



Chemical Modification Improves Mechanical Stickies/Wax Removal

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Discussion Agenda

- What are the Cost of Stickies?
- ENESCO S 1000 Technical Review
 - Mechanism & Benenefits
 - Reference Case Studies
- Mill Application
 - Trial Approach
 - Expected Benefits



What is the cost of Stickies/Wax?

- Lost Production due to Stickies Deposition
 - Including Matrix Deposits of Stickies, Wax, Pitch, Coatings, etc.
 - Deposits: Headbox, Forming Fabric, Press Felts, Dryer Section, Rolls, Converting, etc.
- Cost = Sheet Breaks, Downtime & Cleaning Chemicals



What is the cost of Stickies/Wax?

- Lost Production due to Poor Sheet Quality
 - White Grades: Light Spots, Holes, High Stickies/Dirt Counts
 - Brown Grades: High Wax/Stickies Counts, Wax Migration to Top Ply, < Strength
- Cost = Downgrades, Culls, + Process Adjustments (Grade Changes, DLK & Virgin Fiber Substitution, < Speeds)



What is the cost of Stickies/Wax?

- Fiber Loss
 - Stock Preparation Screening and Cleaning Reject Rate decisions made to promote “acceptable yield” economics.
 - Small Screen Slots to remove smaller particles
 - Reject Rates, Flow modifications, etc.
 - Inherent nature of Stickies/Wax is to be inter-wound with fiber
- Cost = Fiber, Disposal, Equipment + Impact on Production



What is the cost of Stickies/Wax?

- Lost Production due to Non-Optimized Production Processes
- What if:
 - No wax/stickies deposited: HB, forming fabrics, press felts, dryer fabrics, rolls?
 - Stickies/wax not available to negatively impact Sheet Parameters such as Strength, Appearance, Drainage, Sheet Consolidation, Slide Angle?
- Result: Increased 1st Quality Production



Achieving More “Virgin Like” Recycled Fiber

- Product:
 - 3rd Generation: ENESCO S 1000
Chemical Modification
 - Synergistic, Patented Blend of Anionic
Surfactants & Inorganic Salts
- Used to Maximize Stickies, Wax,
Hydrophobic Contaminant Removal in
Recycle Fiber Systems.



ENESSCO S 1000

- Product Fed to Recycle Fiber Repulper
- Dosage: 0.80 – 1.00 Dry LB/Pulper OCC Ton
- Application Methods
 - Dry-batch addition, Liquid-pump feed
- Equipment
 - Standard chemical gear pump for LQ bulk application



Treatment Philosophy

Competition

- Mask stickies/wax problems by trying to render stickies to be non-tacky
- Reduce stickies size
- “Band-Aid Approach”

ENESSCO

- Eliminates stickies problems, while actually improving profitability
- Production & Quality Enhancer



Application Concept

- Product designed to More Efficiently Liberate Stickies/Wax/Ink from the Fiber Substrate
- Designed to Rigidify and keep contaminants in as **Large a Size as Possible** for Maximum Removal
- This mechanism avoids fiber/stickies bundles and avoids reducing contaminant size.
- Screening and Cleaning equipment can easily identify & reject contaminants, while accepting valuable fiber.



Application Concept

- Additional Mechanism attaches entrained air bubble to hydrophobic contaminants
 - This promotes maximum removal in lightweight removal equipment & water clarification.
 - Characteristic surface foam is seen in cleaner rejects, but entrained air is lower.
- Micro-Stickies are coated & pacified.



Contaminant Removal

PRIMARY MECHANISMS

1. Liberate Wax/Stickies from Fiber Substrate
2. Stabilize Wax/Stickies as Large Particles
3. Rigidify Wax/Stickies for Max. Removal

PRIMARY RESULTS

- 2-3 Fold Increase In Screening Rejects
- 2-6 Fold Increase In Lightweight Removal
(Lightweight Cleaners, Gyro-Cleans, DAF Clarification)



The Benefits of Greatly Reduced Wax & Stickies

System

- Yield Increase
 - Reduced Fiber Loss
- Higher Quality Pulp
 - Lower Stickies Count
 - Less Micro-Stickies
 - Substantially < Wax
- Higher Quality White-Water
 - Lower Chemical Use

Machine

- Production up 3-8%
 - Less Breaks, >Speed
 - Higher Strength, CD Sheet Uniformity
- Cleaner HB, Foils, Rolls, and Fabrics
- Chemical Reduction
 - Cleaning Chemicals
 - Control Chemicals
 - AntiSkid, Defoamer



Competitive Approaches

STOCK TREATMENT

- POLYMER
 - Detac
 - DiMDAC
 - P.E.I.
- Enzymes
- Talc
- Diatomaceous Earth
- Dispersants & Surfactants

