER SOCKS USED AS A E&S BMP

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ASMR Conference
April 10, 2017

Obstacles to siting unconventional wells in WV

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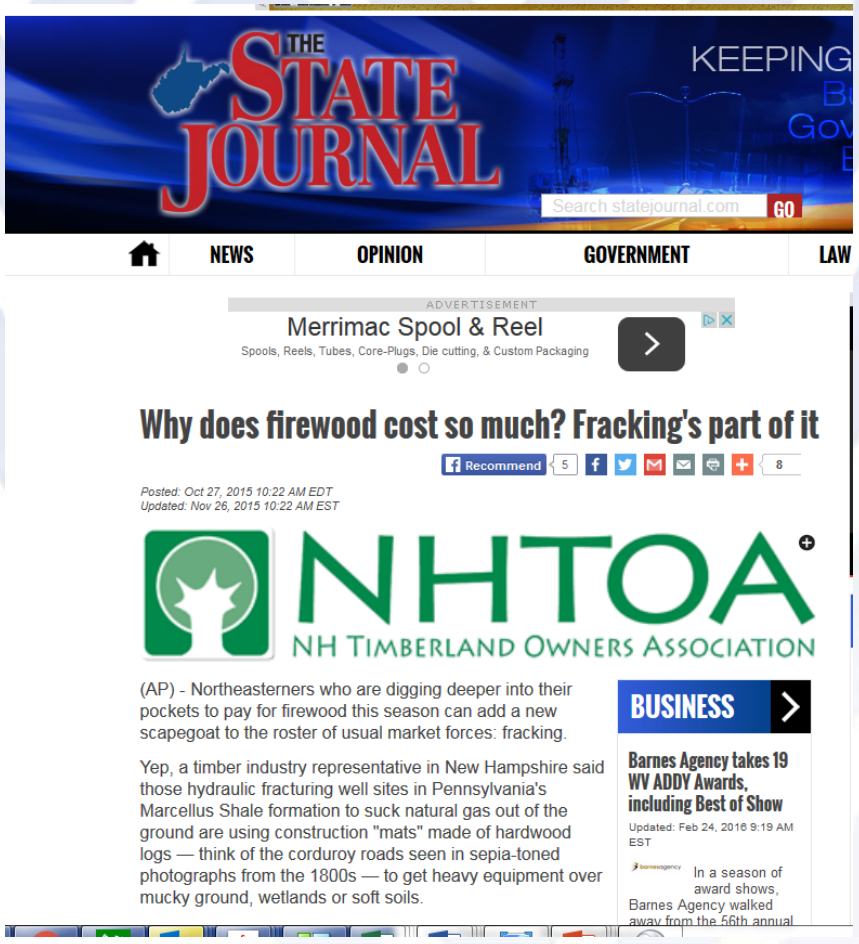
1. Public opinion – nontechnical risk
2. Terrain/Environment
   - Regulatory
     - Wetlands
     - Streams
     - Endangered Species
3. Ownership

Nontechnical risk

- Greater than risk associated with drilling and completion
- Must be cognizant of risk before siting
- Best companies understand concerns and work with local communities



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Why does firewood cost so much? Fracking's part of it

Recommend 5 8

Posted: Oct 27, 2015 10:22 AM EDT
Updated: Nov 26, 2015 10:22 AM EST

NHTOA
NH TIMBERLAND OWNERS ASSOCIATION

(AP) - Northeasterners who are digging deeper into their pockets to pay for firewood this season can add a new scapegoat to the roster of usual market forces: fracking.

Yep, a timber industry representative in New Hampshire said those hydraulic fracturing well sites in Pennsylvania's Marcellus Shale formation to suck natural gas out of the ground are using construction "mats" made of hardwood logs — think of the corduroy roads seen in sepia-toned photographs from the 1800s — to get heavy equipment over mucky ground, wetlands or soft soils.

BUSINESS

Barnes Agency takes 19 WV ADDY Awards, including Best of Show

Updated: Feb 24, 2016 9:19 AM EST

In a season of award shows, Barnes Agency walked away from the 56th annual

Terrain

- Narrow ridges
- Steep slopes
- Soil prone to slipping
- Surface water
- Coal development

Planning…

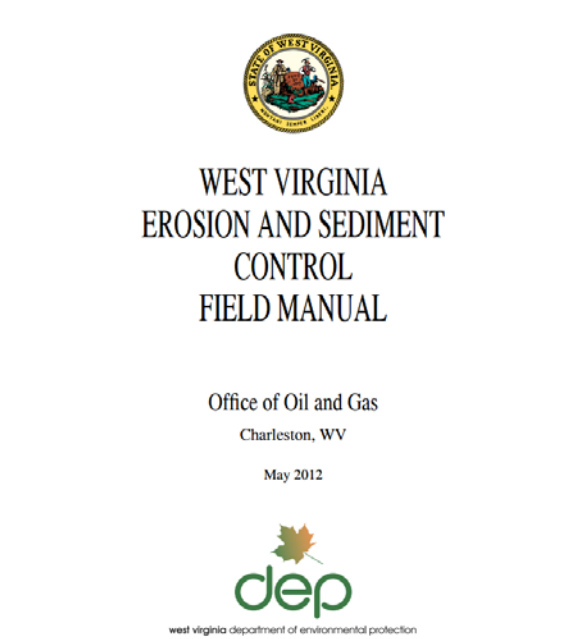
- WV – 2011 HWA
- Can not impound streams, discharge into streams, fill or discharge into wetlands
- WV DEP and Federal EPA
- ***Must also follow erosion and sediment control regulations***
- Historical and Cultural Sites
- Floodplain
- Warm and Coldwater streams
- USFWS
- Others…

WV E&S Manual – May 2012

- http://www.dep.wv.gov/oil-and-gas/Documents/Erosion%20Manual%2004.pdf
- purpose is to present the best management practices (BMPs) for controlling erosion and sedimentation from soil-disturbing operations conducted during oil and gas industry activities in the state of West Virginia.
- As outlined in West Virginia State Code 22-6-6(d) 22-6A-7(c), an E & S control plan shall accompany each application for a well work permit

WV E&S

- Five Sections
  - Planning
  - Construction
  - Reclamation
  - Revegetation
  - Maintenance

