US – India Coal Working Group

Steep Slope Mining, & Overburden Dump Stability

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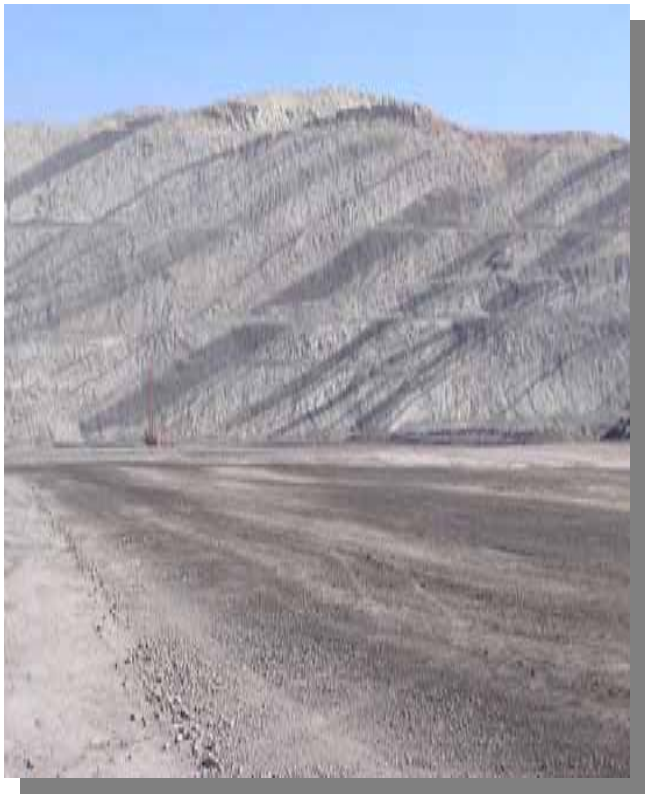
Steep Seam Coal Mining

- **U.S. Activities on Steep Seams**
  - Underground Extraction
    - **A few US mines are competitive working 15 - 18% grades, both CM and LW Units**
    - **Mines located in Maryland, Alabama, Wyoming and Colorado**
    - **Equipment designs enhancements, braking for rolling equipment, increased horse power conveyors with braking, diesel haulage is very beneficial for supplies.**
    - **Excellent Maintenance Program needed to support Production demands**
    - **Trained supervisors and qualified miners**



Steep Seam Underground Mining

- Economics prohibit mining steep seams currently in U.S.
- Production is inherently low
- Cost is extremely high
- Greater safety risk with existing technology
- Specialized equipment is more capital intensive
- Maintenance is of greater importance to meet production goals

Mettiki Coal, LLC

- **Mettiki Coal, LLC. operates a drift mine which enters the outcrop of the 8 1/2 foot Freeport coal seam and dips down starting at a 25% grade towards the Potomac River. Present working sections of the mine are between 2 to 2.5 miles from the mine entrance with an average depth of cover of 600 feet. Over 5 miles of conveyor beltlines transport the raw coal from underground to the surface where the preparation plant cleans the coal of impurities. There are 2 – Continuous Miner Unit and 1 - Longwall**

Steep Seam Coal Mining

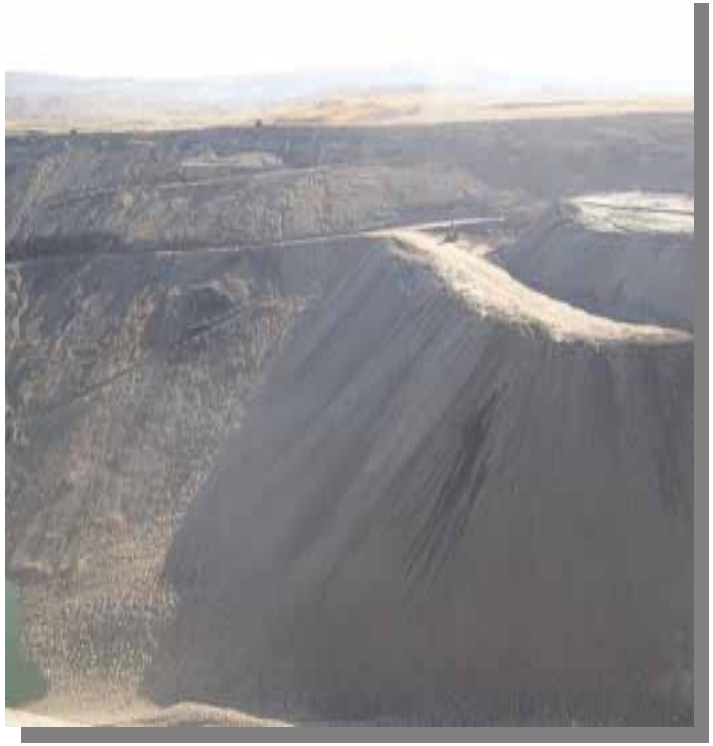
- **U.S. Activities on Steep Seams**
  - Surface Mining
    - **Dip-Line Mining Method**
      - **Overburden operation, design to handle waste one time.**
    - **Engineered haul road and Highwall design**
      - **Haul Roads must be well constructed with designed water drainage applied. (haul road is life line of the surface mine)**
      - **High walls must be properly benched and maintained to avoid slips that interrupt production and cause safety concerns**

Steep Seam Coal Mining

- Planning, planning, and more planning…..Mine plan should have balance blending of strip ratios and dip development….looking as much as 20 to 30 years out
- Sufficient strike length of seam needs to be extracted to afford efficient haul road ramp development into the pits
- Maintenance on equipment needs to be scheduled for the most operating uptime for production
- Education and training for equipment operators and supervisors
- Spoil of waste rock should be planed to dump once
- Sufficient operational area in coal pit to operate needs to be established and maintained for safety and efficiency

Overburden Slope Stability

- **Develop Bench**
  - Design proper width and slope per your overburden make up
  - Overburden shouldn't be placed where it has too be moved again
  - Dumping into old mine pits to reclaim the mine site to original approximate contour is the ideal reclamation plan



Lignite Mining

- **Mining Method**
  - Freedom Mine is the largest lignite mine in the United States, operating two 120-cubic-yard draglines and a fleet of 200-ton overburden trucks
  - Savage Mine opened in 1958. It produces 250,000 tons of lignite annually
  - Lignite mining is not totally without risk. As lignite mines are excavated, there is some risk that the pit's tall, sloped earthen walls could collapse after a heavy rain. However, such incidents are extremely rare, in part because the industry has developed constant monitoring systems to alert managers when weather might be affecting mining conditions

Thank You
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