PAPER MACHINE

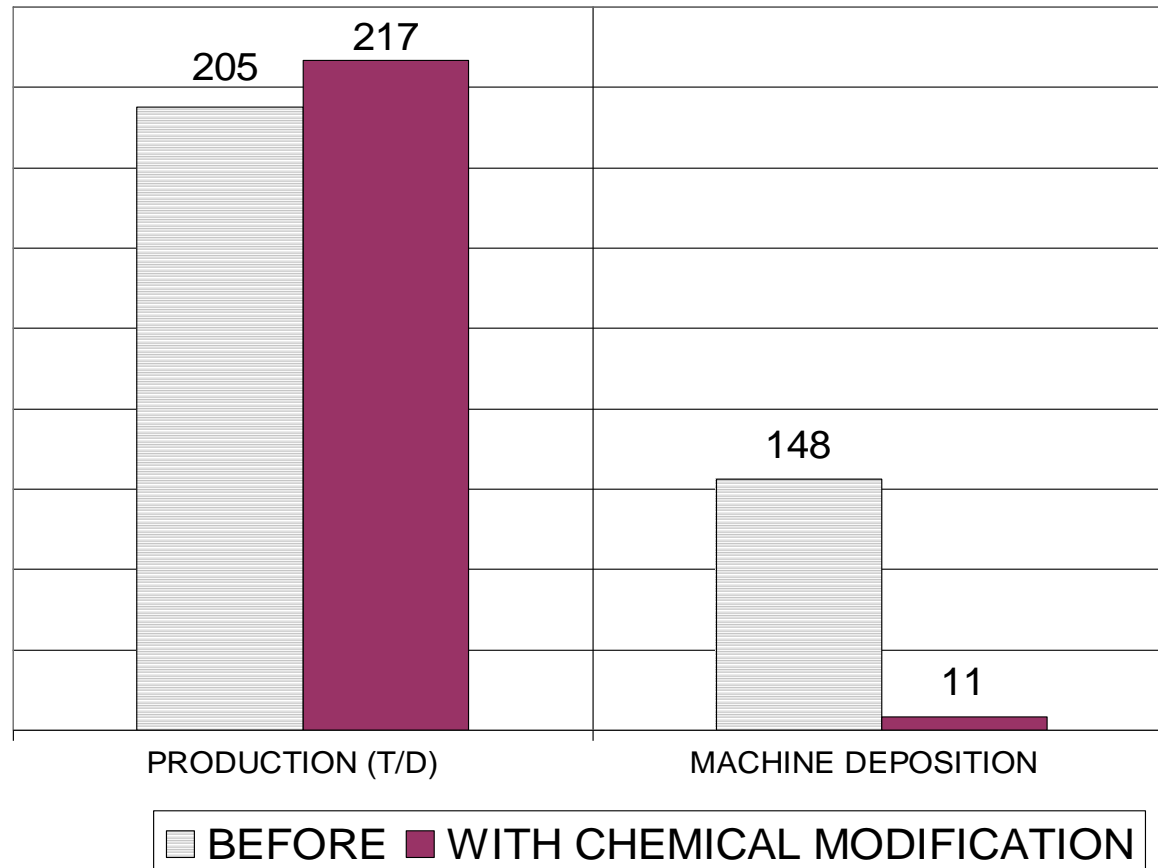
- Retention Aid
- Wire Passivation
- Felt Treatment
 - Solvent, Caustic, and/or Acid Wash
 - Blends with Disp. & Surfactants



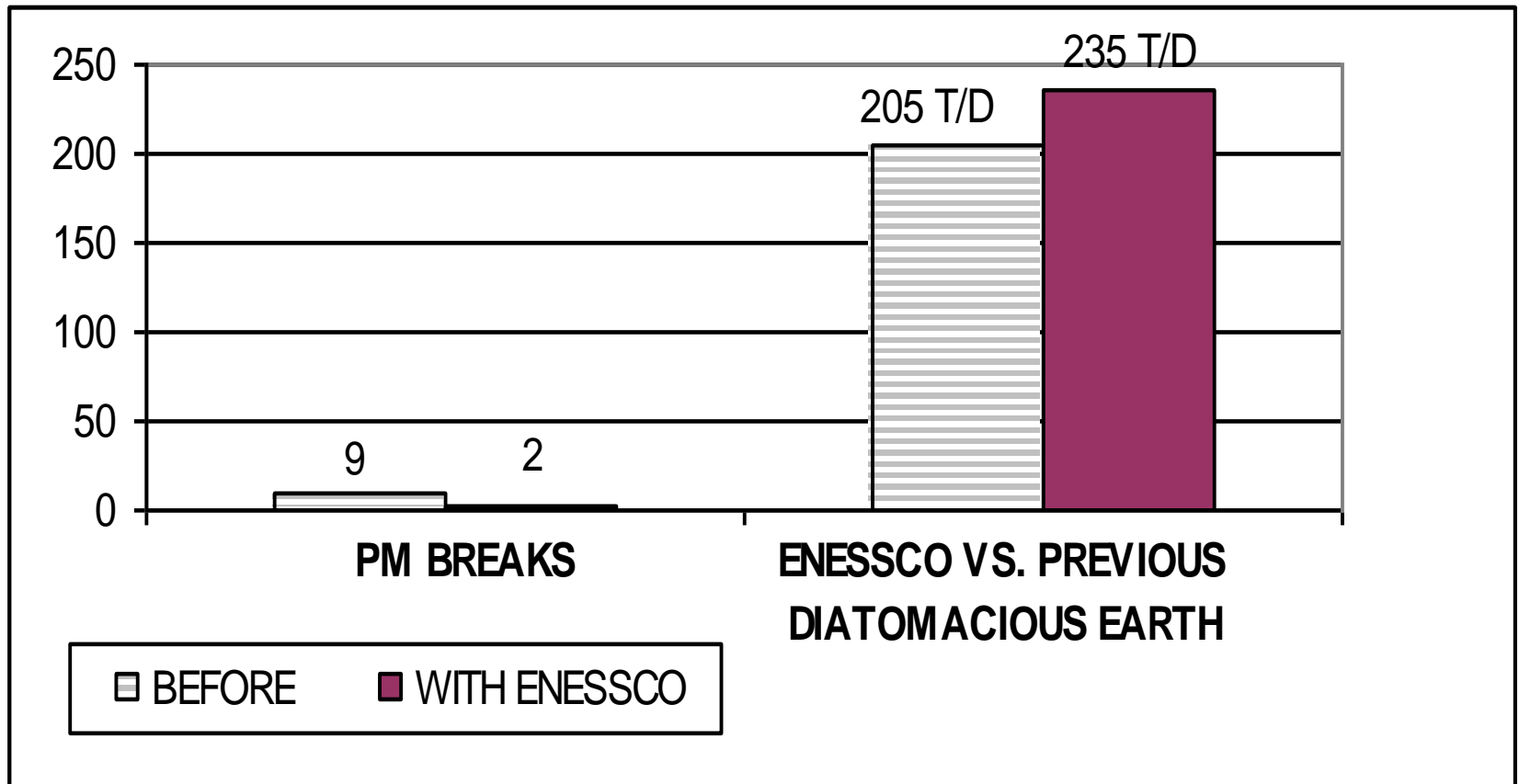
REFERENCE CASE STUDY #1: Midwest - Corrugating Medium