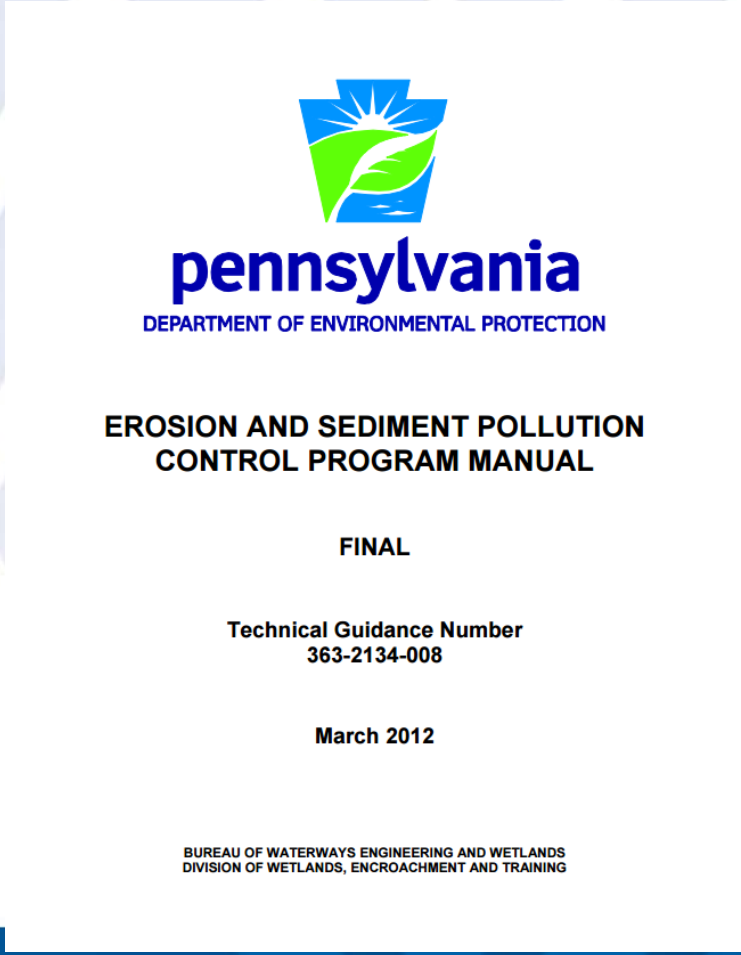


WV – Sediment Control Barriers

- Vegetative Filter Strip
- Silt Fences
- Brush Barrier
- Temporary Earth or Rock Barrier
- Sediment Trap or Basin
- *Compost filter socks*
- Straw Bales

PA E&S BMPS

- Earth moving activities related to siting, drilling, completing, producing, servicing and plugging wells
- Must follow BMPs for oil and gas well operations


pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

EROSION AND SEDIMENT POLLUTION CONTROL PROGRAM MANUAL

FINAL

Technical Guidance Number
363-2134-008

March 2012

BUREAU OF WATERWAYS ENGINEERING AND WETLANDS
DIVISION OF WETLANDS, ENCROACHMENT AND TRAINING

PA BMPS - COMPOST

- “should be a well decomposed, weed free organic matter derived from agriculture, food, stump grindings, and yard or wood/bark organic matter sources”
- Compost should be aerobically composted, possess no objectionable odors and should be reasonably free (<1% by dry weight) of man made matter.
- Compost should not resemble the raw material from which it was derived. Wood and bark chips, ground construction debris or reprocessed wood products are not acceptable as the organic component of the mix.

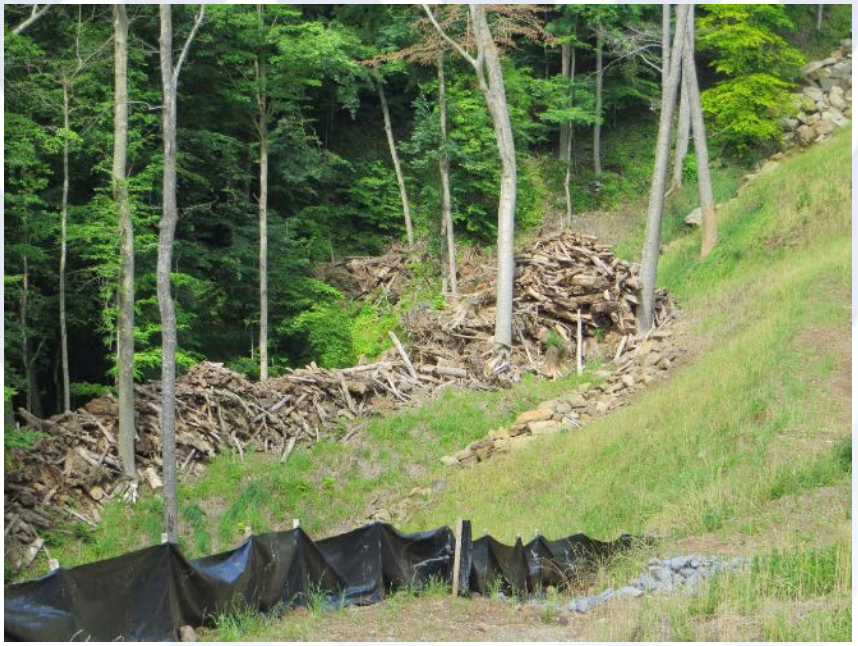
So is compost an issue?

How much sock?

- On average:
  - 587 cubic yards needed per site
  - 5.87 truckloads

Based on sample of 35 as constructed well sites in WV/PA

Do we have wood fiber available?



Objectives

- determine if differences exist in physical size class, pH, moisture content of particles contained in composted versus woods-run materials.
- evaluate differences in water filtration, solids removal, and effluent characteristics of composted versus woods-run materials

Methods

- Procured filter sock material from vendors
  - 3 ‘certified’ composted sock
  - 4 ‘certified’ woods run sock
- 4 socks made from each vendor – 28 total
- Socks all built using same auger filler mounted on skid steer loader

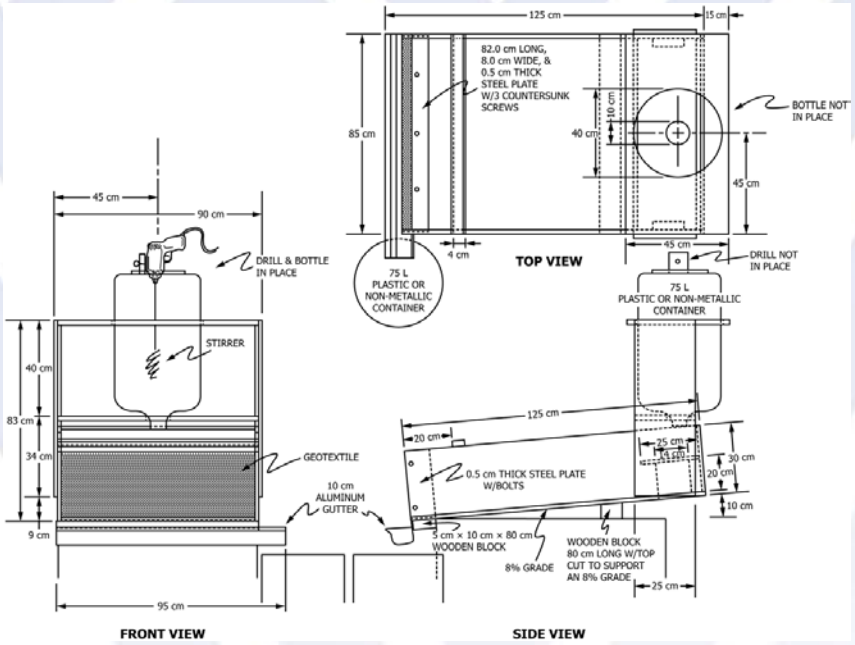
Size Characteristics

- 1 sock/material was sacrificed for size class/MC/pH testing
- Representative samples taken from each sacrificed sock

