

# ***FINE COAL BENEFICIATION***

**Roe-Hoan Yoon, Director**

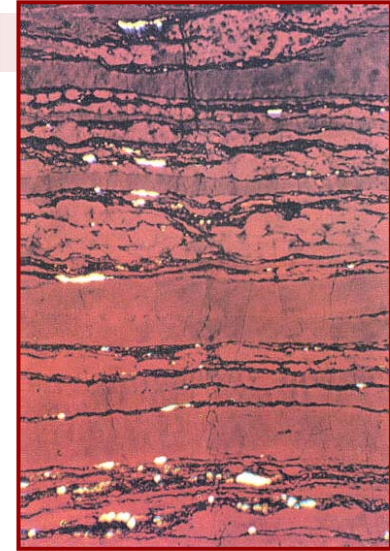
Center for Advanced Separation Technologies  
Virginia Tech, Blacksburg, Virginia 24060

U.S.-India Coal Working Group 8<sup>th</sup> Annual Meeting  
New Delhi, India  
March 24, 2011

# Indian Coal

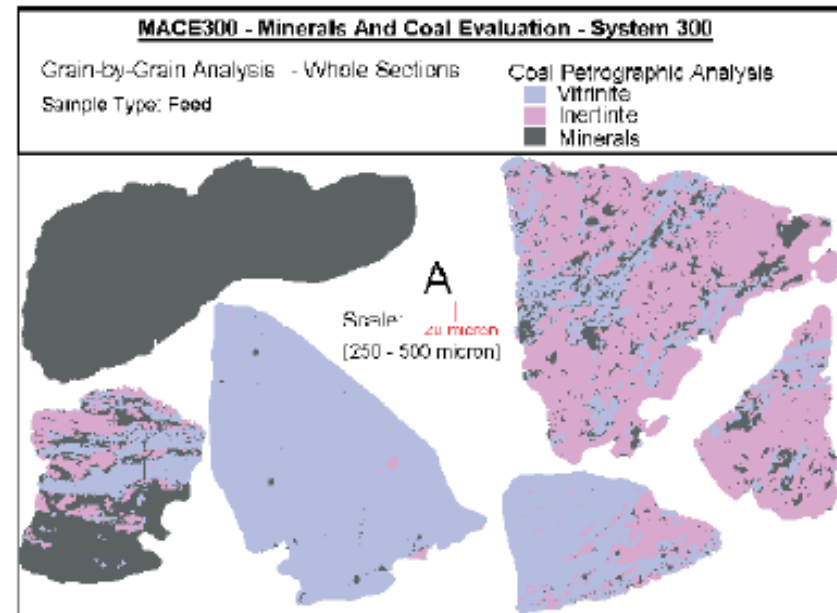
## □ Problem

- Mineral matter is finely disseminated in coal matrix
- Difficult to obtain low-ash product
  - Causes low thermal efficiency in power plants
  - Requires sweetener for metallurgical application
    - >\$3 billion import

