

CONSIDERATIONS WHEN USING A WIDE VARIETY OF FIBRE RESIDUALS AS PELLET FEED STOCK

Scott Bax
Senior Vice President Operations
Scott.Bax@pinnaclepellet.com

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AGENDA

1 Introduction – Pinnacle overview

2 Understanding fibre residuals

A Mill residuals

B Harvest residuals

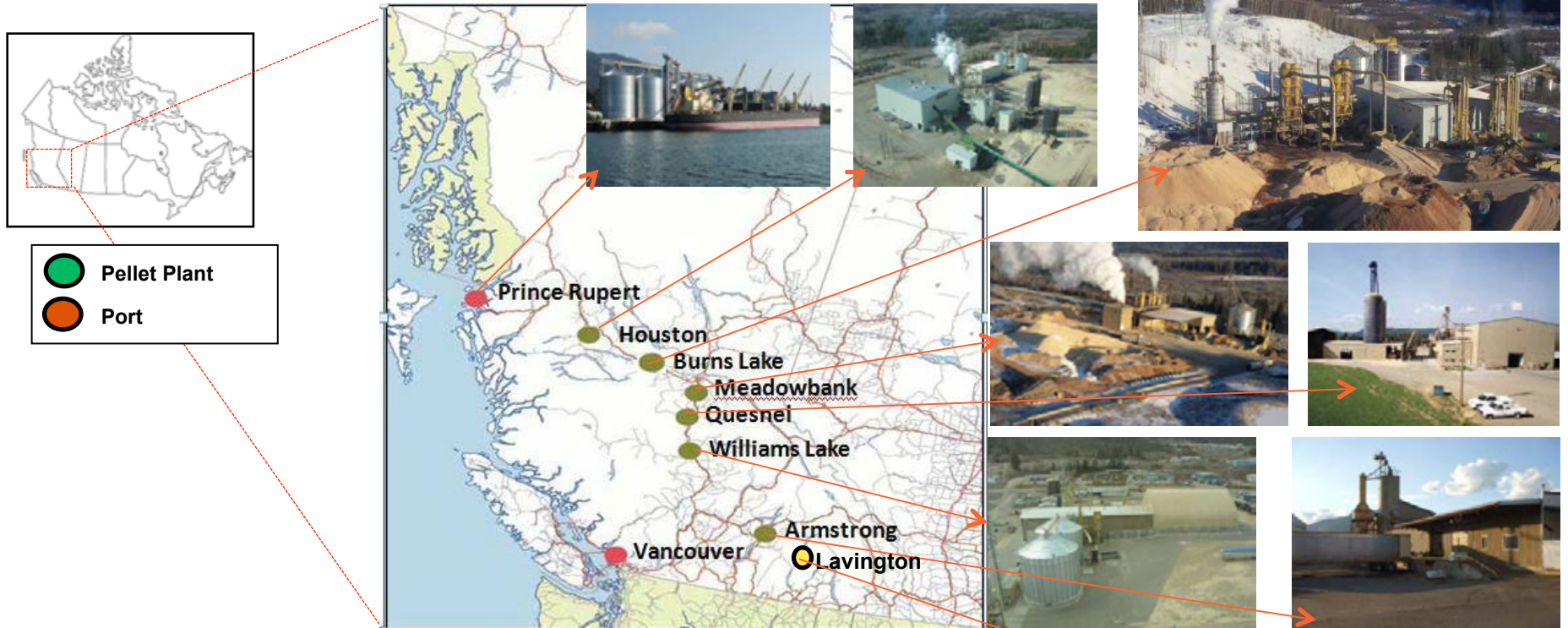
C Stand ‘residuals’

3 Pelleting process overview

4 Know your customer

5 Conclusion

PINNACLE OVERVIEW



- All operations in British Columbia, Canada
- **Seven plants, production capacity ~1.5 MM MT / year;**
plant size varies from 60,000 MT to 440,000 MT per year
- **Wholly owned port terminal** in Prince Rupert (in 2014)
- Newest plant, Lavington, commissioned in Q4 2015

PINNACLE OVERVIEW

Pinnacle's Lavington LP Plant – commissioned Oct. 2015



Pinnacle's Westview Terminal – commissioned Nov. 2013



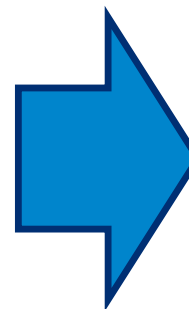
Cascade Chute Ship Loading

UNDERSTANDING FIBRE RESIDUALS

- **Mill residuals** – sawdust, shavings, composer, trim-ends, bark (hog), log ends, species
- **Logging residuals** – tops, branches, low grade logs, species...
- **Stands** – low grade stands, fire kill, decadent MPB...



