REINHOLD ENVIRONMENTAL Ltd.

2011 APC Round Table
& Expo Presentation

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Bag Fabric Selection in Integrated Air Quality Control Systems

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Babcock & Wilcox

Overview

Focus on Coal Fired Boiler Applications

Factors that Affect Filter Media Interact

- **Temperature – low – normal – upsets**
  (Example plant winter low load 235F to summer full load 335F)

Factors that Affect Filter Media Interact

- **Corrosiveness – acids, alkalis, solvents, oxidizing agents** **Example (SO_3 and H_2O - acid attack, bromine iodine, ozone - oxidizing)**
- **Hydrolysis – humidity (Polyesters – typical rating Fair resistance to moist heat)**
- **Dimensional Stability – stretch & shrinkage (Acrylics are sensitive to shrinkage)**

Overview:
Factors that Affect Filter Media Interact:

The Babcock & Wilcox Company
Fabric Comparison Chart

Fiber	Abrasion Resistance	Acid Resistance	Alkalies Resistance	Maximum Operating Temperature F	Relative Cost
Polypropylene	Excellent	Excellent	Excellent	165-200	$
Homopolymer Acrylic	Good	Good	Fair - Good	280	$$
Copolymer Acrylic	Fair	Good	Fair	250	$$
Polyester	Excellent	Fair	Fair-Good	275	$
PTFE	Fair	Excellent	Excellent	500	$$$$$$$
Fiberglass	Fair	Good - Excellent	Fair-Good	500	$$$
PPS	Excellent	Excellent	Good	375	$$$$$
P84	Excellent	Good - Excellent	Fair	400	$$$$$$
Nomex	Good	Poor	Excellent	400	$$$$$

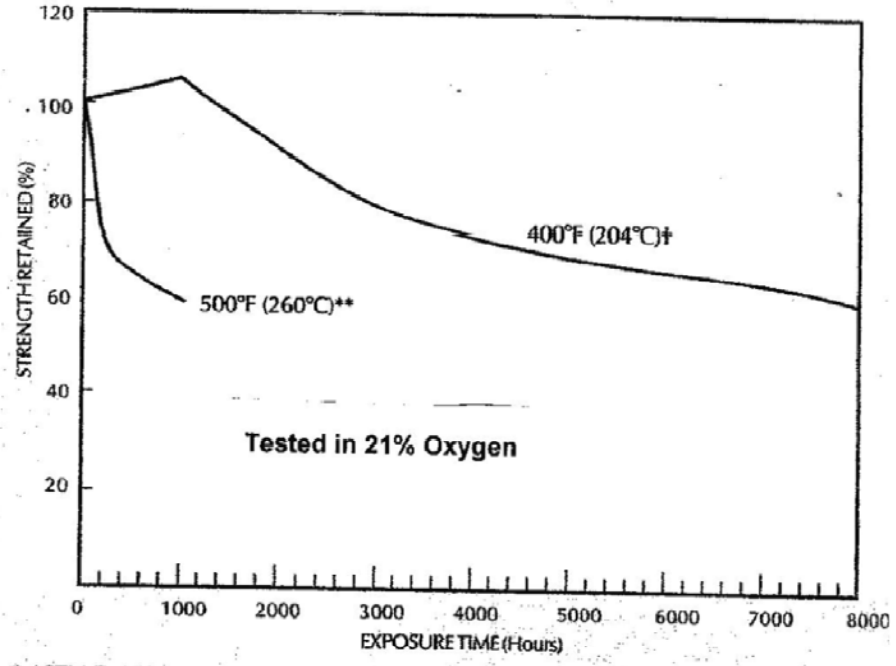
Old Ryton Charts

Figure 1 – Strength Retention of Ryton® Fiber after Exposure in Air at High Temperatures*

Ryton has outstanding strength retention upon exposure to heat.