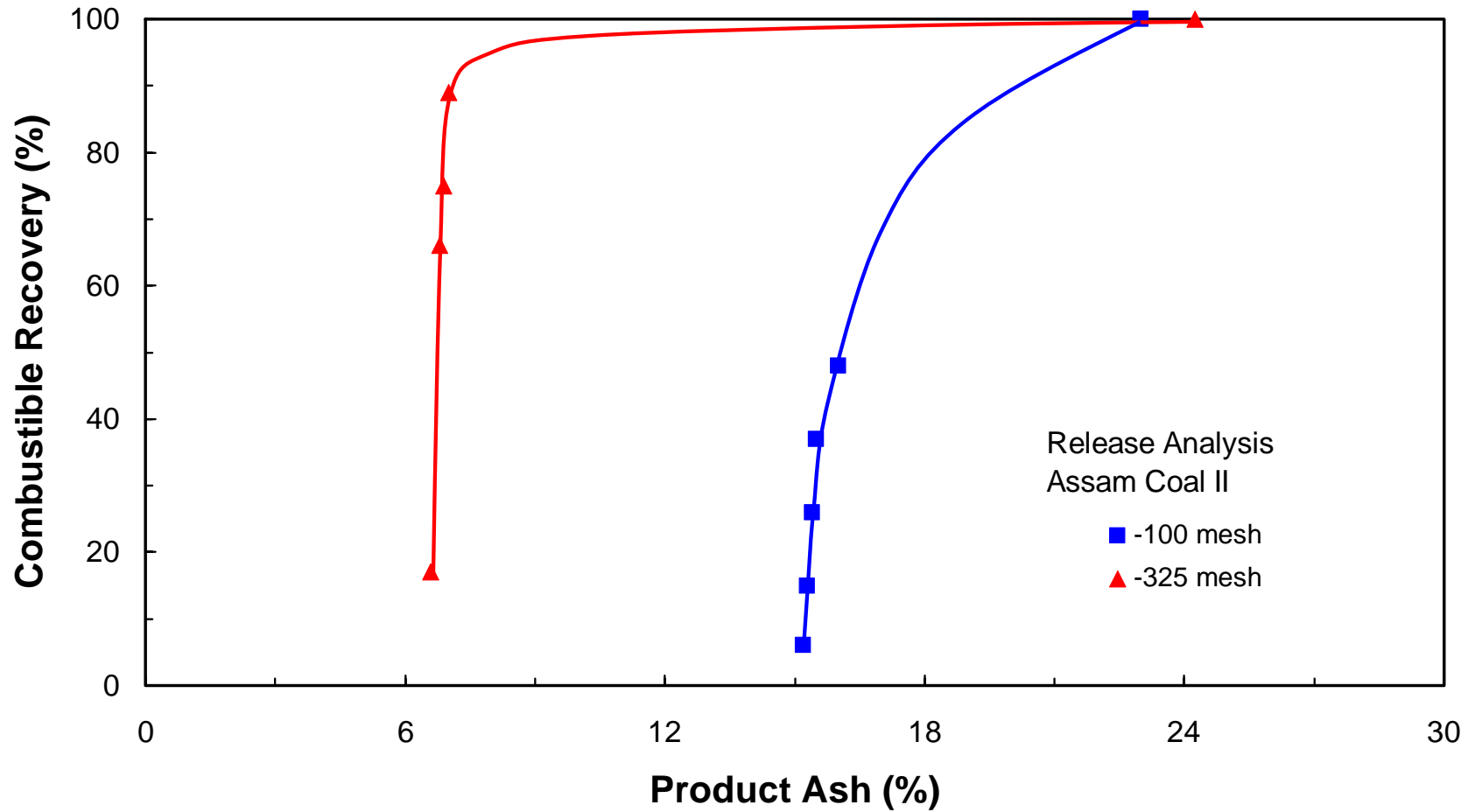


## □ Solution

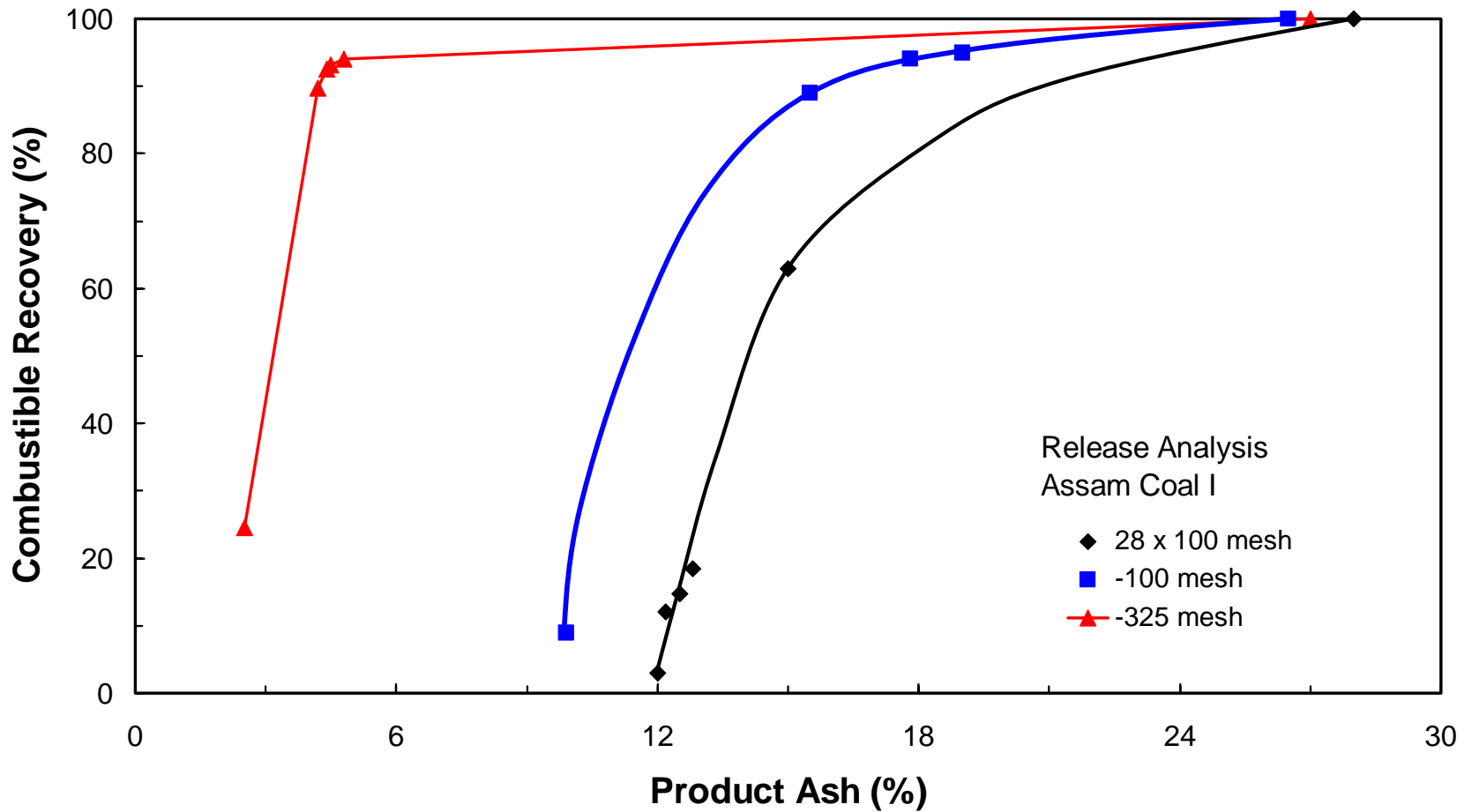
- Fine grinding for liberation of mineral matter
  - Fine coal cleaning
  - Fine coal dewatering