- Fourdrinear(2)- 18# to 40#, 100% OCC
- 100% Closed Water System
- ENESCO Goals:
 - Reduce Cost of Chemical For Wax Control
 - Increase Quality Production
 - Reduce Downgraded/Culled Production
 - Reduce Stickies & Wax Deposition
 - Reduce Splices at the Rewinder

Initial Performance Of ENESSCO Program



Extended Production Benefits





Chemical Comparison

Chemical Use Before

- Defoamer
- Felt Wash
- Press Roll Treatment
- Starch
- Diatomaceous Earth

Chemical Use After Chemical Modification

- 60% Reduction
- 80% Reduction
- Eliminated
- 50% Reduction
- Enessco Cost Lower than Diatomaceous Earth



Cost Justification of ENESSCO Chemistry

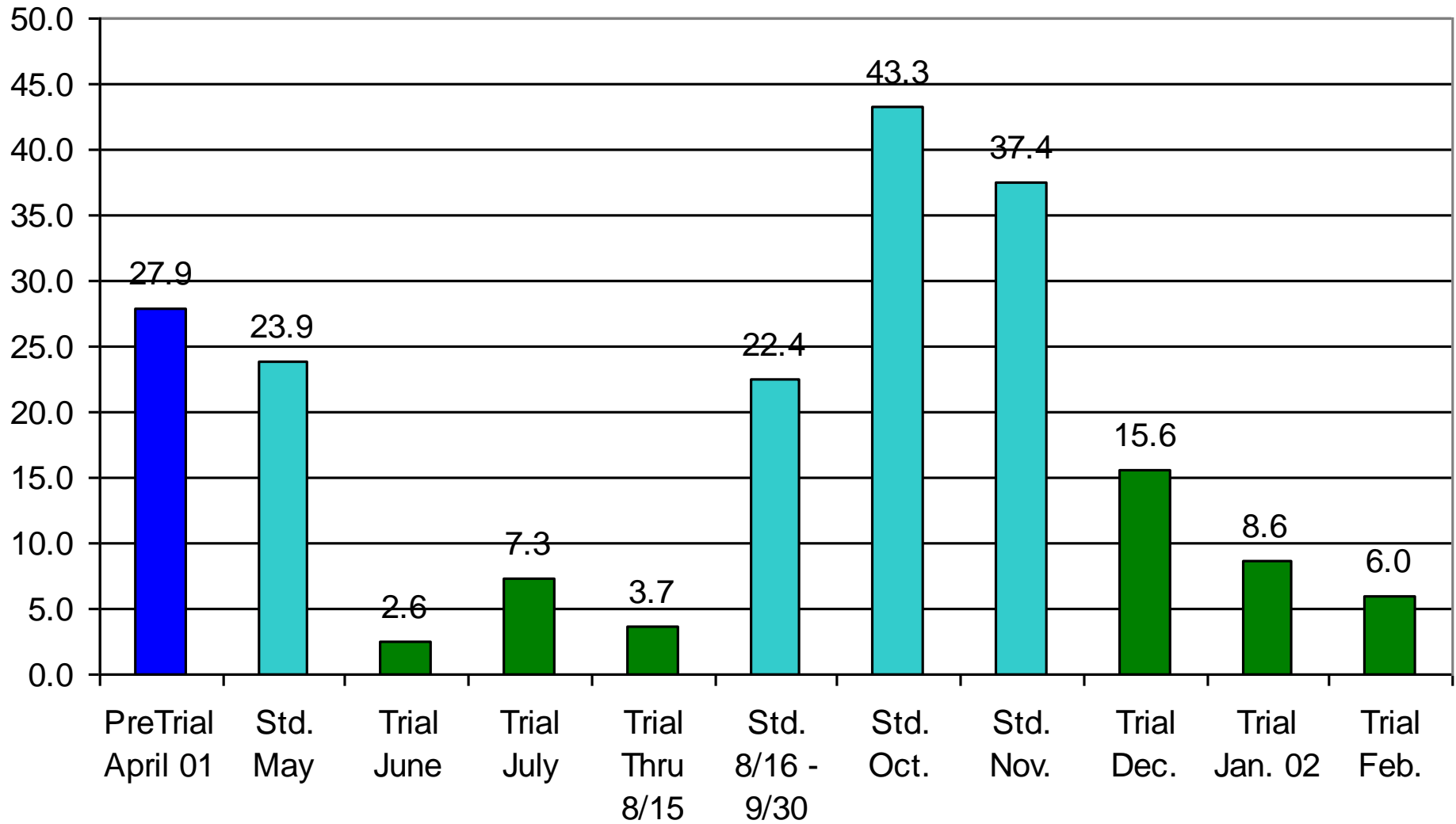
- Machine Operation
 - **6%-8% Production Increase**
 - 90% Lower Culls
 - 70% Fewer Splices
 - 90+% Reduced Stickies Deposition
 - **Program Justification Easily**
 - Operational Savings
 - Savings of \$0.80/Treated Ton by replacing DE with Enessco S 1000
 - **Reduction of over \$5.50/Ton of other Specialty Chemicals**
- EXCEEDS 3 to 1 ROI.**