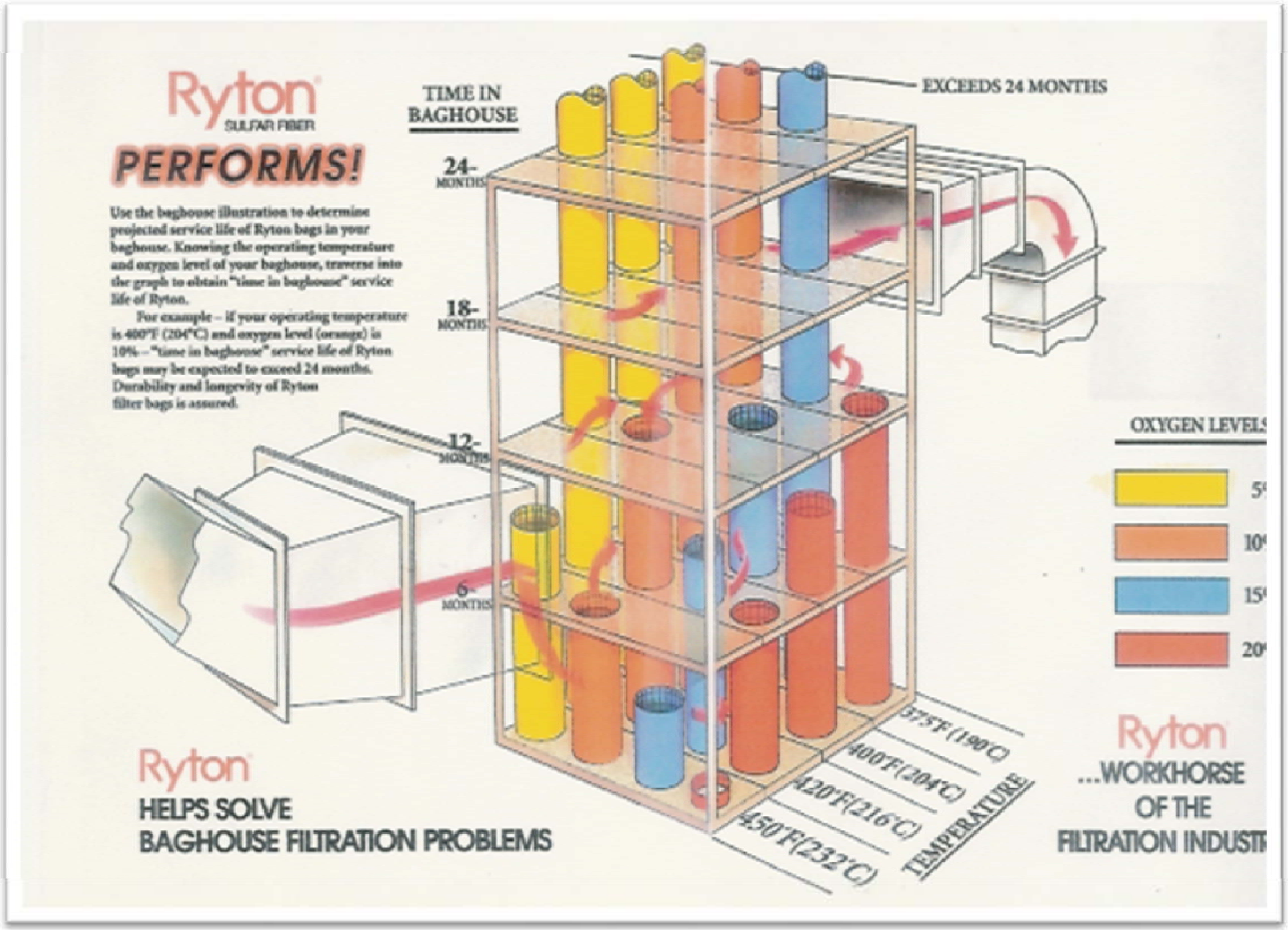
Ryton retains 60% of its original strength after exposure to 500°F (260°C) for 1000 hours.

It retains 90% strength after exposure to 400°F (204°C) air for 2000 hours — 70% after 5000 hours and almost 60% after 8000 hours.



* ASTM D-461
** Based on laboratory tests
† Based on lab and field data

Old Ryton Charts



Low Sulfur Coal Fired Units Without SO_2 Capture

- **Filter media options (when to use / experience) –**
  - **PPS – operation <350F PJFF (life 2-5 years) – sensitive to temperature (winter – summer)**
  - **Fiberglass – RGFF's (4-7+ years) Sensitive to A/C – many units operated for years then SDA added**

Low Sulfur Coal Fired Units Without SO_2 Capture

- **Filter media options (when to use / experience) –**
  - **Acrylics – (3 years) when used in conjunction with dilution air to keep temperatures below 250F**
  - **Polyester – (no cases found but application above would be possible)**

Low Sulfur Coal Fired Units Without SO_2 Capture

- **Filter media options (when to use / experience) –**
  - **P84 PJFF (life 3- 5+) years operation > 350F – limited data**
  - **Membranes – (life ?)**
  - **PPS/PI (Blends) Eskom has extensive experience with these fabrics)**