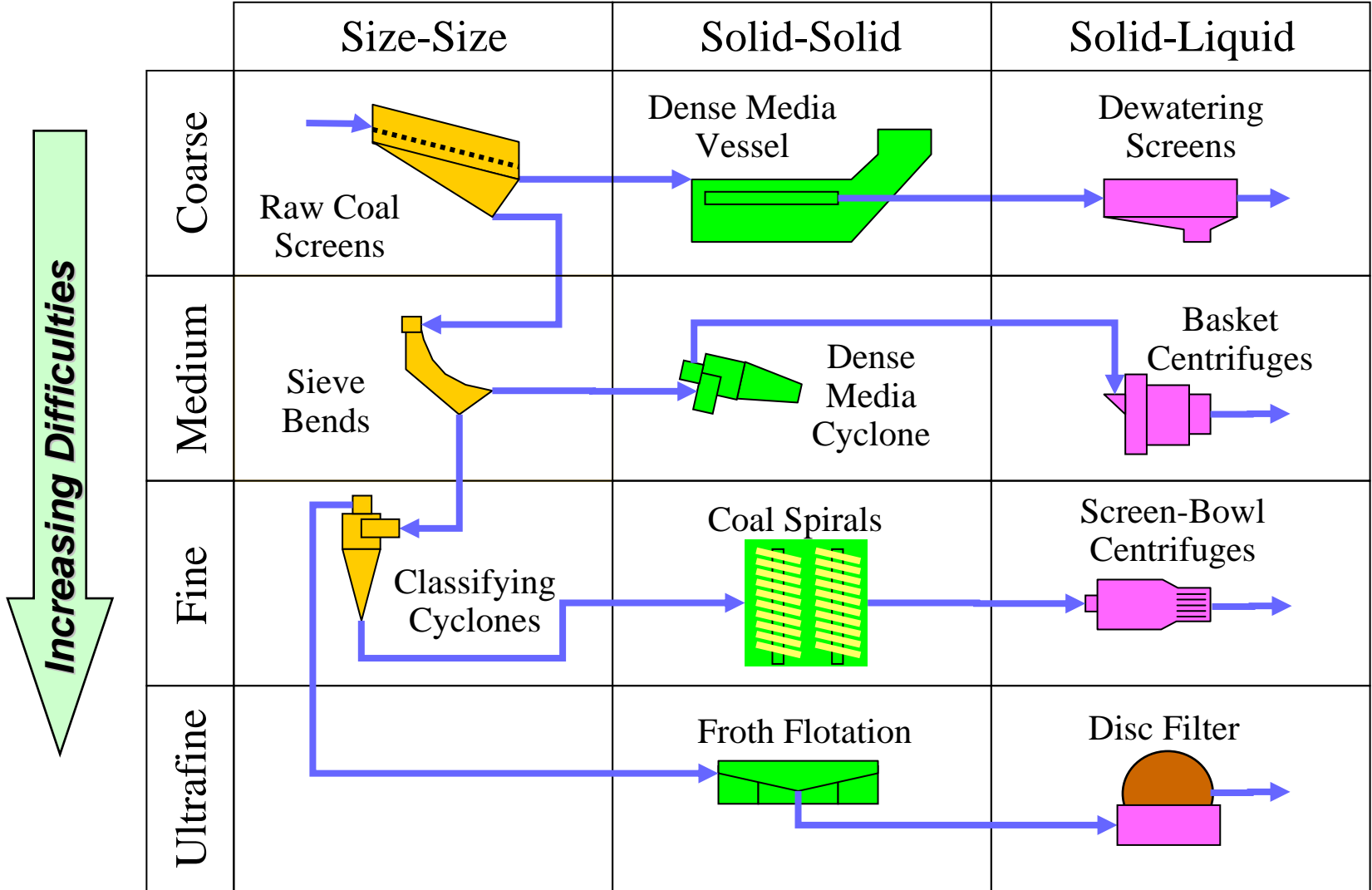
# Finer coal produces lower-ash coal.



# Another Example



# But fine coal cleaning is difficult and costly.



# Middle Fork, Virginia

- ❑ Coal industry discards fine coal
  - Impoundment
    - ~2-2.5 billion tons in the U.S.
  - Underground injection
- ❑ Microcel™ Technology developed at CAST
  - >\$50 million profit from one pond

*Then...*



*...and Now*



*Microcel Technology*



# Microcel Technology in Australia

*Licensed to Eriez*



*Red Mountain  
(BMA)*



The technology is used to recover coal in operating plants.