Filtration capacity

- ASTM D5141-11

Standard Test Method for Determining Filtering Efficiency and Flow Rate of the Filtration Component of a Sediment Retention Device

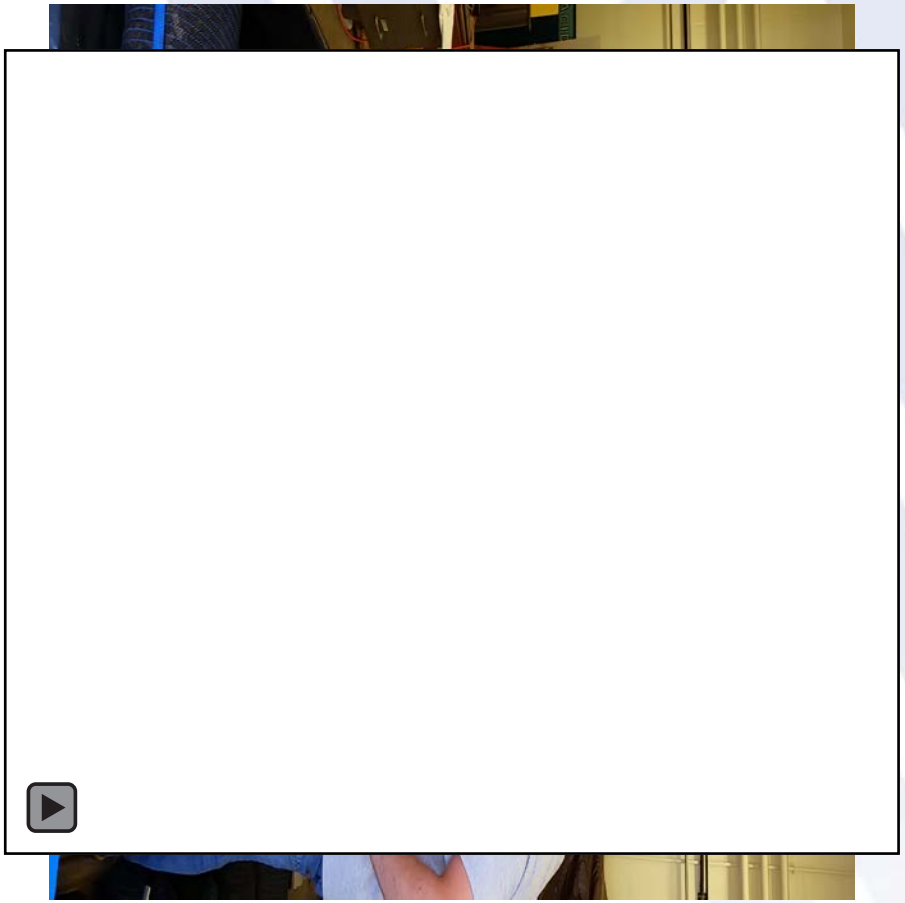


First Steps

Adding sediment (0.15 kg)

Release and catch filtered water

Trial



Final Wash – 2 L

Sampling filtered water

Filtering Sediment

Water Chemistry

- Filtered – Whatman 42 paper
- Ph and EC with electrodes
- N as nitrate with colorimetry
- P and K by ICP

Compost Standards

TABLE 4.2
Compost Standards

Organic Matter Content	80% - 100% (dry weight basis)
Organic Portion	Fibrous and elongated
pH	5.5 - 8.0
Moisture Content	35% - 55%
Particle Size	98% pass through 1" screen
Soluble Salt Concentration	5.0 dS/m (mmhos/cm) Maximum

Filtrexx

64

TABLE 4.2
Compost Standards

Organic Matter Content	**25% - 100%** (dry weight basis)
Organic Portion	Fibrous and elongated
pH	5.5 - **8.5**
Moisture Content	**30% - 60%**
Particle Size	**30% - 50%** pass through **3/8" sieve**
Soluble Salt Concentration	5.0 dS/m (mmhos/cm) Maximum