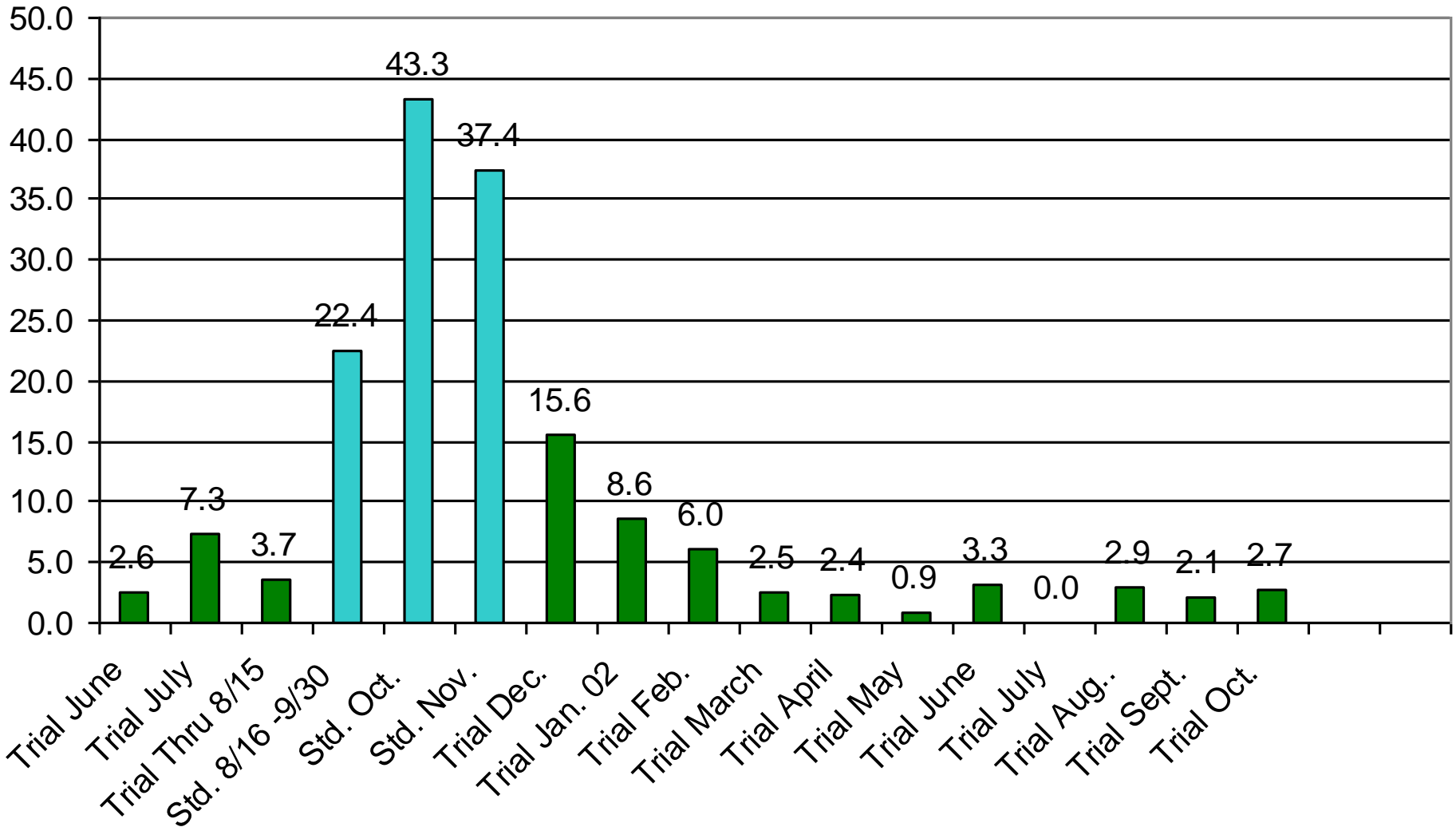
REFERENCE CASE STUDY #2: Northeast - Linerboard

- Fourdrinear- 28# to 42# (100% OCC)
- Surface Water, Summer- Closed System
- ENESCO Goals:
 - Reduce Stickies/Wax Downgrades & Culls
 - Maximize Production by improving Fabric Performance and Minimizing Dryer Deposition
 - Reduce Anti-Skid, < Slide Angle Variation