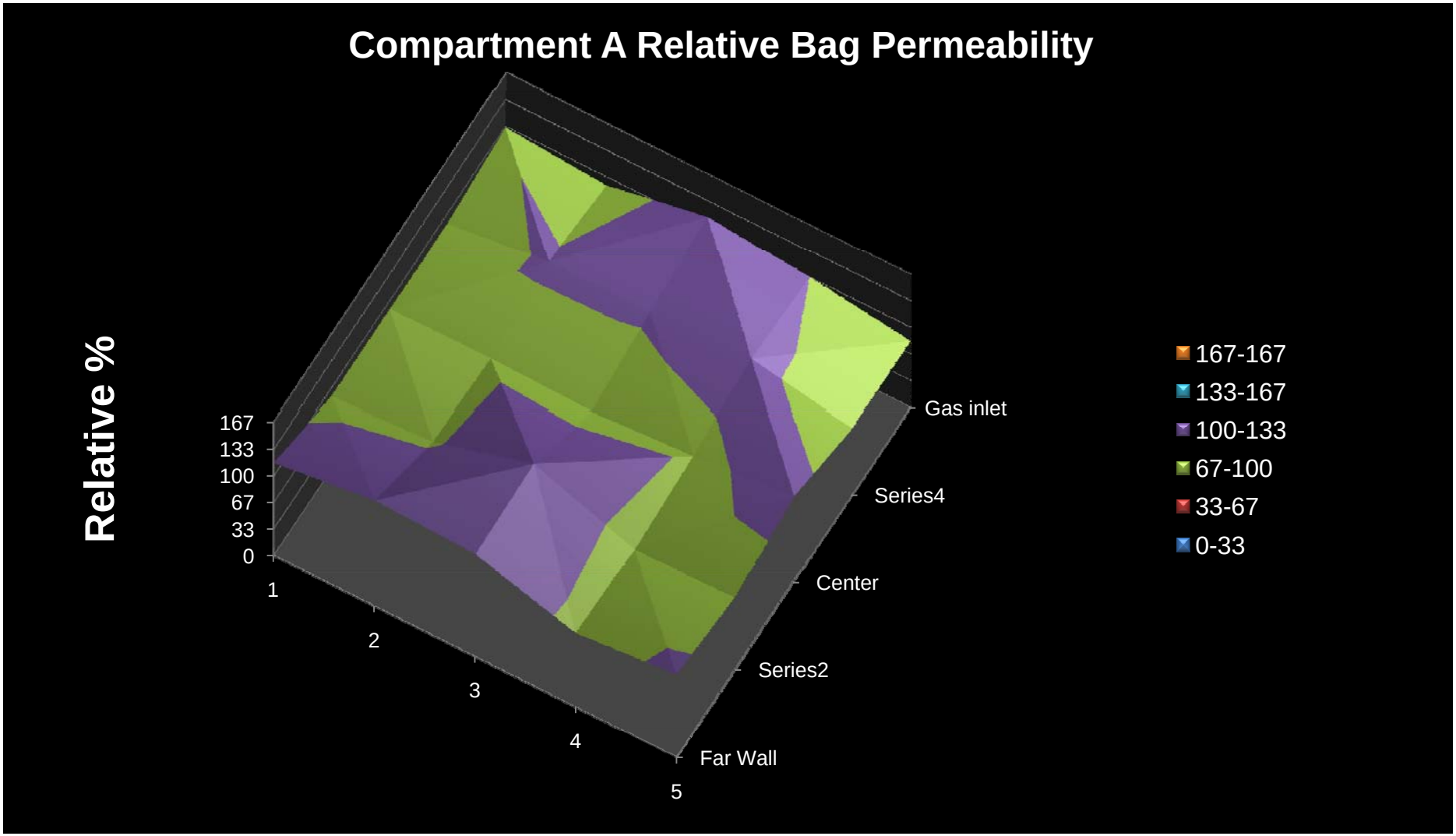
Low Sulfur Coal Fired Units With Dry FGD or CDS

- **Filter media options (when to use / experience) –**
  - **PPS and (PPS/PI blends)– PJFF (life 2-5 years) most common material, bag life – A/C and upsets**
  - **Fiberglass – RGFF's (4-7+ years)**
  - **Acrylic PJFF (life 2-5 years) Low cost – temperature limitations. More common in Europe**

