



Colloid Removal Efficiency of Nonwoven Filtration Media

**AFS Technical Conference
June 19, 2003**

Lydall Filtration/Separation

Agenda

- Clarification of biological products
- Turbidity testing
- Colloid preparation
- Media construction
- Colloid removal
- Experimental Design
- Future Work

Filtration of Biological Products

- **Bioreactor Solution**
 - Contains bioburden particles, colloids and water soluble biopolymers
- **Primary Recovery**
 - Removal of bioburden particles,
- **Secondary Clarification**
 - Removal of bioburden and colloids
- **Prefiltration**
 - Removal of trace bioburden and colloids
- **Sterile Filtration**

Clarification Filtration

- Depth or Pad filters are utilized in the primary recovery to remove the high particulate load
- Depth filter are used as a pretreatment for UF/MF membranes in the secondary separation
- Nonwoven filters utilize a combination of mechanical sieving and adsorption to remove

Clarification Filters

- Charged Cellulose
 - Good at reducing high particulate loads
 - High removal of colloids due to charge
- Glass fiber Prefilter
 - High efficiency
 - Low colloid removal
- MB PP
 - Moderate efficiency
 - Poor retention of colloids

Turbidity Testing

- Colloid challenge
- Amicon stirred cells
- Spectrophotometer capable of reading FTU
- A calibration curve was run with the FTU standard
- The colloid challenge was diluted several times to check the accuracy of the equipment

Colloid Challenge

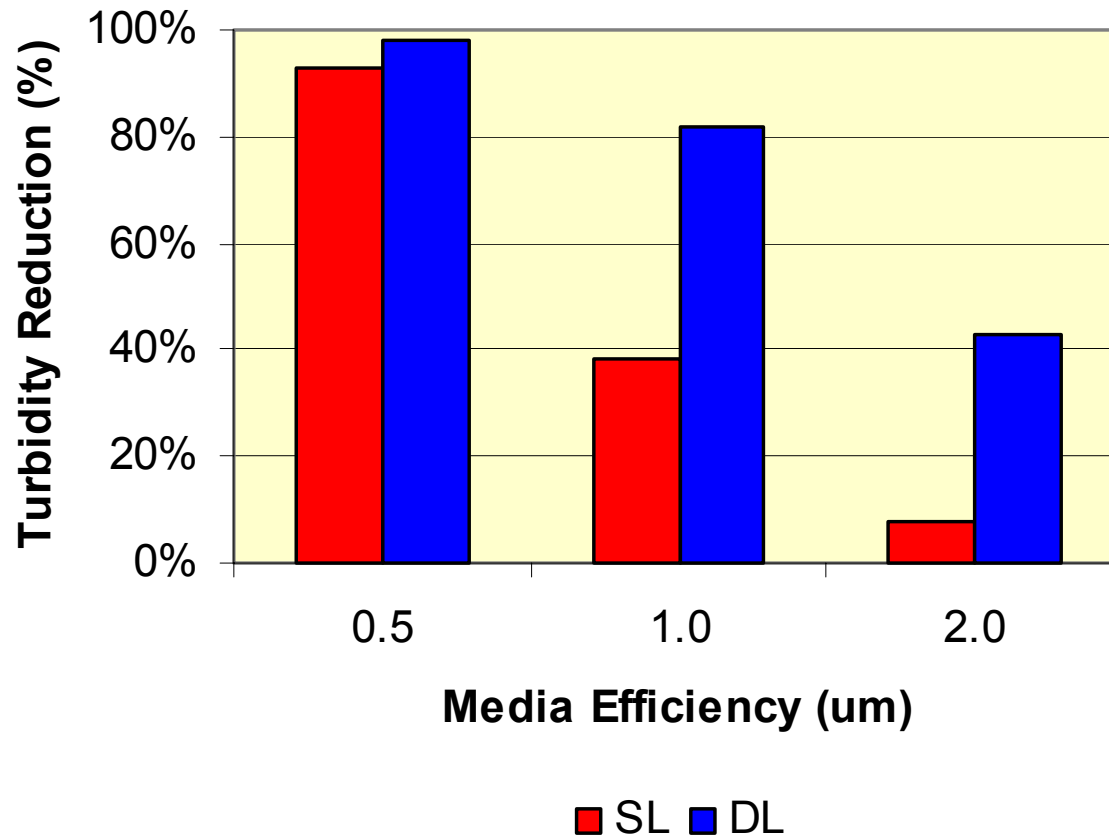
- A slurry of AC fine test dust was prepared and left to settle out for three days
- The supernate was poured off and checked for stability
- The sol remained stable for over 24 hours with out and sedimentation
- Concentration of the sol was determined gravametrically