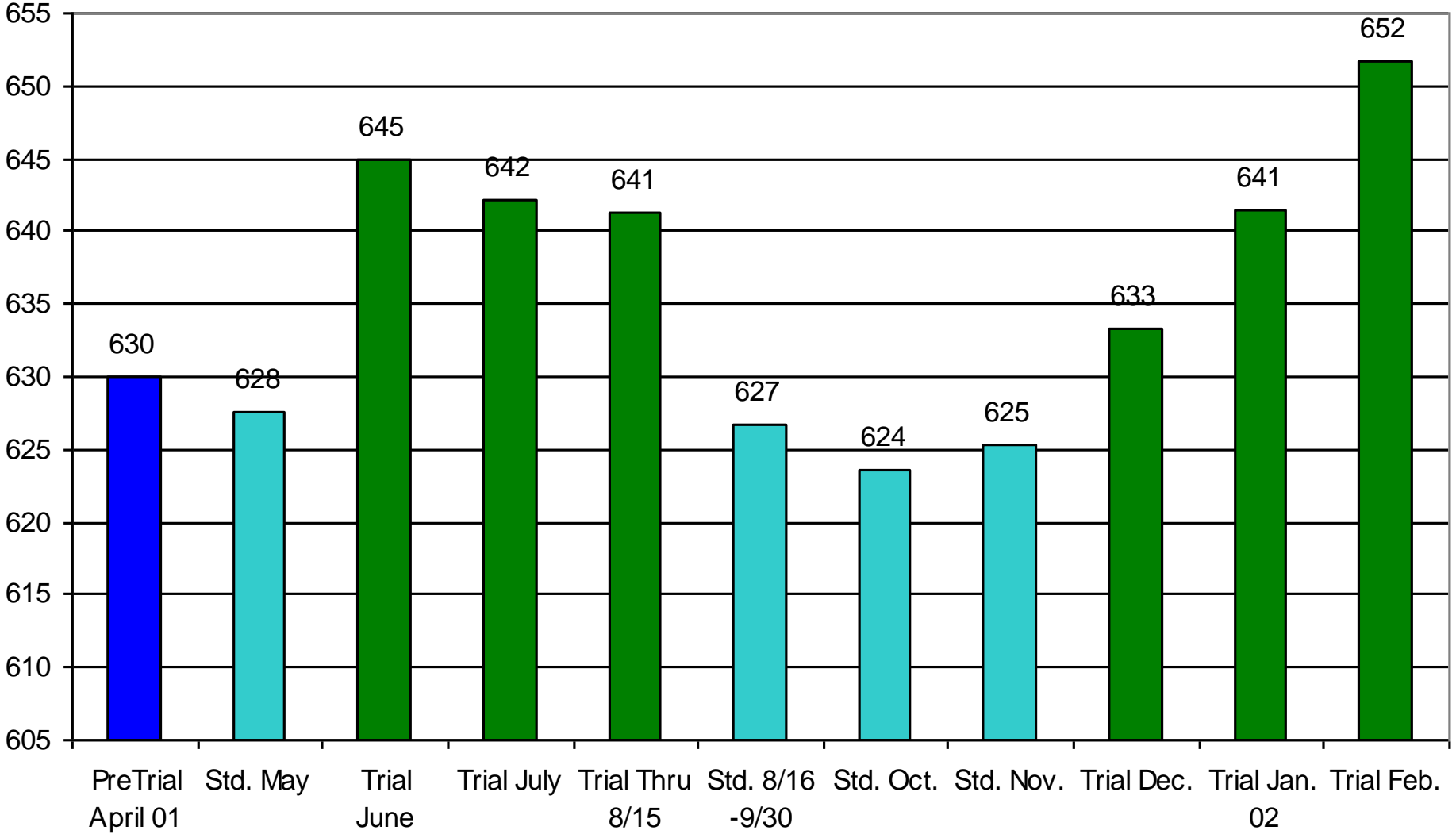
Cull Tonnage - Dirt



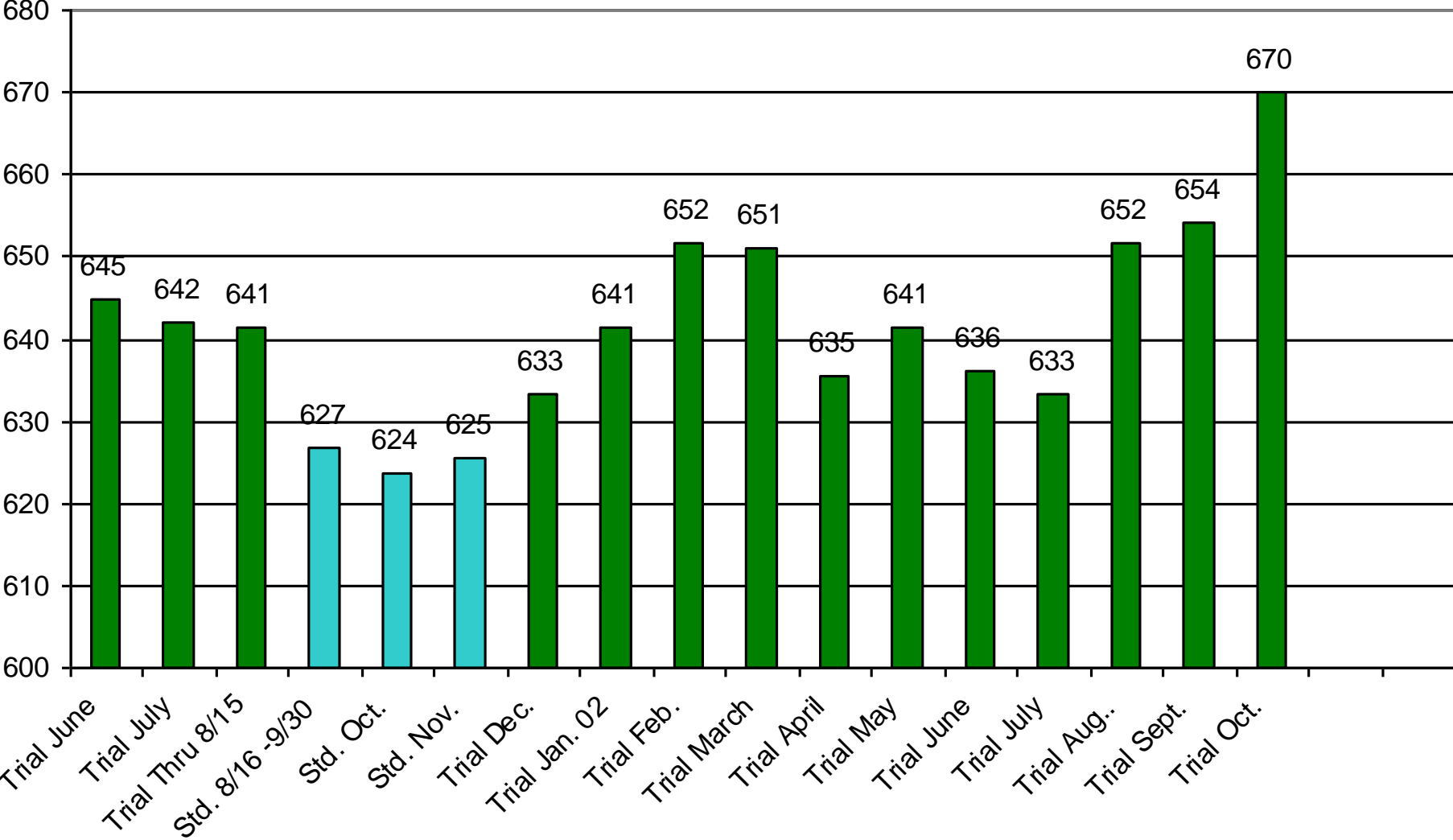
Cull Tonnage - Dirt



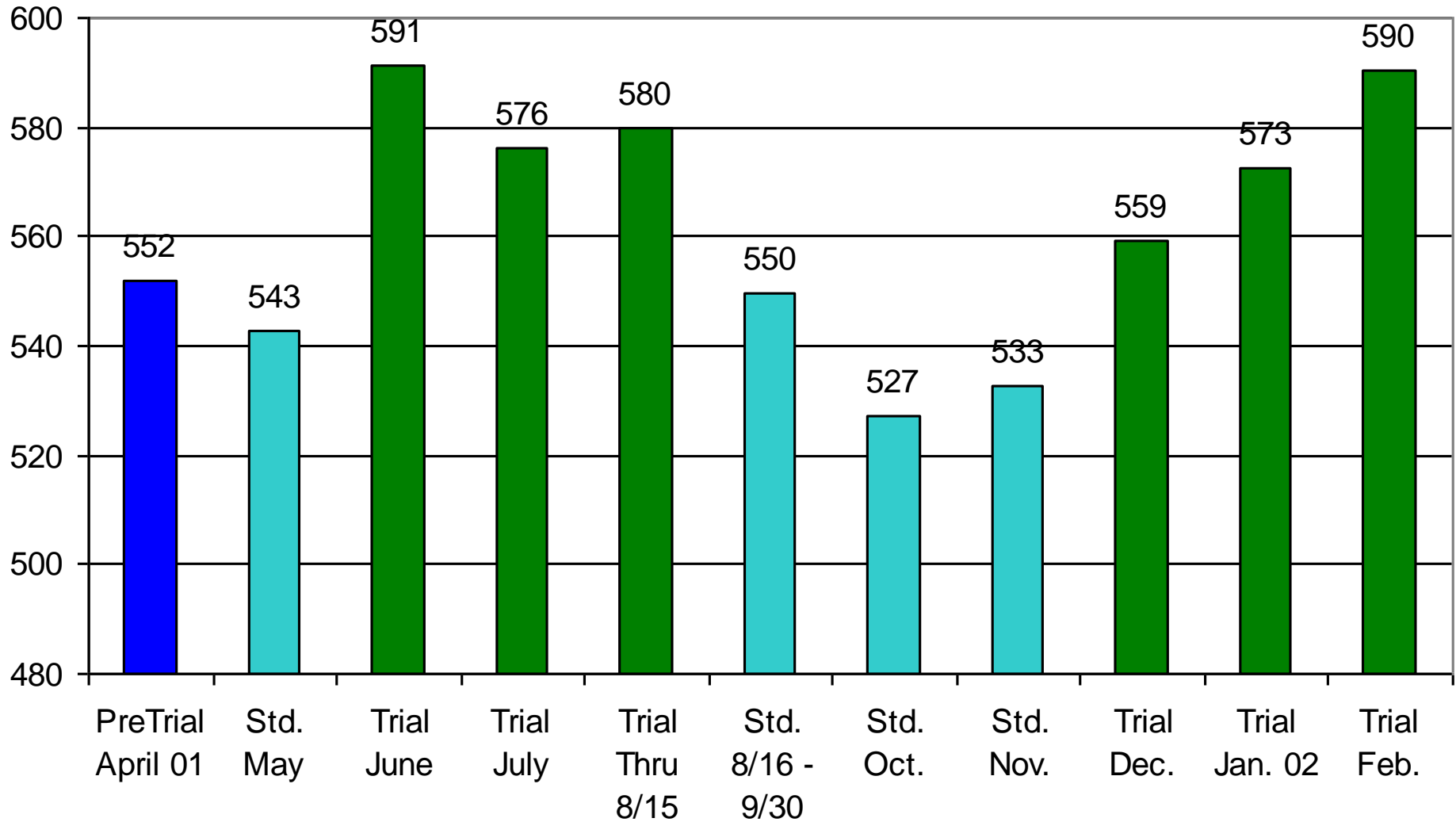
PM Tons



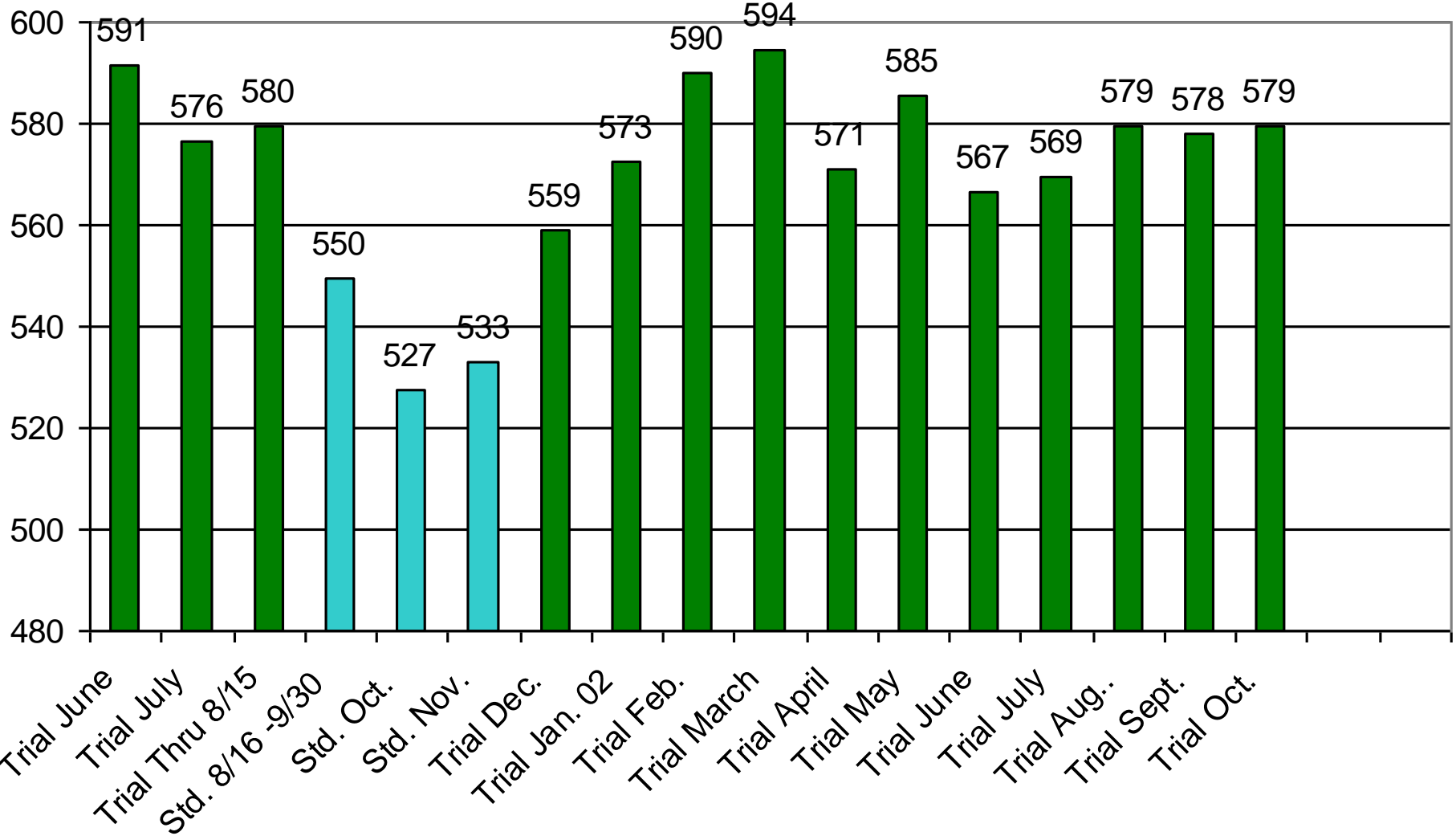
PM Tons



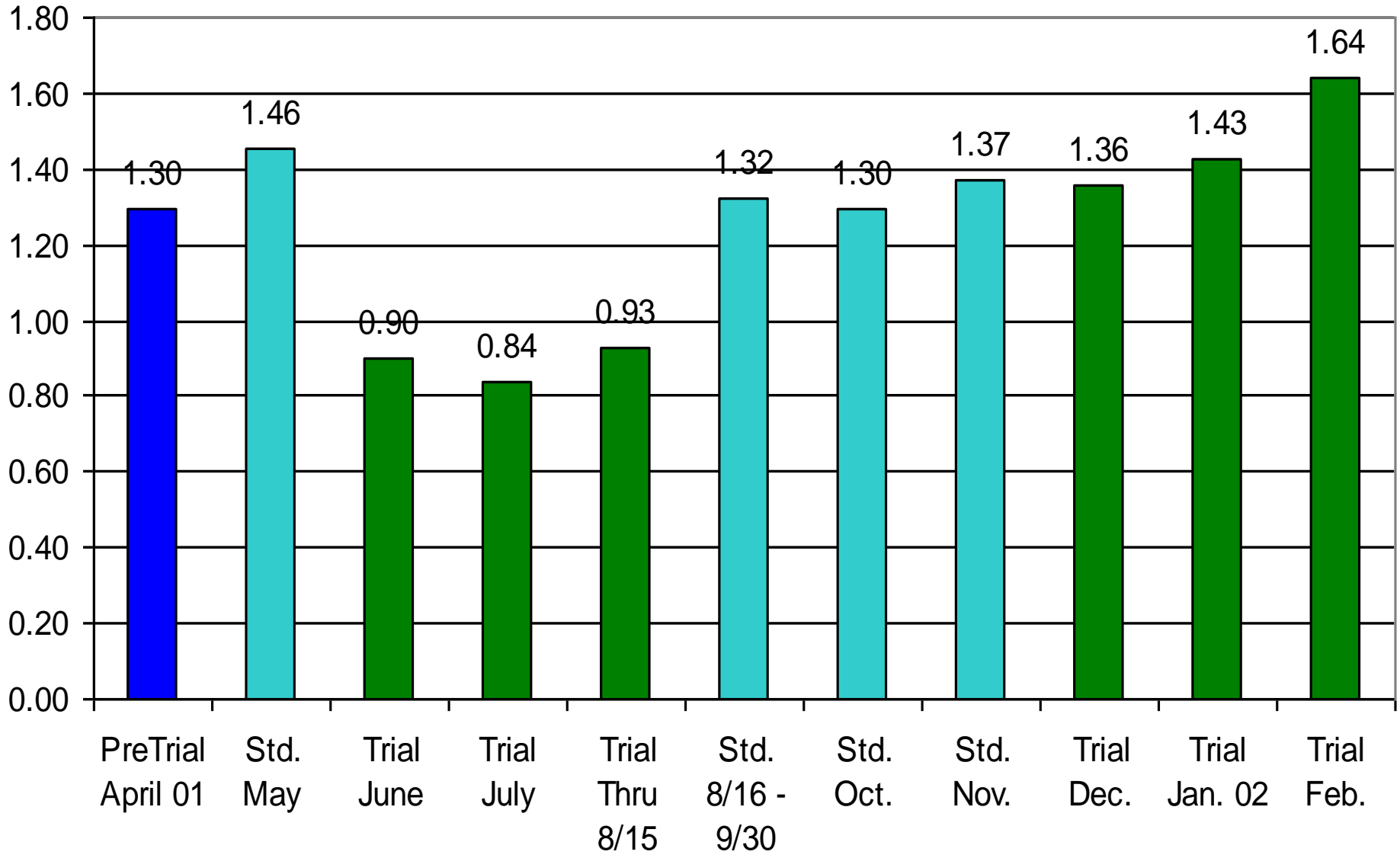
First Quality



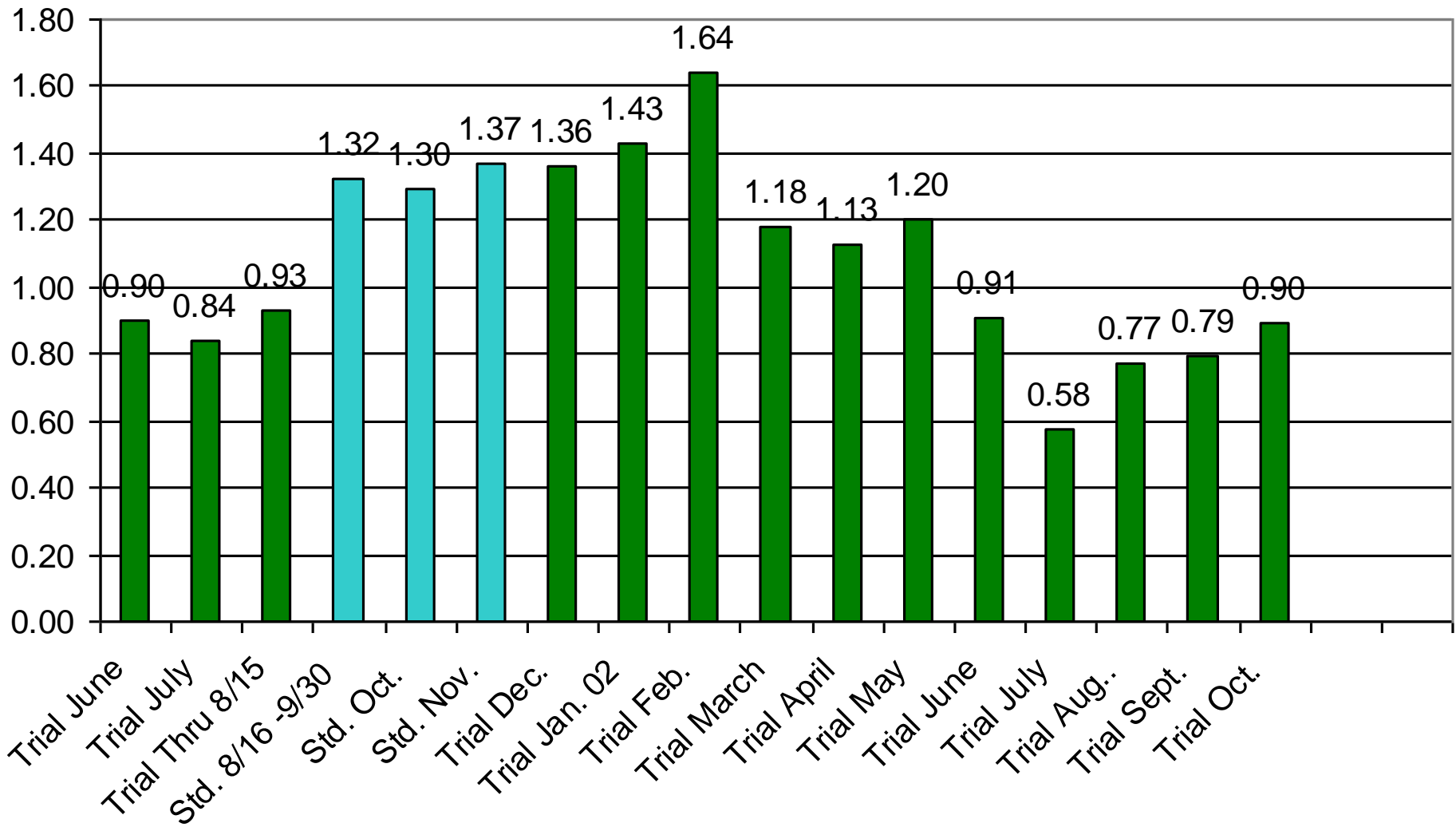
First Quality



Antiskid



Antiskid





Cost Justification of ENESSCO Chemistry

- Machine Operation
 - **4% Production Increase**
 - **8% Increase: First Quality Production**
 - 80% Cull Reduction
 - Maintained Lowest Grade OCC usage