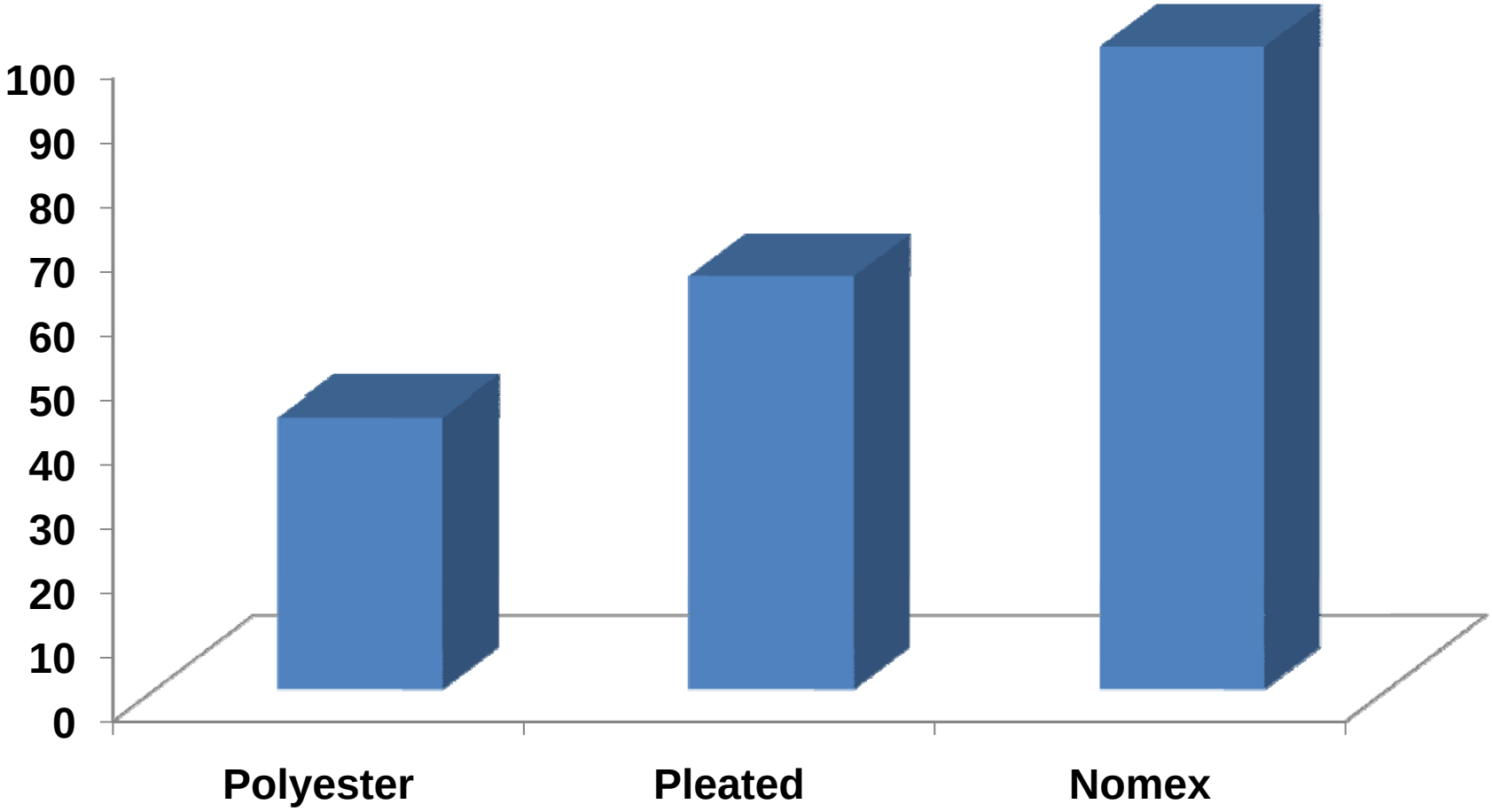
Low Sulfur Coal Fired Units With Dry FGD or CDS

- **Filter media options (when to use / experience) –**
  - **Polyester PJFF (life 2-? years) Not common – low $**
  - **Membranes typical used for extending bag life (mixed results). Installed in several units but bag life unchanged (replacement interval unchanged)**