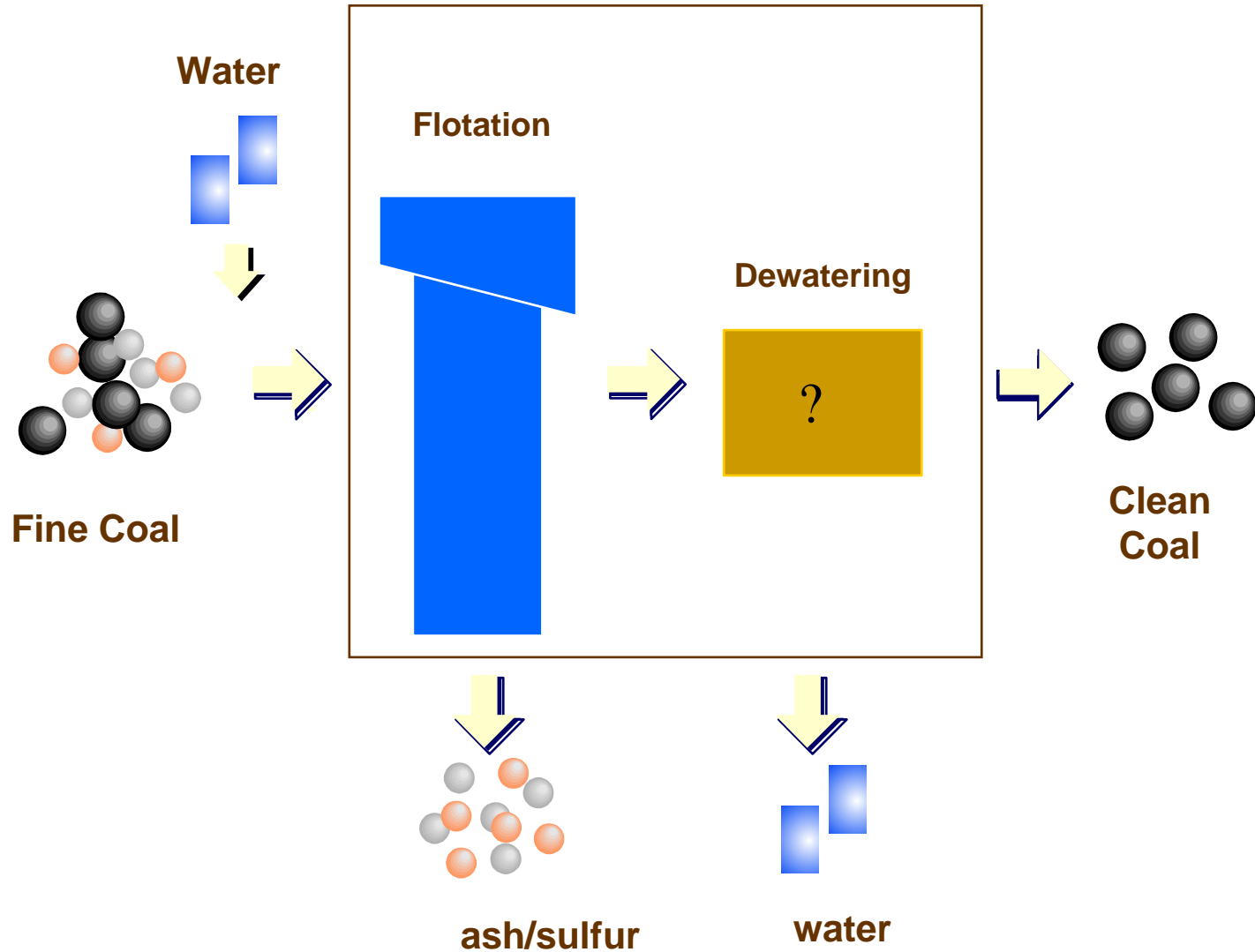
# Moura Dawson

(Anglo Coal)



