Kentucky Crushed Stone Industry

Is there light at the end of the tunnel?

John S L Morgan
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John Morgan - Background

- Degree in Mining Engineering from the Royal School of Mines in London
- Mine planning engineer for coal company in Appalachia
- VP of Operations for an aggregate company since 2005. Responsible for two limestone quarries and one sand and gravel operation. Annual Production of about 5 M tons
- Owned a mining consulting company since 1990
- Consulting assignments worldwide
US Crushed Stone Industry

Crushed Stone - Annual Production Trends

Source: USGS Minerals Yearbook
US Crushed Stone Industry

65% of Crushed Stone is Limestone
US Crushed Stone Industry

- Production Distribution for US Crushed Stone Industry

63% of Production comes from the 19% of operations producing more than 0.5 M ton per annum

Source: USGS 2010 Minerals Yearbook
US Crushed Stone Industry

- End Use
  - Aggregates
  - Cement
  - Lime
  - Flue Gas Delsulfurization
  - Agricultural
US Crushed Stone Industry

- **Top 10 Producers**
  - Vulcan
  - Martin Marietta
  - Lehigh Hanson
  - Oldcastle
  - LaFarge
  - Cemex
  - Carmeuse
  - Rogers
  - Holcim
  - New Enterprise Stone & Lime

- **Top 10 produced 619 M tons or 49% of 2010 total**
- **Top 100 produced 1,007 M tons or 79% of 2010 total**

- **Ongoing consolidation:**
  - Vulcan – Martin Marietta
  - Summit Materials
  - Bluegrass Materials – Acquired Cemex Kentucky Assets in August 2010
  - Vantacore
Consolidation of US Crushed Stone Industry

- Oldcastle purchased Mountain Materials
- Vantacore purchased Winn Materials
Consolidation of US Crushed Stone Industry

- Summit Materials
Consolidation of US Crushed Stone Industry

- Bluegrass Materials – Acquired Cemex Kentucky Assets in August 2010
Industry Consolidation in UK

Takeaway: Consolidation in the US Industry will continue and probably accelerate in 2013
Kentucky Production

Kentucky Production

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>-25.00%</td>
</tr>
<tr>
<td>2003</td>
<td>5.00%</td>
</tr>
<tr>
<td>2004</td>
<td>10.00%</td>
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<tr>
<td>2005</td>
<td>15.00%</td>
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<tr>
<td>2006</td>
<td>10.00%</td>
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<tr>
<td>2007</td>
<td>5.00%</td>
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<tr>
<td>2008</td>
<td>0.00%</td>
</tr>
<tr>
<td>2009</td>
<td>-5.00%</td>
</tr>
<tr>
<td>2010</td>
<td>20.00%</td>
</tr>
<tr>
<td>2011</td>
<td>15.00%</td>
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</tbody>
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Legend:
- Red: Sand and Gravel
- Green: Limestone
Each Operation is Different

- Challenge of dipping seams
- Extreme wall heights
Mine Economics

Financial Model

- Production
  - Tons Mined
  - Tons Processed
  - Saleable Tons

- Revenue
  - Tons Sold
  - Selling Price

- Expense
  - Variable
    - Labour
    - Fuel
    - Utilities
    - Drilling Supplies
    - Blasting
    - Royalty
    - Severance Tax
    - Tyres
    - Lubricants
    - Fleet Spares
    - Plant Repair
  - Fixed
    - Salary
    - Equipment Lease
    - Depreciation
    - Taxes

Difference between tons processed and tons sold is yield

Difference between Saleable Tons and Tons Sold is inventory change
## Mine Economics

### Typical Mine Analysis

<table>
<thead>
<tr>
<th>Production</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tons Mined and Processed</td>
<td>1,650,000</td>
</tr>
<tr>
<td>Overburden / Interburden Tons Removed</td>
<td>1,150,000</td>
</tr>
<tr>
<td><strong>Total Tons Handled in Quarry</strong></td>
<td><strong>2,800,000</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sales</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Saleable Tons</td>
<td>1,450,000</td>
</tr>
</tbody>
</table>

- **Plant Yield is 89%**
- **Stripping Ratio is 0.7 tons of waste per ton of Processed Stone**
Mine Economics

Mine Cost Breakdown

Effect of 10% decrease in Sales Price
Royalty and Severance Taxes are fixed % and depend on specific Mine
Mine Economics

Financial Sensitivity to Input Price Changes

- Historic Changes in AN price
- 8.6% increase in AN price over last 12 months
- Average annual AN price increase over last 5 years of 10%
New focus on highwall stability

30 CFR 56/57.3200 - Correction of hazardous conditions.

SCALING AND SUPPORT
Ground conditions that create a hazard to persons shall be taken down or supported before other work or travel is permitted in the affected area. Until corrective work is completed, the area shall be posted with a warning against entry and, when left unattended, a barrier shall be installed to impede unauthorized entry.

30 CFR 56/57.3130 - Wall, bank, and slope stability.

MINING METHODS
Mining methods shall be used that will maintain wall, bank, and slope stability in places where persons work or travel in performing their assigned tasks. When benching is necessary, the width and height shall be based on the type of equipment used for cleaning of benches or for scaling of walls, banks, and slopes.

30 CFR 56/57.3201 - Location for performing scaling.
Scaling shall be performed from a location which will not expose persons to injury from falling material, or other protection from falling material shall be provided.
Regulatory / Environmental Compliance
Regulatory / Environmental Compliance

MSHA Guidance is that:

“barrier placed 25% of the height of the highwall, from the base of the wall to the inside edge of the barrier, to provide sufficient protection..”

“..provide a sufficient ground control plan..”

Actions:

- Work with operator to design MSHA compliant ground control
- Increased use of pre-split
- Design pre-split to reduce cap rock overhang
Blasting Impacts

- Vibration
  - Scale distance is not adequate
  - Identify critical structures
  - Site Specific criteria

- Air Blast
- Fly Rock
Permitting

Mine Permits
- Issued by State agency
- Defined format and performance standards

Zoning
- Major Issue due to land use conflicts:
  - Noise
  - Dust
  - Vibration
  - Traffic
  - Light
  - Viewshed
Permitting

Trends due to Permitting:

- More remote mining locations
- Underground Mining

Hannibal, MO

Wampum, PA

Joliet, IL

Verona, KY
Understanding your Customer

Changes in the Characteristics of the Industry

- Shortages of Engineers
- Aging of the workforce
- Ability of hourly employees to meet pre–employment requirements

Takeaway: Industry will increase outsourcing