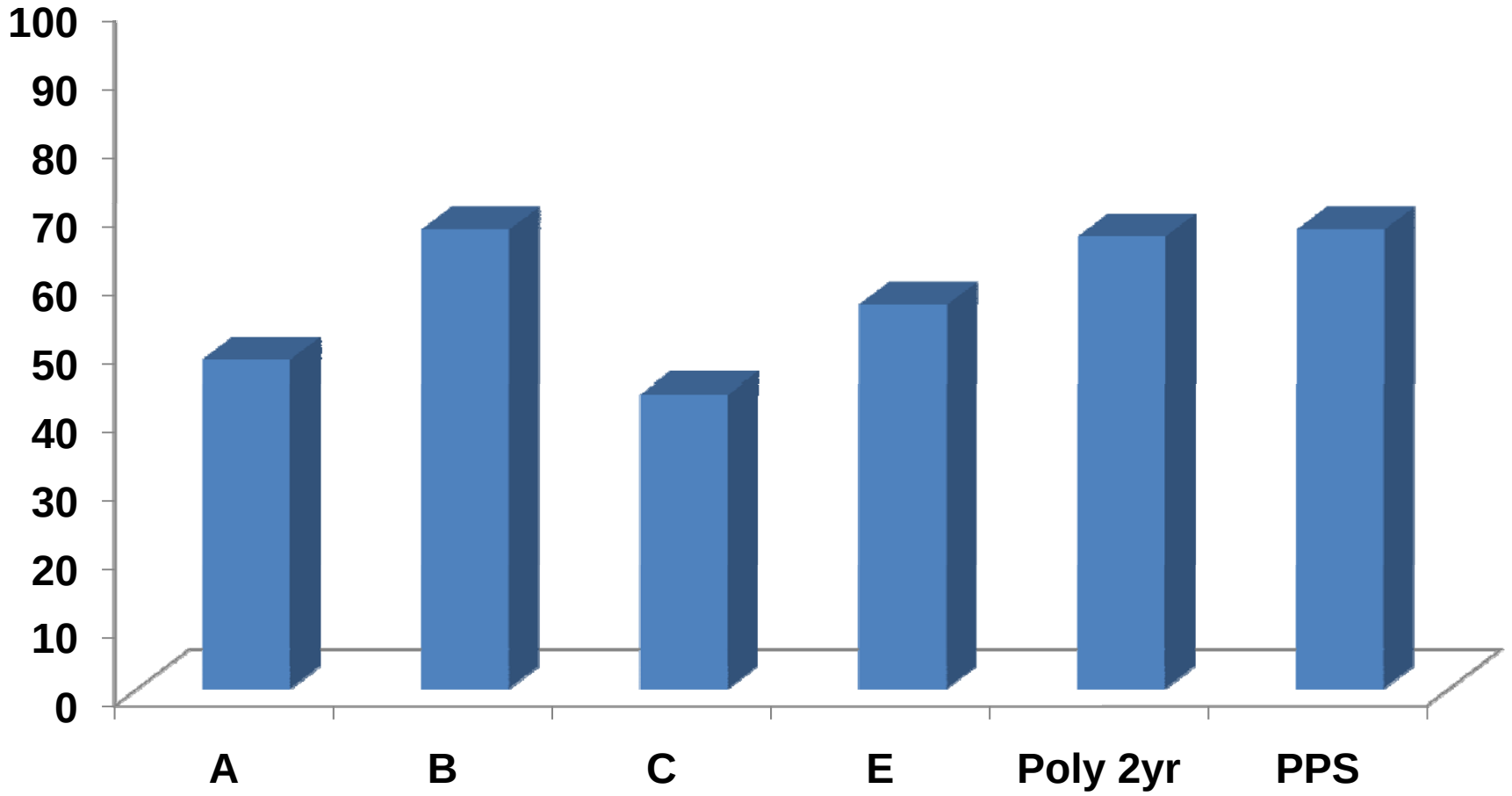
Permeability Uniformity



Unit 1 – Test Results



Unit 3 – Test Results *Note A-E various Acrylics*



Membrane versus Non-membrane

Example A

	PJFF dP	*Unit Load*	*Flow*	*Cleaning Frequency*	*Full Flow dP @ 25 minute cleaning*
	Inches WC	MW		Minutes	Inches WC
OEM Needle Felt Bags					
6 months	5.24	540	1650	15	6.4
1 year	6.83	588	1755	36	6.3
Membrane Bags					
6 months	6.21	590	1825	28	5.8
1 year	6.19	528	1635	20	7.2
1 ½ years	6.20	589	1786	28	6.0