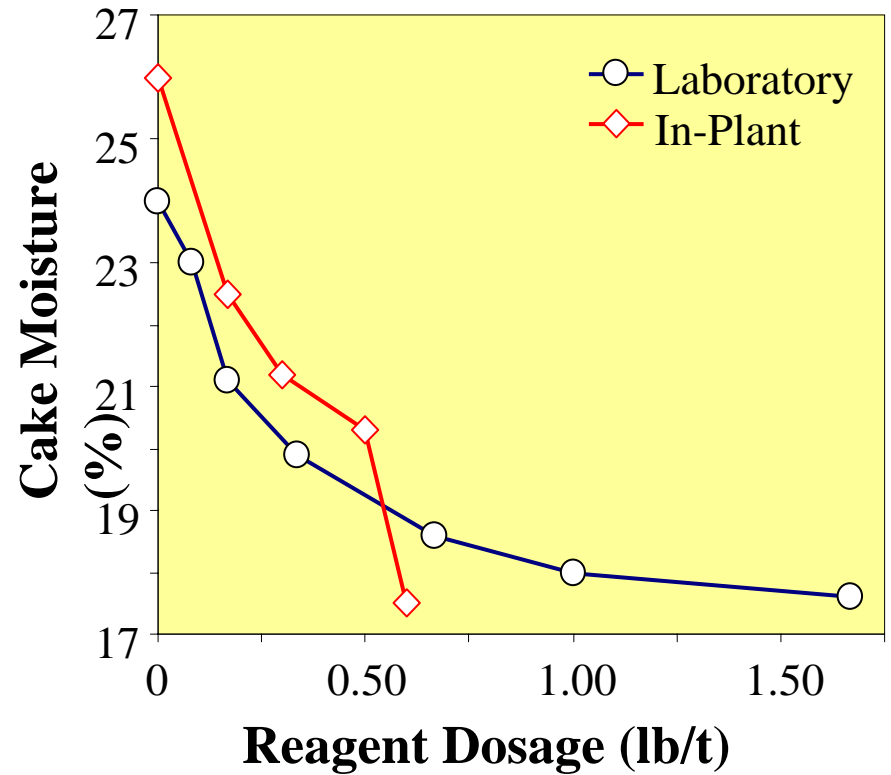
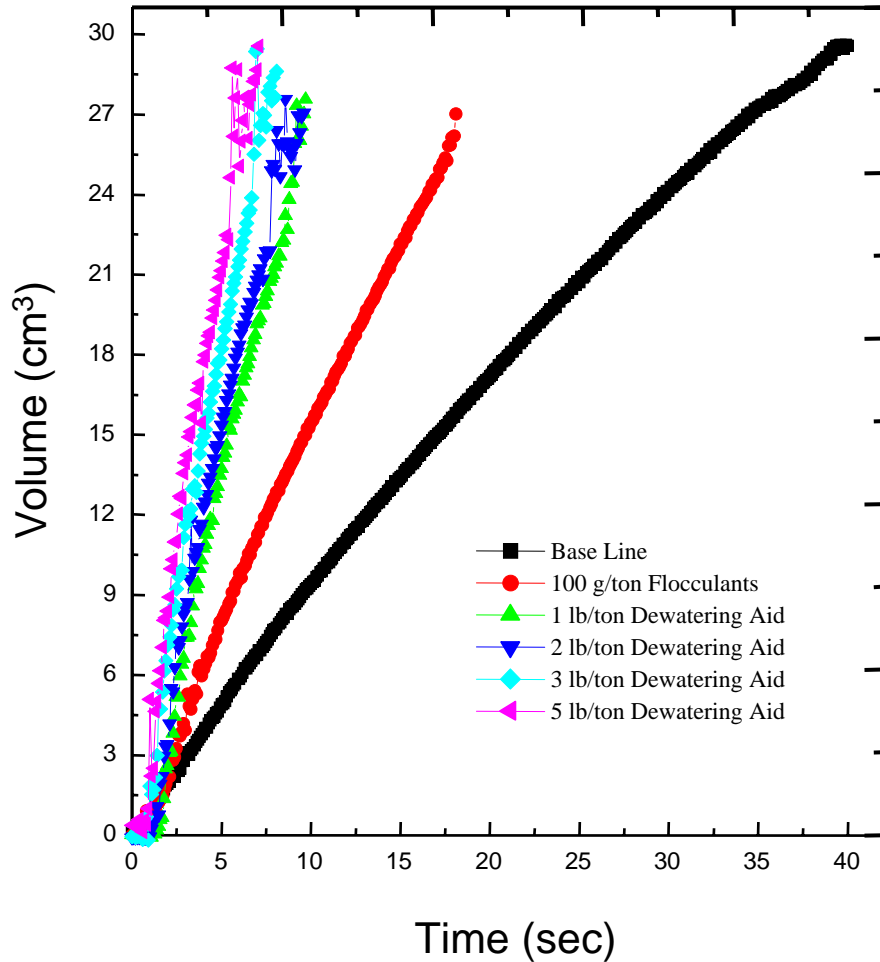