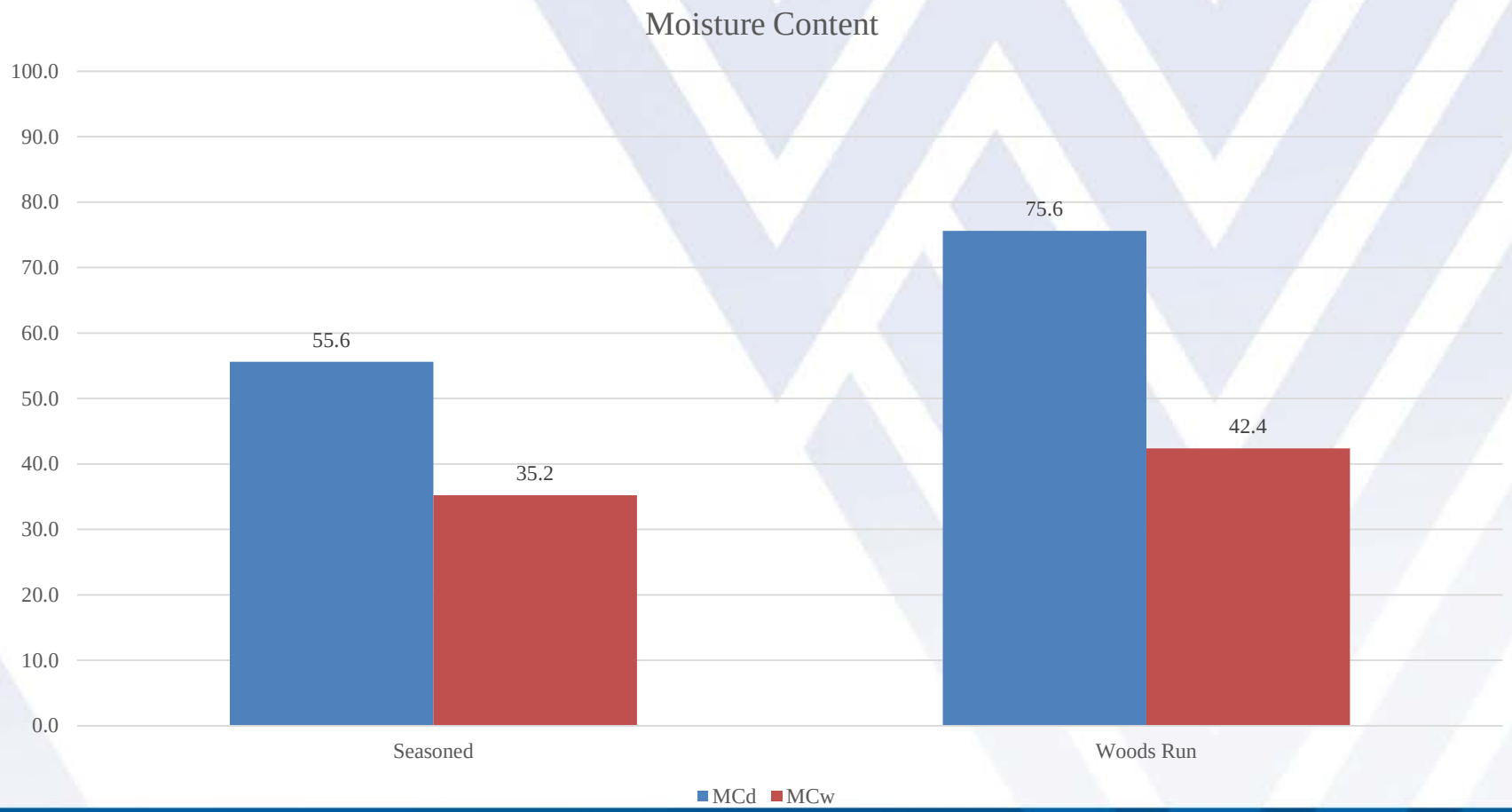
Compost - USDA

Table 1 Compost quality guidelines

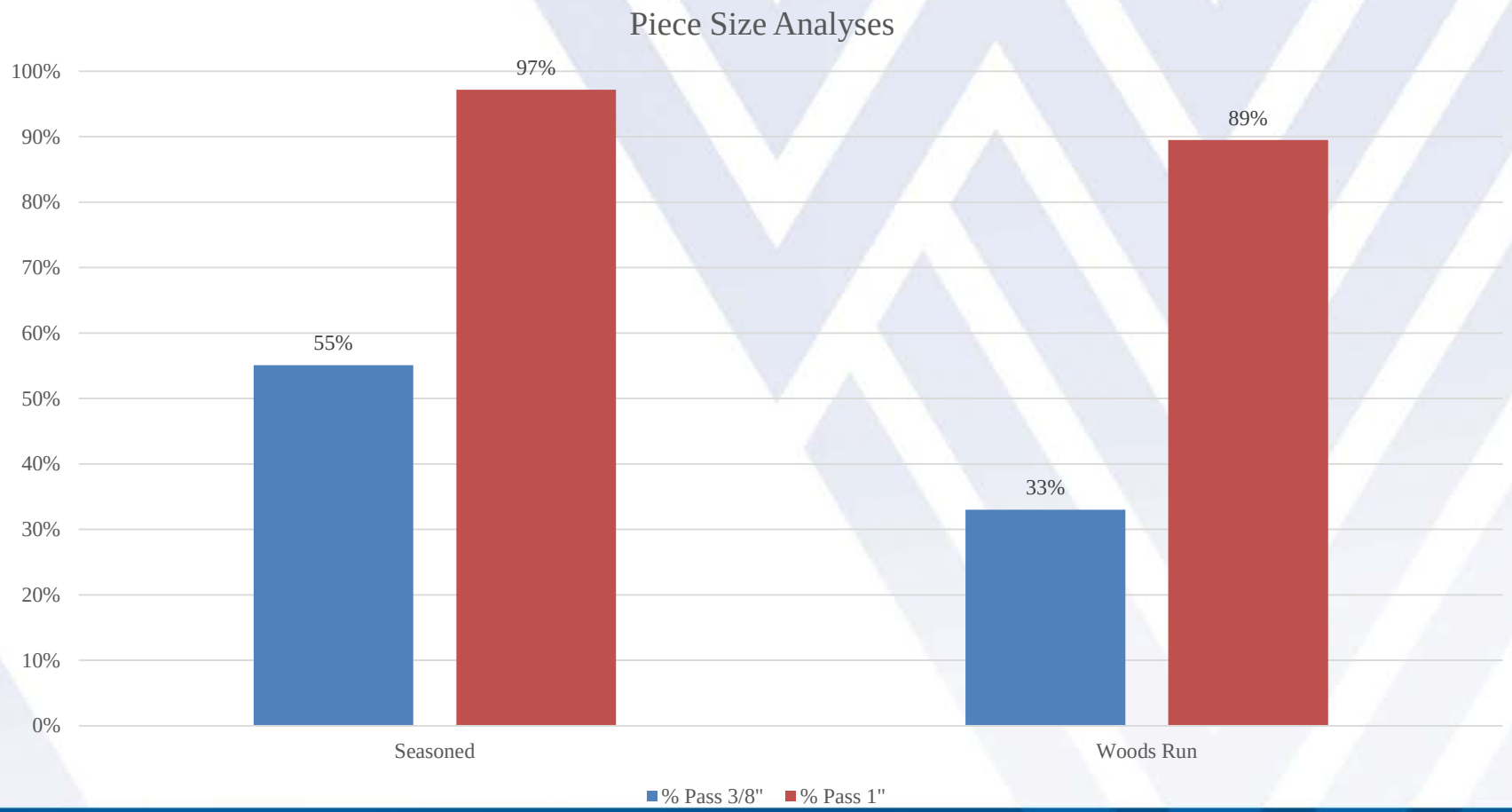
Parameters	Units of measure	Compost
pH	pH units	6.0–8.0
Soluble salt concentration (electrical conductivity)	dS/m (mmhos/cm)	Maximum 5
Moisture content	percent, wet weight basis	30–60
Organic matter content	percent , dry weight basis	25–65
Particle size	percent passing a selected mesh size, dry weight basis	2 in (51 mm), 100% passing –0.375 in (10 mm), 10% –30% passing
Biological stability Carbon dioxide evolution rate	mg CO_2–C per gram of organic matter per day	<8
Physical contaminants (human-made inerts)	percent, dry weight basis	<1

Source: U.S. Environmental Protection Agency (2006)