High Sulfur Coal Fired Units With FF Followed by Wet FGD or CDS

With or Without ESP Precollector

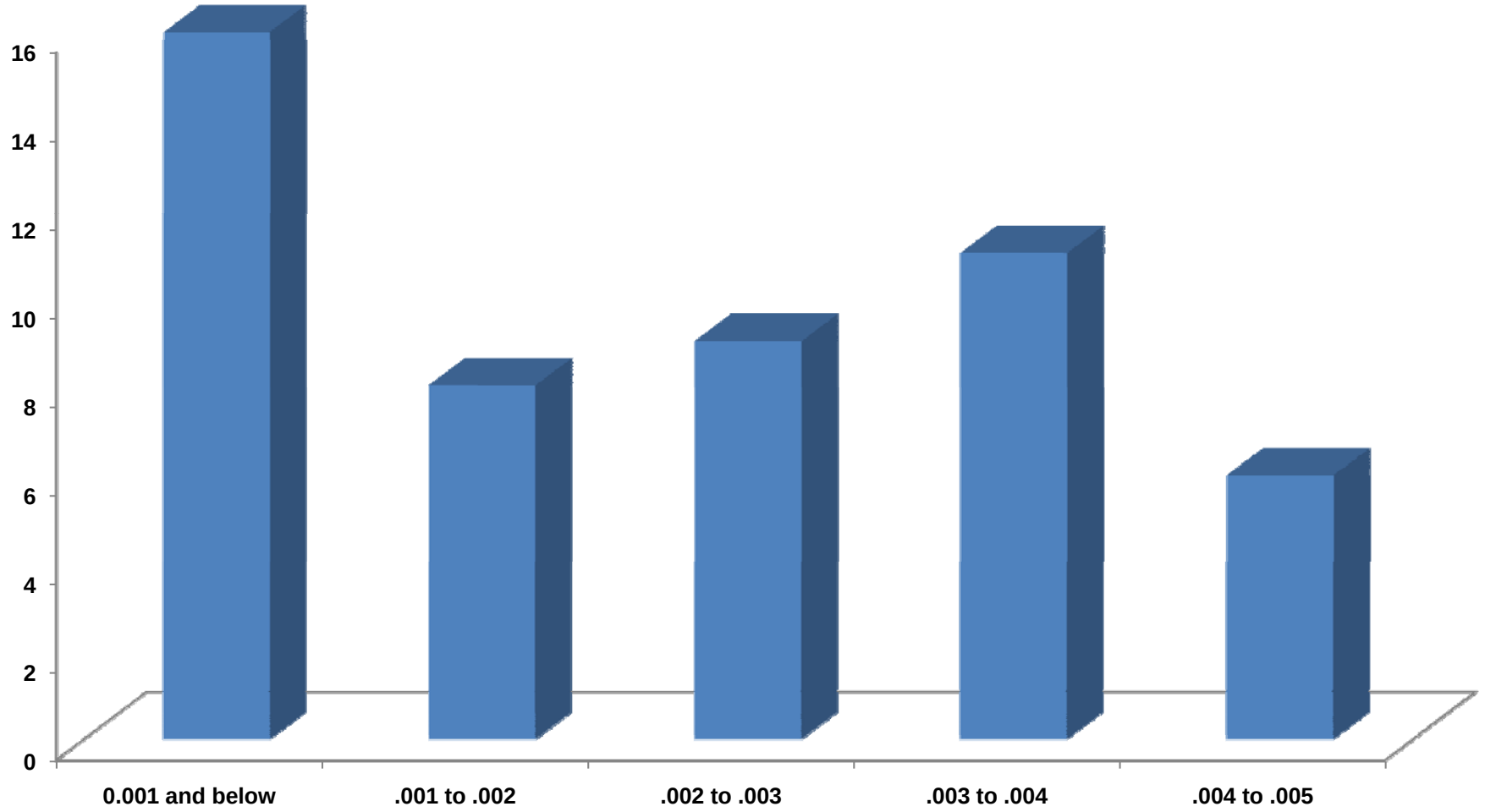
- **Filter media options (when to use / experience) –**
  - **PTFE (3 years+)**
  - **Membranes (3 years+) 22oz Fiberglass with membrane**

High Sulfur Coal Fired Units With FF Followed by Wet FGD or CDS

With or Without ESP Precollector

- **Filter media possible options –**
  - **PPS – coupled with SO3 mitigation (Line injection)**
  - **Various blends of fiberglass and PTFE**

Emissions – ICR Data – Top 50 of 95 Tested lb/mbtu



Questions?

Thank you.