Proven Solutions to Traditional Problems:
Comparing Lime Slaking, Traditional Low Density Lime, and High Density Lime Systems

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MERRICK
Discussion Topics

• Introduction to Lime types and Slurry preparation
• Design considerations for storing, feeding, and flow promotion of dry lime
• Discussion on the type of equipment used in each type of system
• The problems of Lime systems
Lime Types

- Calcium Oxide (CaO) - AKA Pebble Lime or Quicklime
  - Bulk Density 55-60 lbs/ft³
  - Must be slaked: CaO + H₂O → Ca(OH)₂
  - Must have grit removed

- Calcium Hydroxide (Ca(OH)₂) - AKA Slaked Lime or Hydrated Lime
  - Bulk Density 25-35 lbs/ft³
Slurry Preparation

- Calcium Oxide
  - Slaking
  - Grit Removal
  - Holding/Aging
  - Recirculation
- Calcium Hydroxide
  - Low Density Hydrated Lime Slurry
    - Recirculation
  - High Density Hydrated Lime Slurry
    - 30-40% Concentration by weight
Slurry Preparation
Design Considerations

- Storage Silo
  - Proper Filling
  - Dust Collection
  - Promote Mass Flow
- Lime Feeding Equipment
  - Prevent material segregation
  - Promote consistent flow
  - Do not use compressed air
Types of Equipment

- Calcium Oxide
  - Slaker
  - Grit Removal
  - Holding/Aging Tank
  - Recirculation Pumps
  - Control Valves
- Low Density Hydrated Lime System
  - Mixing/Batch Tank
  - Recirculation Pumps
  - Control Valves
Types of Equipment

- High Density Hydrated Lime System
  - Mixing/Batch Tank
  - Metering Pumps
# Problems with Lime Systems: Maintenance

<table>
<thead>
<tr>
<th>Slaking System</th>
<th>Low Density Lime System</th>
<th>High Density Lime System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaling of the pipe lines, troughs, slakers, etc.</td>
<td>Scaling of the pipe lines, troughs, tanks, etc.</td>
<td>N/A HDLS Systems produce significantly less scale</td>
</tr>
<tr>
<td>Acid cleaning</td>
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<td>N/A HDLS Systems produce significantly less scale</td>
</tr>
<tr>
<td>Manual cleaning, pigging, etc.</td>
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<td>N/A HDLS Systems produce significantly less scale</td>
</tr>
<tr>
<td>Replacement of pipes &amp; valves due to scaling</td>
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<td>N/A HDLS Systems produce significantly less scale</td>
</tr>
<tr>
<td>Cleaning the slaker &amp; grit remover</td>
<td>N/A LDLS Systems do not require grit removal</td>
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</tr>
<tr>
<td>Removal/Disposal of grit</td>
<td>N/A LDLS Systems do not have grit; only a very minimal amount of impurities in the hydrate, maybe a few lbs/month</td>
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Problems with Lime Systems: Housekeeping

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<th>High Density Lime System</th>
</tr>
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<tbody>
<tr>
<td>Slaking systems are never dust tight</td>
<td>LDLS Systems can be made dust &amp; water tight</td>
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</tr>
<tr>
<td>Dust &amp; Vapor remover must be cleaned regularly</td>
<td>Breather/filter bag &amp; nozzle cleaned once per week</td>
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</tr>
<tr>
<td>Slaking equipment must be cleaned routinely. Material is usually not re-usable</td>
<td>Slurry batch tanks must be cleaned routinely. Material is usually not re-usable</td>
<td>Slurry batch tanks require a brief wash down once a week but the material is kept inside the slurry tank; a very clean procedure</td>
</tr>
</tbody>
</table>
## Problems with Lime Systems: Pumping System

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<tr>
<td>Slurry must be pumped at a minimum of 2.5 ft/sec</td>
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<td>30 to 40% by weight slurries do not settle; pipeline velocity is a moot point</td>
</tr>
<tr>
<td>Recirculation loop required</td>
<td>Recirculation loop required</td>
<td>HDLS slurries can be pumped to the use points, stopped and restarted without flushing of the pipelines</td>
</tr>
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<td>Pumps for dilute slurries must be sized to pump the amount of slurry plus the excess required for recirculation; requires automatic dosing valve at point of application</td>
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<td>Pumps for HDLS are always smaller as the amount of slurry required can be up to 7 times less due to the high density</td>
</tr>
</tbody>
</table>
Thank you for your time, we hope that this presentation has been helpful.

Please contact our office for more detailed information about each of our system types or to discuss specific needs of your application.

For more information about liquid lime handling systems contact
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