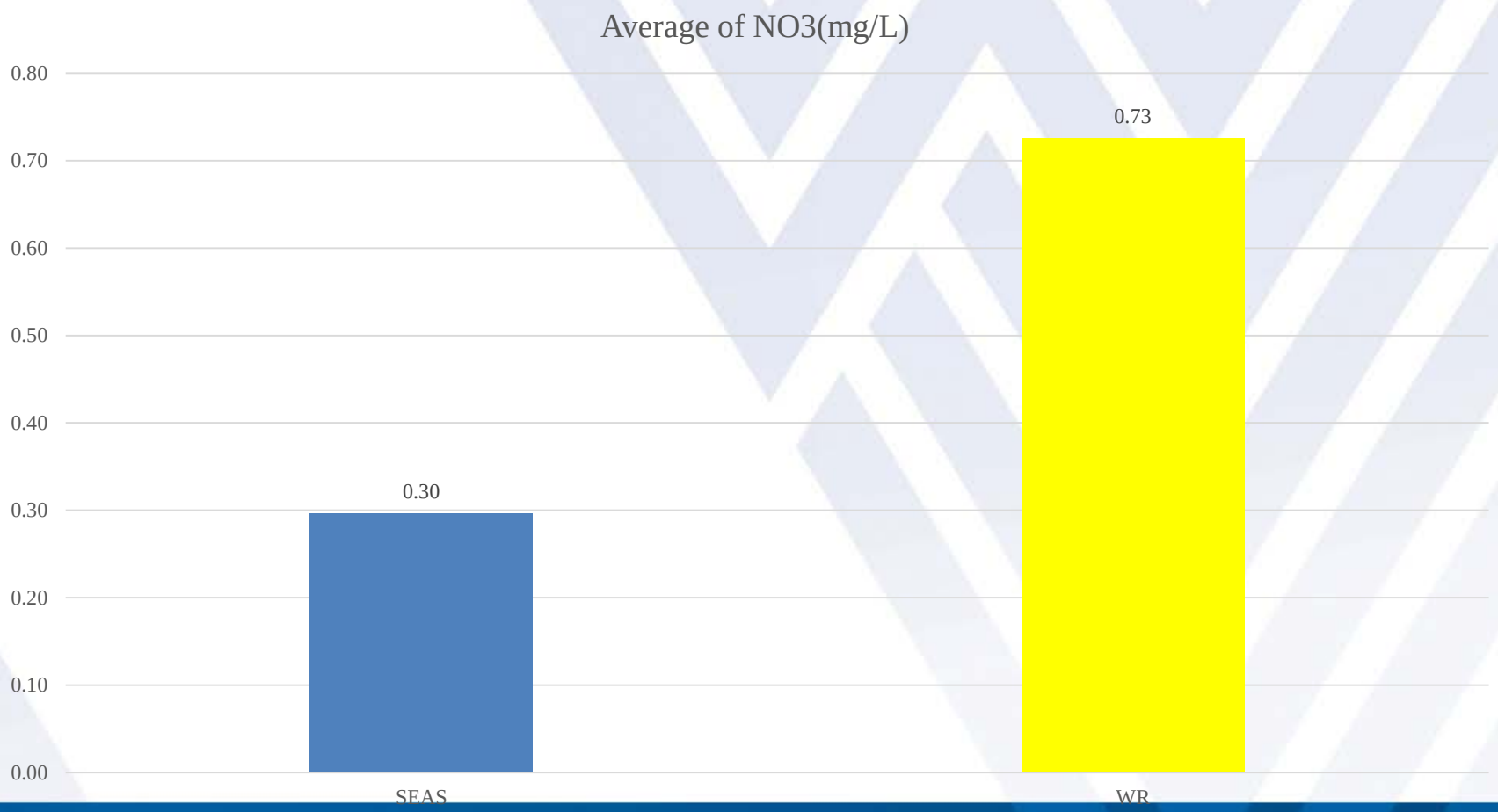
Results - MC


Moisture Content
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
55.6
35.2
75.6
42.4
Seasoned
Woods Run
MCd
MCw

