Eastern Longwall Bleeder Systems

Lou Barletta – CONSOL Energy
Eastern Longwall Operations

- 28 Eastern longwall mines producing from 500K to 11 million tons
- 31 operating longwalls
- 3-Entry gates mainly utilized for development
- 4-Entry gates used for deeper gassier mines
- 3 or 4-Entries driven on the set-up utilizing one or two as dedicated bleeder entries
Bleeder System Design and Operation

- Bleeder systems serve a twofold purpose:
  - Continuously dilute and move methane-air mixtures away from the active sections.
  - Relieve the expansion gob contaminants due to atmospheric pressure drops, directing them away from the active longwall section.

- Eastern longwall mines primarily use the flow-through bleeder system.
Flow-Through Bleeder Method
Flow-Through with Internal Ladder
Longwall Mining Operational Changes

- Advances in equipment design, automation technology & improved operating procedures

- Results \(\rightarrow\) Enhanced Safety \(\rightarrow\) Higher Productivity

- Not coincidence or a trial-and-error approach

- Based on sound engineering design with cooperation of MSHA
Improved Panel Geometry

- **Increased Face Widths:**
  - 500’ ➔ 700’ ➔ 900’ ➔ 1100’
  - Extended up to 1450’

- **Extended Panel Lengths:**
  - 6,000’ ➔ 10,000’ ➔ 12,000’
  - Extended up to 14,500’

- Accomplished using engineering principles

- Enhanced safety with less miner exposure during longwall recovery operations
Central & Northern App. mines use 3-entry gates

Southern Appalachian gassy mines use 4-entry gates

Enhanced miner’s safety by reducing exposure to roof & rib hazards

Improved ventilation: longer blocks and fewer crosscuts decreases leakage
Ventilation Changes

- Typical air quantities increased 150 to 200%
- Fewer wrap-around bleeder systems
- Increased capacity of flow-through systems
  - Larger diameter shafts
  - Greater capacity and higher pressure fans
  - Increased fan motor horsepower
  - Improved bleeder and tailgate support
Methane Extraction Systems

- Used on as needed basis
- Supplement the mine’s bleeder system
- Use vertical frac, horizontal in-seam and vertical gob holes
- Vertical frac holes used for gassy, deep, low-permeability coal seams
Horizontal & Gob Hole Layout

VERTICAL DEGAS HOLES

HORIZONTAL DEGAS HOLES
Vertical Methane Extraction Techniques

- Vertical gob holes help control methane in bleeder system
- Gob hole efficiency is improved by use of blowers and/or compressors
Bleeder System Evaluation
## Single Bleeder Fan Districts

<table>
<thead>
<tr>
<th>Mine</th>
<th>No.</th>
<th>Acres</th>
<th>Width</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>18</td>
<td>4,500</td>
<td>880’-1086’</td>
<td>9000’</td>
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<tr>
<td>B</td>
<td>14</td>
<td>3,180</td>
<td>735’-985’</td>
<td>8,750’</td>
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<td>C</td>
<td>10</td>
<td>3,030</td>
<td>980’</td>
<td>11,500’</td>
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<td>D</td>
<td>13</td>
<td>2,900</td>
<td>985’</td>
<td>10,000’</td>
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<tr>
<td>E</td>
<td>9</td>
<td>2,880</td>
<td>1050’</td>
<td>12,400’</td>
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<tr>
<td>F</td>
<td>14</td>
<td>2,570</td>
<td>730’ – 980’</td>
<td>10,050’</td>
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<tr>
<td>G</td>
<td>9</td>
<td>2,360</td>
<td>990’</td>
<td>10,000’</td>
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## Multiple Fan Bleeder Districts

<table>
<thead>
<tr>
<th>Mine</th>
<th>No.</th>
<th>Acres</th>
<th>Width</th>
<th>Length</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>23</td>
<td>6,070</td>
<td>735’ – 1086’</td>
<td>9,700’</td>
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<td>985’ – 1086’</td>
<td>10,600’</td>
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<td>C</td>
<td>20</td>
<td>3,620</td>
<td>585’ – 735’</td>
<td>8,000’</td>
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<tr>
<td>D</td>
<td>17</td>
<td>3,500</td>
<td>735’ – 985’</td>
<td>9,000’</td>
</tr>
<tr>
<td>E</td>
<td>10</td>
<td>3,050</td>
<td>800’</td>
<td>10,000’</td>
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<tr>
<td>F</td>
<td>11</td>
<td>2,800</td>
<td>742’ – 1050’</td>
<td>9,500’</td>
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<tr>
<td>G</td>
<td>10</td>
<td>2,190</td>
<td>1,080’</td>
<td>4,300’-8,650’</td>
</tr>
</tbody>
</table>
Two Longwalls in Adjacent Panels

LW #1

LW #2

LW #1
Two Longwalls in the Same District

LW #1

LW #2
Major Issues

- Prescriptive bleeder system requirements rather than performance based.
- Regular examinations of areas considered to be Gob.
- Arbitrary limits on number of panels in a district.
Looking Forward

- Tailor systems to site-specific conditions
- Learn from large flow-through bleeder systems
- Better utilize available industry wide technical & field expertise
- Form joint panels to study proposed regulatory directives
Ventilation Summit
National Mine Health and Safety Academy
February 21 – 22, 2007

We Mine the Coal That Powers the Nation