Media Construction

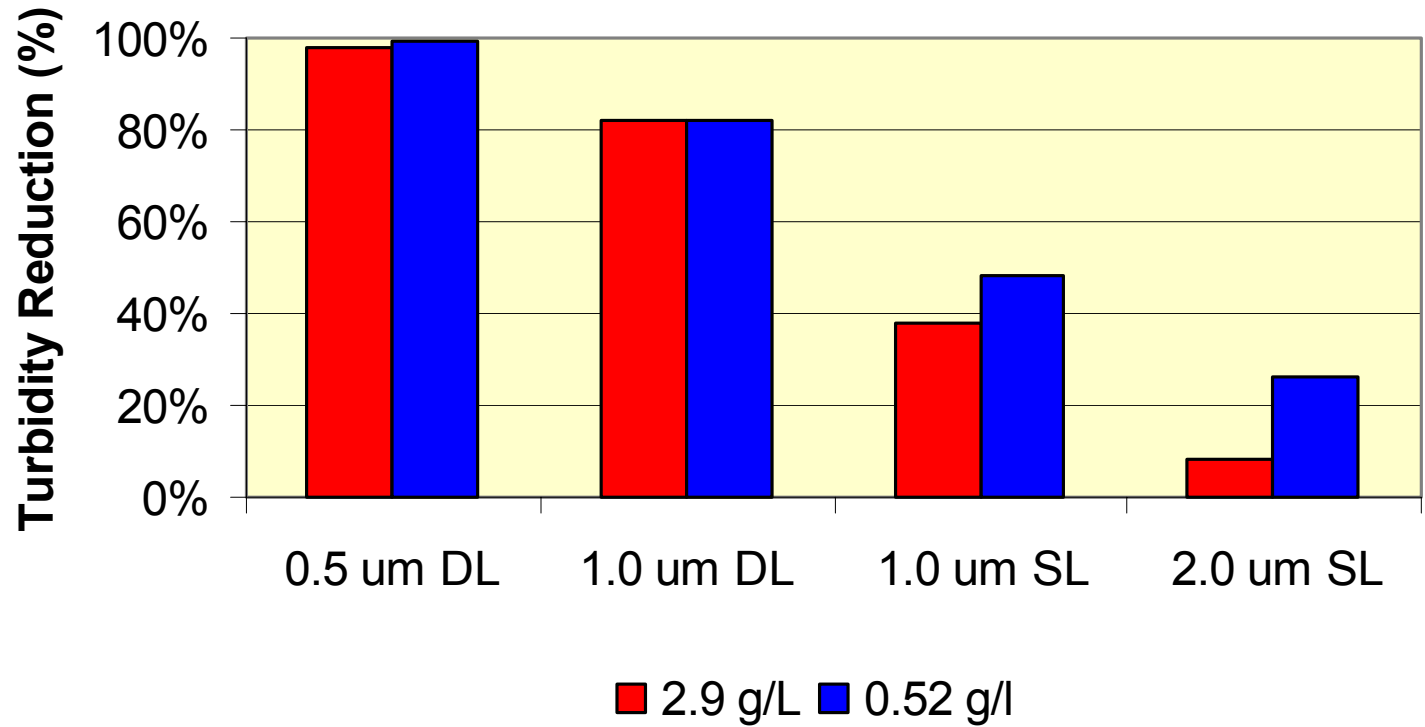
| Efficiency (μm) | Weight (#/3000 ft ²) | | Thickness (mils) | | Resistance (mm H ₂ O) | |
|---------------------------------|----------------------------------|----|------------------|----|----------------------------------|----|
| | SL | DL | SL | DL | SL | DL |
| 0.5 | 90 | 50 | 30 | 16 | 250 | 60 |
| 1 | 52 | 60 | 17 | 18 | 80 | 40 |
| 2 | 45 | 60 | 15 | 18 | 36 | 20 |