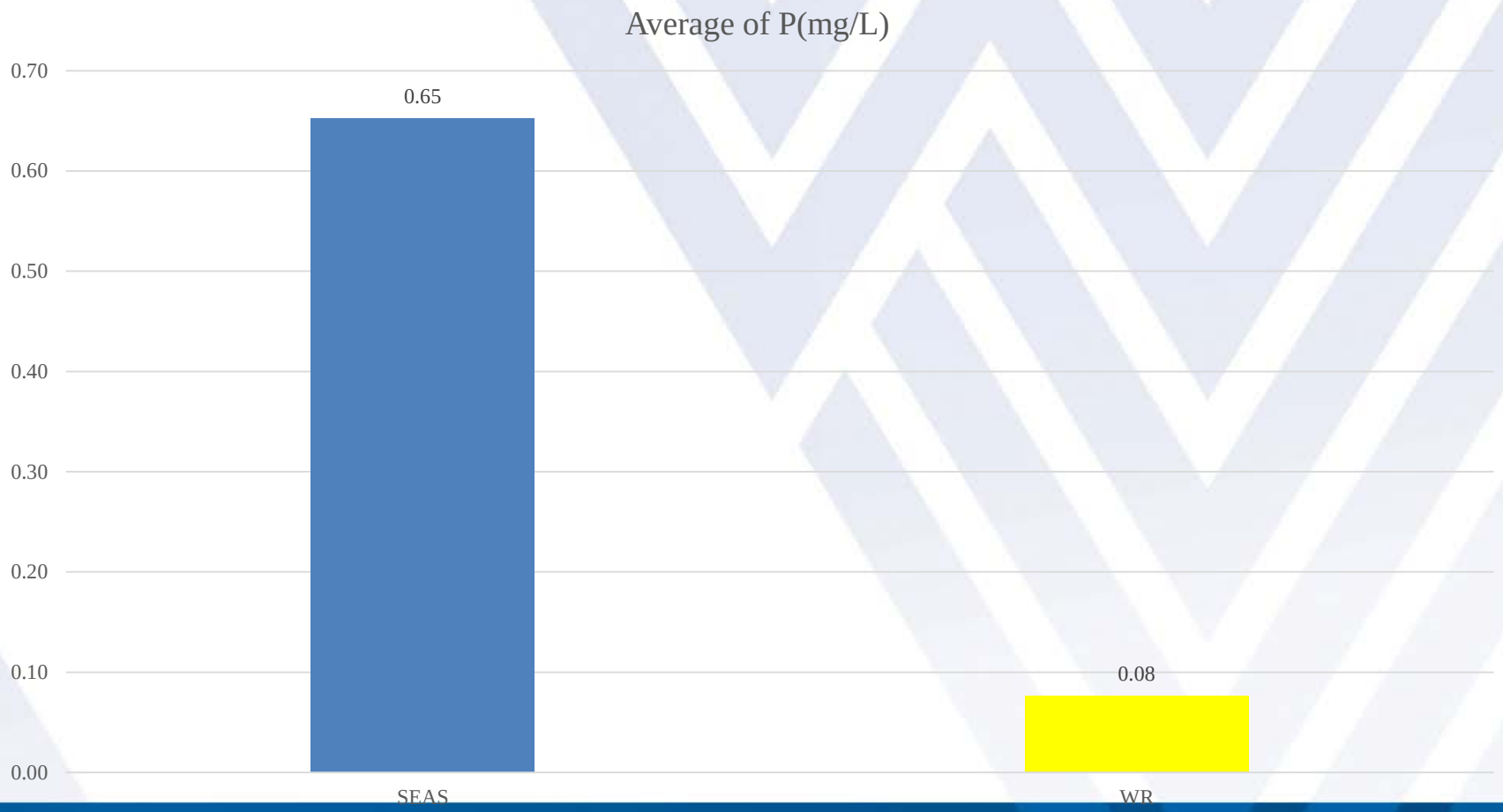
Results – Piece Size



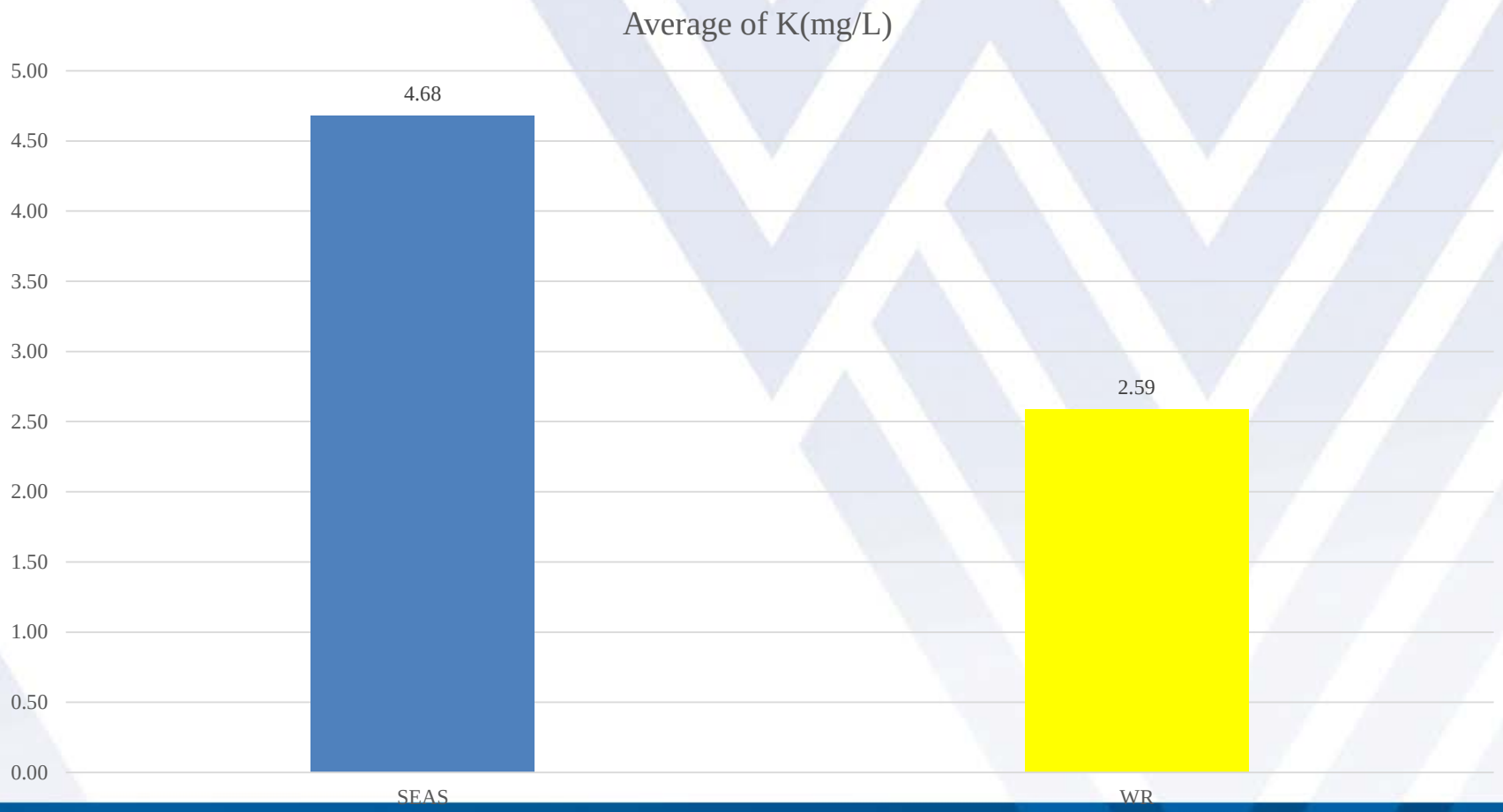
Results – NO_3


Average of NO3(mg/L)
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.30
0.73
SEAS
WR

