

PURCHASED LIME QUALITY CONTROL

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Understand the Chemical and Physical Properties of Purchased Lime to Improve Mill Efficiency

Variation in the quality of purchased lime has led to serious process disruptions and shutdowns at many mills. Problems have centered on poor causticizing, increased plugging of white liquor pressure filters, decrease in lime mud solids content, and increased lime kiln ring formation. Lime purity requirements for Kraft mills are much higher than required by other commercial users. This is because non-process element impurities accumulate in the lime cycle of a Kraft mill (McGuffie and Taylor, 2007). Previous work has shown that increased levels of clays, iron and magnesium in purchased lime and limestone have resulted in process disruption (Taylor et al., 2008).

This course looks at the chemical and physical properties of purchased lime and how they can affect mill operation. This course is based on site visits to limestone quarries and mills along with a review of the technical literature. The following items are covered:

- The mining of limestone – variability of chemical and physical properties of mined limestone. Factors at the quarry that affect limestone quality and variability.
- Production of lime at the quarry – how kiln operation affects the properties of produced lime. Degree of burning and causticizing properties. Effect of kiln fuel.
- Measurements of lime properties made at the quarry – slaking rate, residual carbonate, available lime, loss-on-ignition (LOI).
- How the properties of produced lime are affected by storage and transport to the mill (significant changes can occur during shipment).
- How variation in chemical purity of purchased lime can affect mill operation.
 - Accumulation of non-process element compounds (NPEs)
 - Plugging of white liquor pressure filters
 - Residual carbonate effect on causticizing efficiency
- Effect of variations in physical properties of purchased limestone on mill operation.
 - Physical strength, reactivity, slaking rate
 - Causticizing properties
- Comparison of reburned lime and purchased lime physical properties.
- Quality control of purchased lime – how to apply this information in the mill.

References:

MCGUFFIE, B., and TAYLOR, K., "Non-Process Element Mass Balance Improves Recast and Lime Kiln Efficiency at Elk Falls Mill", *Pulp & Paper Canada*, 108(3), T49-55 (2007). 2006 John S. Bates Award for Best Branch Paper.

TAYLOR, K., ADDERLY, R. and BAXTER, G., "Tubular Backpulse Pressure Filters: Identification of Acid-Insoluble Filter Plugging Compounds and Optimization of Acid Washing Procedures", Best Mill Paper, PAPTAC Pacific Coast Branch Conference, April 18-19, 2008. Published in *Tappi Journal*, 10(1) 17-23 (January, 2011).