Colloid Removal

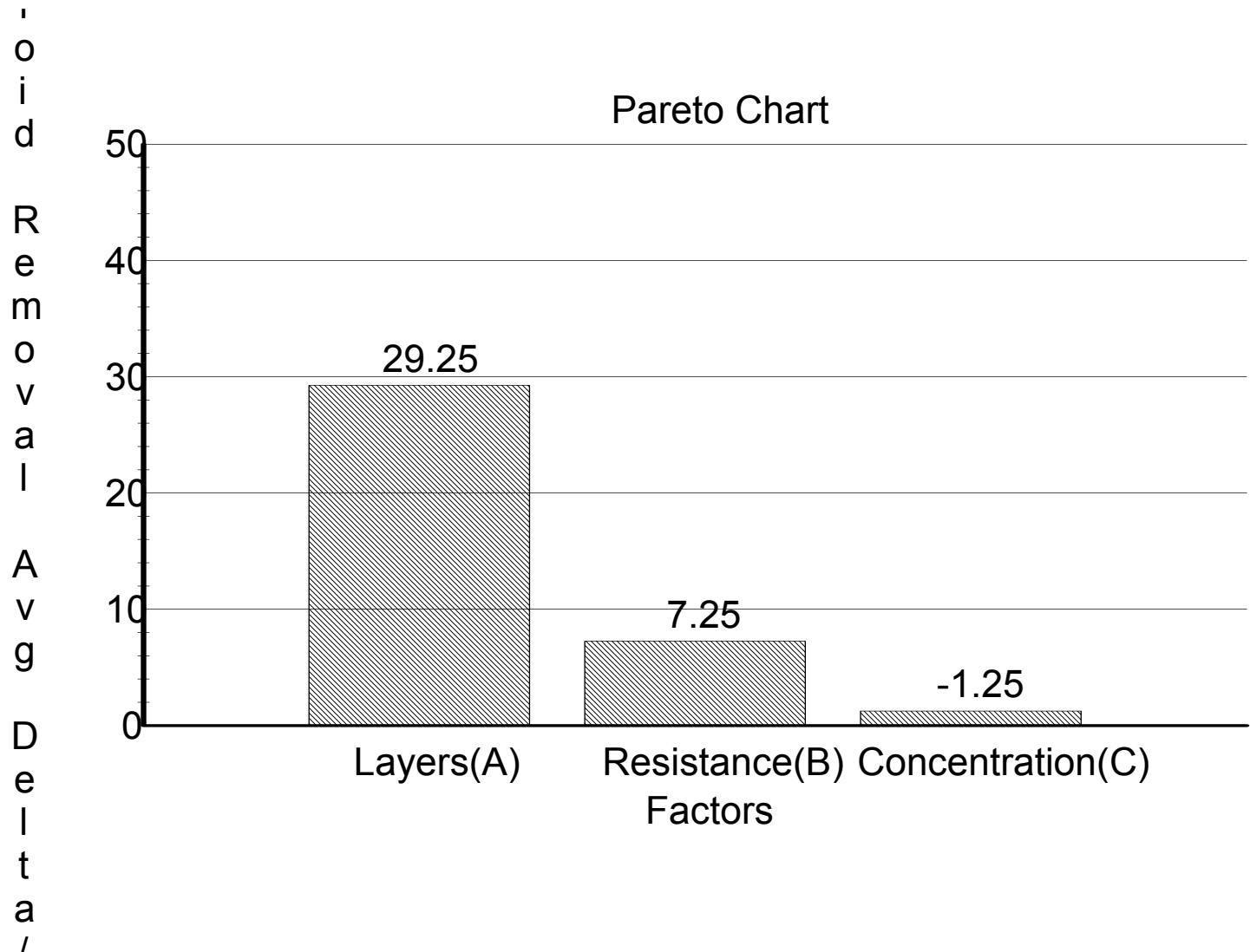
Challenge Concentration 2.8 g/L



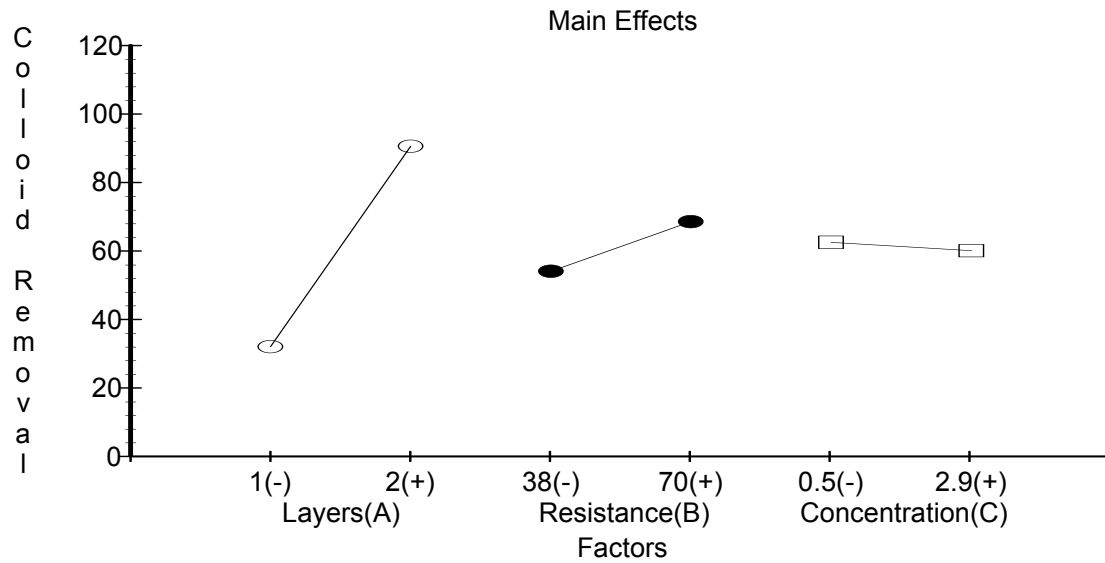
Colloid Removal



Experimental Design



Main Effects Plot



Response Surface