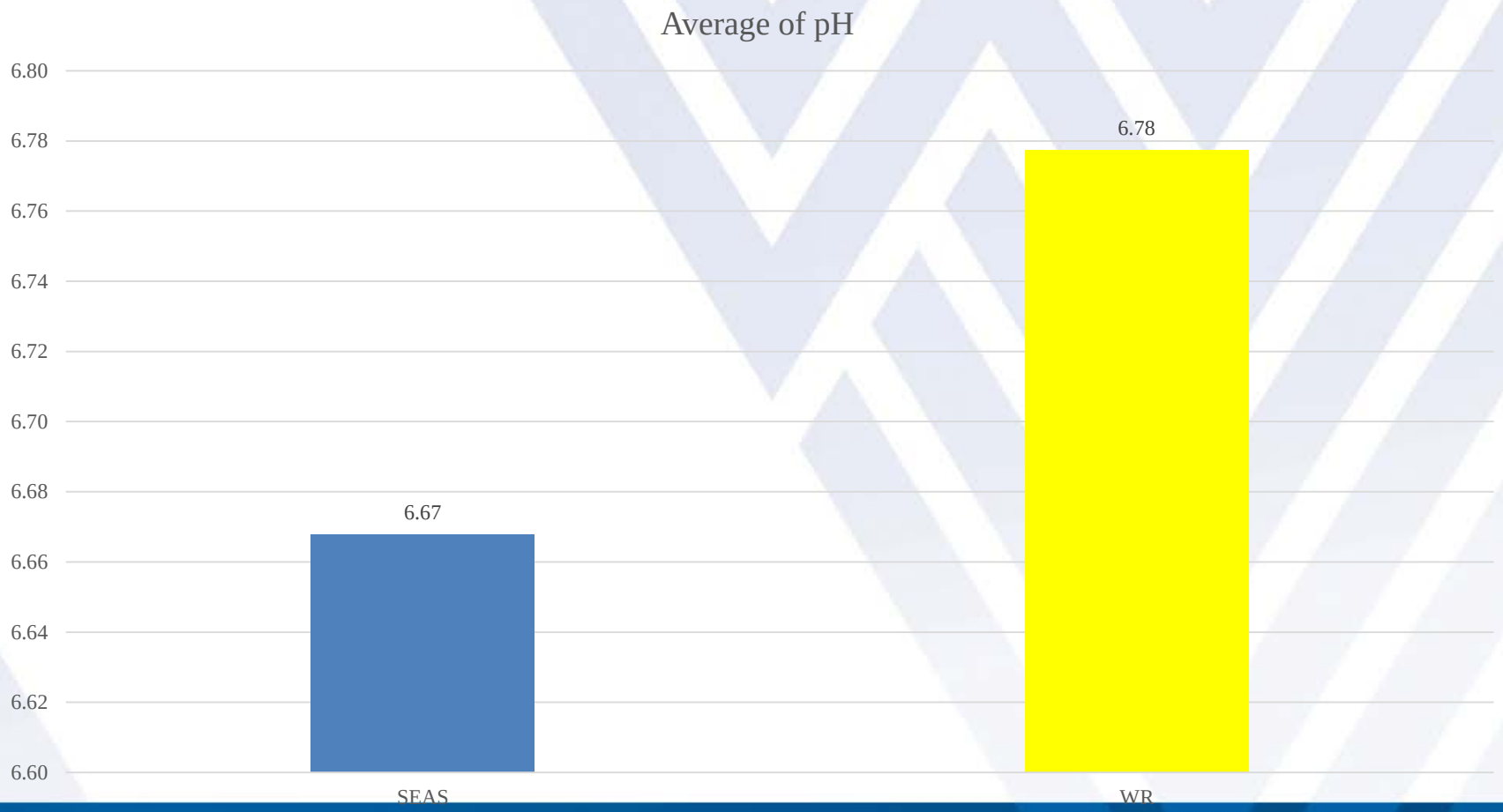
Results - P



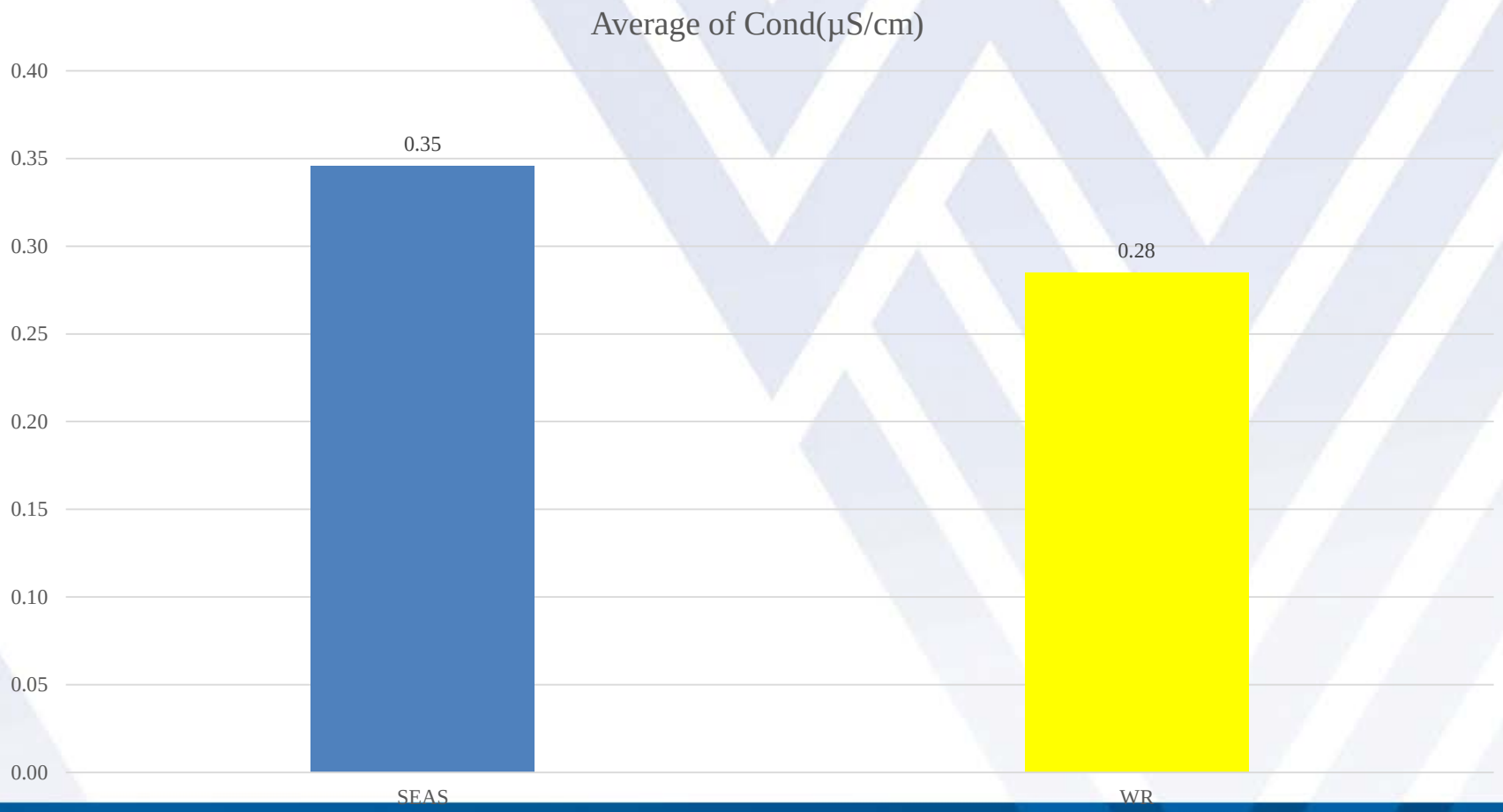
Results - K


Average of K(mg/L)
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
4.68
2.59
SEAS
WR