 - 2% Yield Gain
 - **Program Justification Easily**
 - Operational Benefit
 - Improved Strength
 - More uniform sheet CD profile
 - Improved Press Section performance
 - Improved Dryer Section Performance
 - < Antiskid 40%
- EXCEEDS 3 to 1 ROI.**



ENESSCO Trial Approach

- System Survey to confirm Enessco S 1000 benefits can be realized.
 - Sample Final Stage Screening Operations
 - Sample Final Stage Lightweight Removal Equip.
 - Define Stickies/Wax Operational Issues.
- Based on Assessment of Mill Process:
 - Initiate Enessco at 0.80 – 1.0 Dry LB/Finish production Ton



Proposed Trial Approach

PHASE #1

- **1st 2-Week Period**
- **Monitor:**
 - Screening Efficiency
 - Lightweight Cleaners
 - Sheet Slide Angle Improvement
 - Document Improving Trends On Machine

PHASE #2

- **2nd 2-Week Period**
- **Monitor:**
 - Machine Speeds
 - Incremental Production
 - Reduction Downgrades & Culls; < Dirt Count
 - Sheet Strength
 - Other Chemical Use
 - Document ROI



Anticipated ENESSCO Benefits

PHASE #1

■ **Benefits:**

- Screening Rejects Removal Improved 2 x
- Lightweight Cleaner Rejects Removal Improved 3-6 x
- Sheet Slide Angle Improvement
20-50% Improvement

PHASE #2

■ **Benefits:**

- Production
 - 85+% < Culled Rolls
 - 2-4% Increased T/D
- Increased Strength
- Chemical Savings
 - Antiskid(30+%), Defoamer(20%) Polymer, Strength, Felt Wash, Cleaning Chem.
- Steam Savings



CLOSING

- ENESCO Chemical Modification Technology Keeps Stickies & Wax Large For Superior Removal Efficiencies.
- The Value of “More Virgin Like” Recycled Fiber is extensive.
- Mill’s Concentrate on Maximizing Profitability, Not Contaminants.



ANY QUESTIONS ???
