Operational Goals

- To achieve quality consistency
- To achieve color consistency
- Maximize first grade quality yield
- Minimize bat loss
- Optimize the raw material reserve
The Brick Maker’s Reality:

“Over 80% of the Brick Makers success lies with his raw material and how he uses it”

Garth Tayler
05/06/2013
Optimization process.....

• Exploration/drilling
• Lab analyses/Characterization
• Quantify useable reserve and in-ground ratios
• Define mining composite(s)
• Determine mining plan
• Mining and stockpiling
• Lab work to develop optimum body mix
• Draw trial studies
• Large batch firing simulations
• Plant trials
• Finalize plant operational conditions
• Product acceptance
Tulsa Plant
Holland Pit
Weathered Pennsylvania Shale layers.
Tulsa Shale: Mineralogy

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free quartz</td>
<td>31%</td>
</tr>
<tr>
<td>Muscovite</td>
<td>20.3%</td>
</tr>
<tr>
<td>Potassium Felspar</td>
<td>3.9%</td>
</tr>
<tr>
<td>Plagioclase</td>
<td>8.7%</td>
</tr>
<tr>
<td>Kaolinite</td>
<td>5.6%</td>
</tr>
<tr>
<td>Amorphous clay</td>
<td>21.3%</td>
</tr>
</tbody>
</table>
# Carbon and Sulfur with 5 ft depth increments

<table>
<thead>
<tr>
<th>Typical:</th>
<th>Sulfur</th>
<th>Carbon</th>
</tr>
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<tbody>
<tr>
<td>Sample 1</td>
<td>0.0514</td>
<td>0.3172</td>
</tr>
<tr>
<td>Sample 2</td>
<td>0.0483</td>
<td>0.3118</td>
</tr>
<tr>
<td>Sample 3</td>
<td>0.0987</td>
<td>1.1502</td>
</tr>
<tr>
<td>Sample 4</td>
<td>0.0658</td>
<td>1.1473</td>
</tr>
<tr>
<td>Sample 5</td>
<td>0.0733</td>
<td>0.9430</td>
</tr>
<tr>
<td>Sample 6</td>
<td>0.0676</td>
<td>0.9266</td>
</tr>
<tr>
<td>Sample 7</td>
<td>0.0613</td>
<td>1.0461</td>
</tr>
<tr>
<td>Sample 8</td>
<td>0.1041</td>
<td>1.0738</td>
</tr>
<tr>
<td>Sample 9</td>
<td>0.1077</td>
<td>1.1094</td>
</tr>
<tr>
<td><strong>Average:</strong></td>
<td><strong>0.0753</strong></td>
<td><strong>0.8917</strong></td>
</tr>
<tr>
<td><strong>Std Dev:</strong></td>
<td><strong>0.0226</strong></td>
<td><strong>0.337</strong></td>
</tr>
<tr>
<td><strong>CV:</strong></td>
<td></td>
<td><strong>37.7%</strong></td>
</tr>
</tbody>
</table>
Revised Extraction Order

<table>
<thead>
<tr>
<th>Cut</th>
<th>Cut</th>
<th>Cut</th>
<th>Cut</th>
<th>Cut</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>O/B Extraction</td>
<td>O/B Extraction</td>
<td>O/B Extraction</td>
<td>O/B Extraction</td>
<td>O/B Extraction</td>
</tr>
<tr>
<td>Bench-1</td>
<td>Bench-1</td>
<td>Bench-1</td>
<td>Bench-2</td>
<td>Bench-3</td>
</tr>
</tbody>
</table>

Sump

200'

Extraction

Remaining Bench
DRAW TRIALS:

Matrix: 2, 4, 6, 8 hours at 1500°F, 1600°F, 1700°F, and 1800°F

• 80% Blue 20% Yellow
• 50% Blue 50% Yellow
• 100% Blue
• 100% Yellow
ACME BRICK
TECHNICAL CENTER

DRAW TRIALS
TEST KILN
ACME BRICK TECHNICAL CENTER

DRAW TRIAL TEST KILN
TULSA OPTIMIZATION STUDY

DRAW TRIAL
Large Batch firings......
Optimization process.....

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Finalize plant operating conditions:

Kiln improvements.....
After
Before
After

TULSA PLANT DATAPAQ FILE: 04/09/2013
Product acceptance....
Thank you!