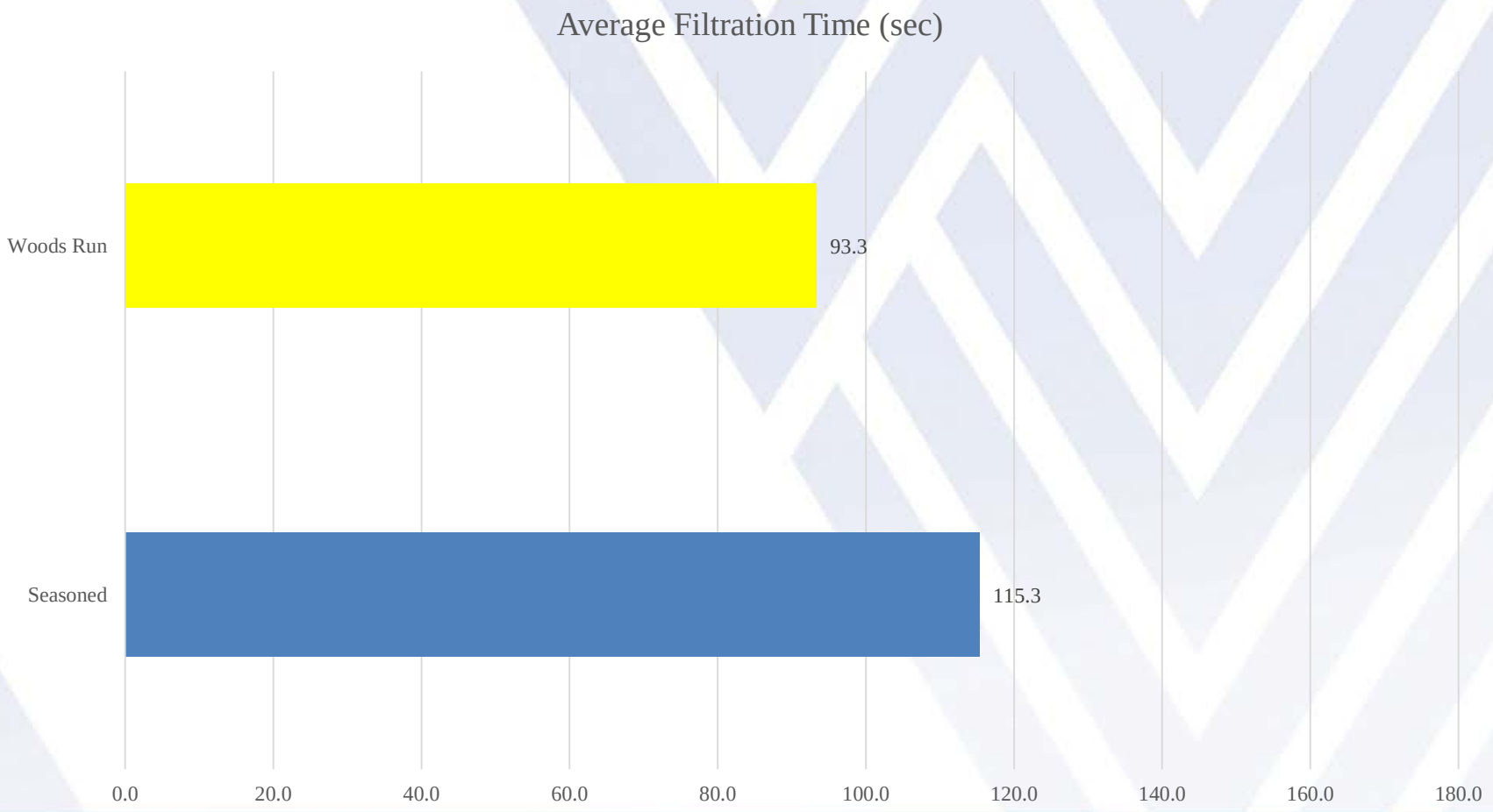
Results - pH


Average of pH
6.80
6.78
6.76
6.74
6.72
6.70
6.68
6.66
6.64
6.62
6.60
6.67
6.78
SEAS
WR

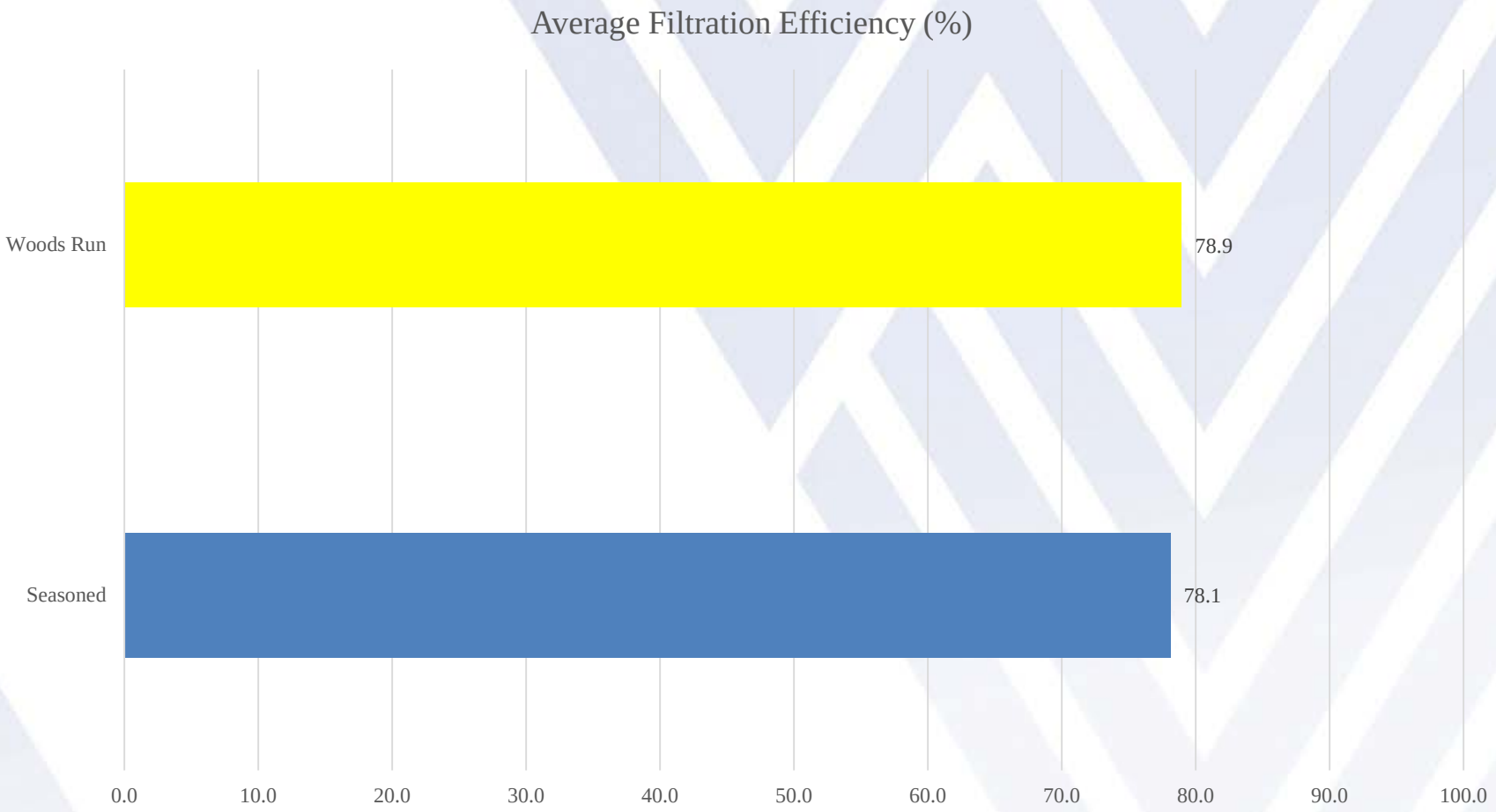
Results - conductivity



Results – Filtering Time



Results – Filtration efficiency



Overall Results

Parameter	Woods Run	Seasoned/Compost
pH	Passed	Passed
Moisture Content	Failed Dry Basis (75% vs 60 %)	Passed
Particle Size	Passed	Passed
Conductivity	Passed	Passed
No_3	Sig Higher – in Standard	
P		Sig Higher – Outside standard
K		Sig Higher
Filtering Time		Sig Higher
Filtering Efficiency	Sig Higher	

Conclusions

- MC only parameter that woods run sock failed
- No indication that WR sock installation would be detrimental to environment
- In most cases, WR sock performed better than seasoned sock