Carbon 'Neutral' Fuel



FIBRE RESIDUALS

- Newton's third law is: For **every action**, there is an **equal and opposite reaction**
- Your system is perfectly designed to deliver the results it currently produces.
- Each type or category of residuals will have a different impact on your business.
 - Work to understand these impacts before making a change
 - Know your customers exceptionally well

What gets measured, gets managed...

- **Fibre (raw material) costs** – inclusive of transportation (FOB)
- **Fibre conversion costs** – particle sizing and moisture reduction
- **Additional process equipment costs** – what machine centres or modifications are required to address each type of residual type
- **Repair & maintenance costs** – impacts of each residual type (increased wear and tear, downtime, electrical costs, dryer performance etc.)
- **Pellet quality specifications** – know your customer exceptionally well. Impacts on fines, durability, ash, energy, trace elements etc.

1) Mill residuals – sawdust, shavings, composer, trim-ends, bark (hog), log ends

- How does the fibre get loaded on to a truck
- When does the facility do its maintenance
- How will metal (rocks) be removed
- QC of loads
- What species is the mill consuming (delivering)
- Seasonality
- Consistency of supply (linked or independent to above)

2) Logging residuals – tops, branches, low grade logs, species

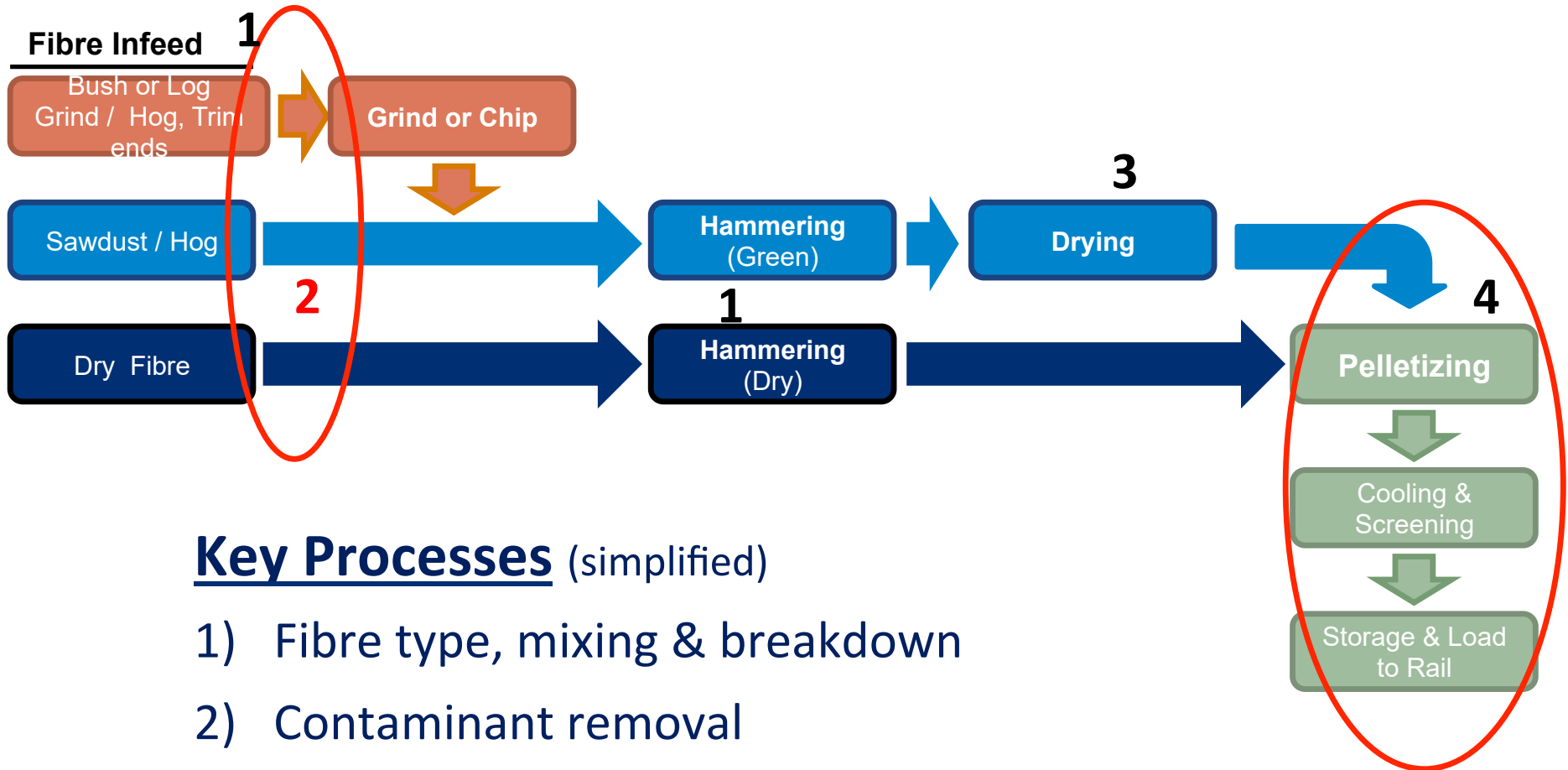
- How does the fibre get loaded on to a truck
- Is there an active plan to avoid contamination
- QC of delivered loads
- How will rocks (metal) be removed
- What species being delivered
- Seasonality
- Consistency of supply (linked or independent to above)

