COST EFFECTIVE TECHNOLOGY FOR BENEFICIATION AND RECOVERY OF FINE COAL

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Indian Coal

- **Problem**
  - Difficult to clean
    - Finely disseminated mineral matter
  - Coking coal requires low ash coal
    - <8% ash
    - Imported coal is used as sweetener
      - High cost

- **Solution**
  - Fine grinding for improved liberation
  - Fine coal cleaning
  - Fine coal dewatering

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Fine coal produces lower-ash coal.
But fine coal cleaning is costly and difficult.
Advanced Fine Coal Cleaning Technologies
Developed at Virginia Tech

Under DOE Sponsorship

- Advanced Flotation
  - Microcel technology
  - New FLS technology

- Advanced Dewatering
  - Dewatering aids
    - Licensed to Nalco
    - Pinnacle pond recovery
  - Hyperbaric centrifuge
    - Licensed to Decanter
    - Field tests are ongoing

All of the technologies are commercially available.
Bubble Generation in Microcel
Microcel Column Installation

Red Mountain (BHP Billiton)
Advanced Flotation

Pilot-Scale Test Unit
Installed at Virginia Tech

Simulation of fluid flows using Computational Fluid Dynamics (CFD)

World’s largest and most efficient flotation machine (located at Kennecott).

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Dewatering Aid
Comparison of Lab and Plant data

Cake Moisture (%) vs Reagent Dosage (lb/t)

- Laboratory
- In-Plant
Hyperbaric Centrifuge

- **Pilot-scale tests**
  - **Moisture reduction**
    - ≈50% using conventional filter
    - 13.4% using hyperbaric centrifugation.
    - >97% recovery on a coal with 90% -325 mesh
  - **Marketed by Decanter Machine Inc.**

*Mobile Test Rig for Field Demonstration of the New Hyperbaric Technology*

*Testing at Arch Coal’s Cardinal Preparation Plant in Southern West Virginia*
Proposed Flowsheet for Indian Coking Coal

Note: Not all clarified and process water streams are shown.
Summary

- India can increase the domestic production of coking coal.
  - fine grinding to improve liberation,
  - advanced flotation to remove ash, and
  - advanced dewatering to remove moisture.
- Advanced technologies:
  - Microcel flotation
  - Novel dewatering aids
  - Hyperbaric centrifugation
- Demonstration plant
  - 75 -100 tonnes/hour
  - Virginia Tech design
  - Contract is being negotiated.