3) Stands – low grade stands, fire kill, decadent MPB...

- Adherence to your business model (does it include management of Standing Timber Inventory, Licence(s), harvesting, silviculture?)
- How does the fibre get loaded on to a truck
- Is there an active plan to avoid contamination
- QC of delivered loads
- What species being delivered
- How will rocks (metal) be removed
- Seasonality
- Fibre storage
- Consistency of supply (linked or independent to above)

Operations Overview – Fibre residual optimization

Simplified Conversion Process

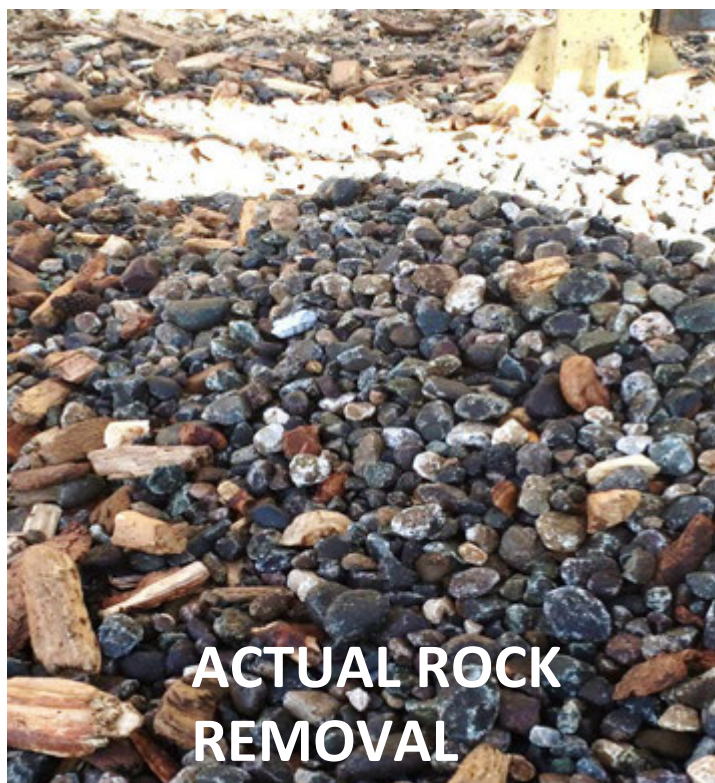


Key Processes (simplified)

- 1) Fibre type, mixing & breakdown
- 2) Contaminant removal
- 3) Dryer and Drying
- 4) Pelletizing & Finished product screening

Fibre residual optimization - Challenges

ACTUAL METAL REMOVAL



ACTUAL ROCK REMOVAL

KNOW YOUR CUSTOMER

1) Know the product specs perfectly

- Fines, durability, particle size
- Contamination
- Ash Content & elements
- Particle size distribution

2) Test regularly and proactively

- See #1
- Don't get caught off guard

3) Have in place a management plan

- For contaminants & specification adherence
- Have a trail of due diligence

4) Be redundant

- Don't rely on one solution
- Employ multiple solutions at different stages of the process



There is no one size fits all solution

- Fibre residual diversity has both Pro's and Con's
 - **Pro's** – more secure fibre supply; lower cost;
 - **Con's** – more variability, more machine centres; less consistency; higher costs; varying pellet quality
- Customer First
 - Start with the end in mind,
 - Don't move forward in isolation



Thank you



Scott Bax, SVP Operations
Scott.Bax@pinnaclepellet.com