# A missing link



# Dewatering Aid Technology

*Licensed to Nalco Company*



Pinnacle impoundment, WV

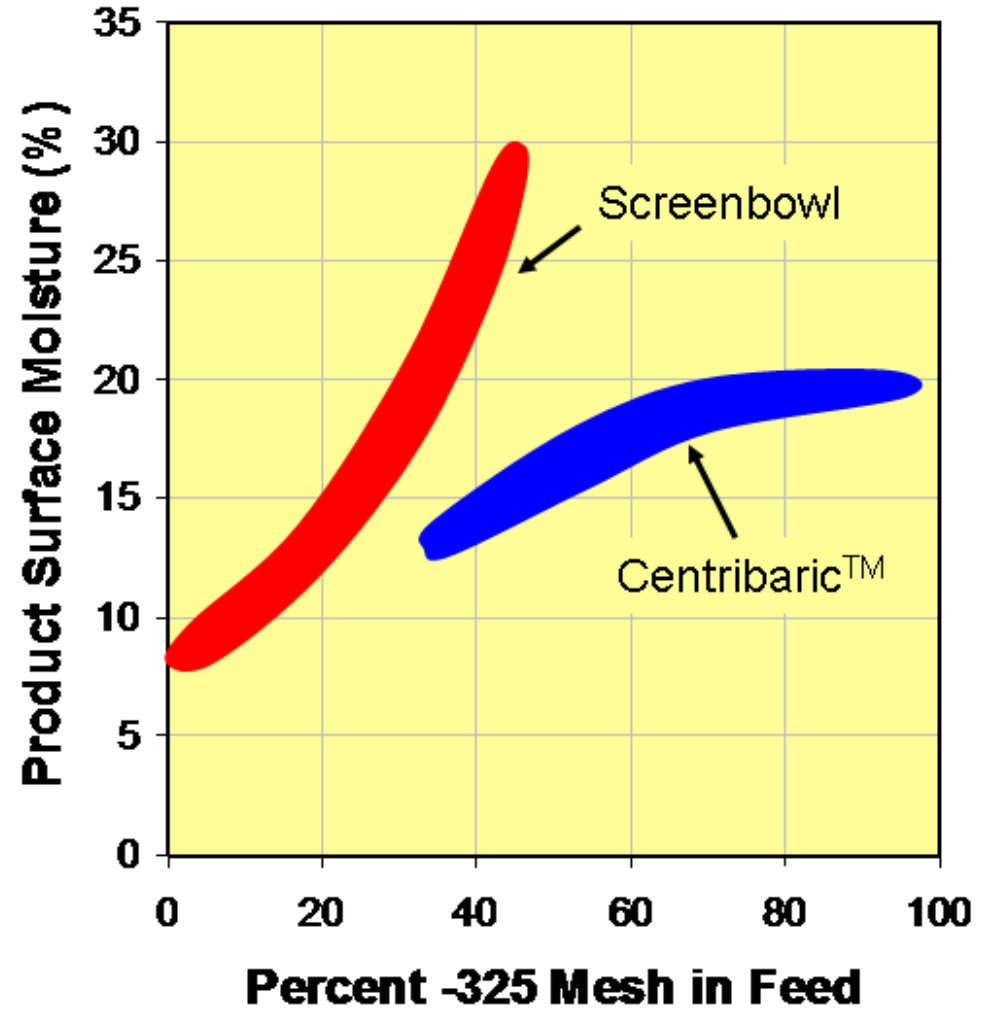
# Hyperbaric Centrifuge Technology

*Licensed to Decanter*

Screen-bowl Centrifuge



Hyperbaric (or Centrabaric™) Centrifuge



# Commercial Installation

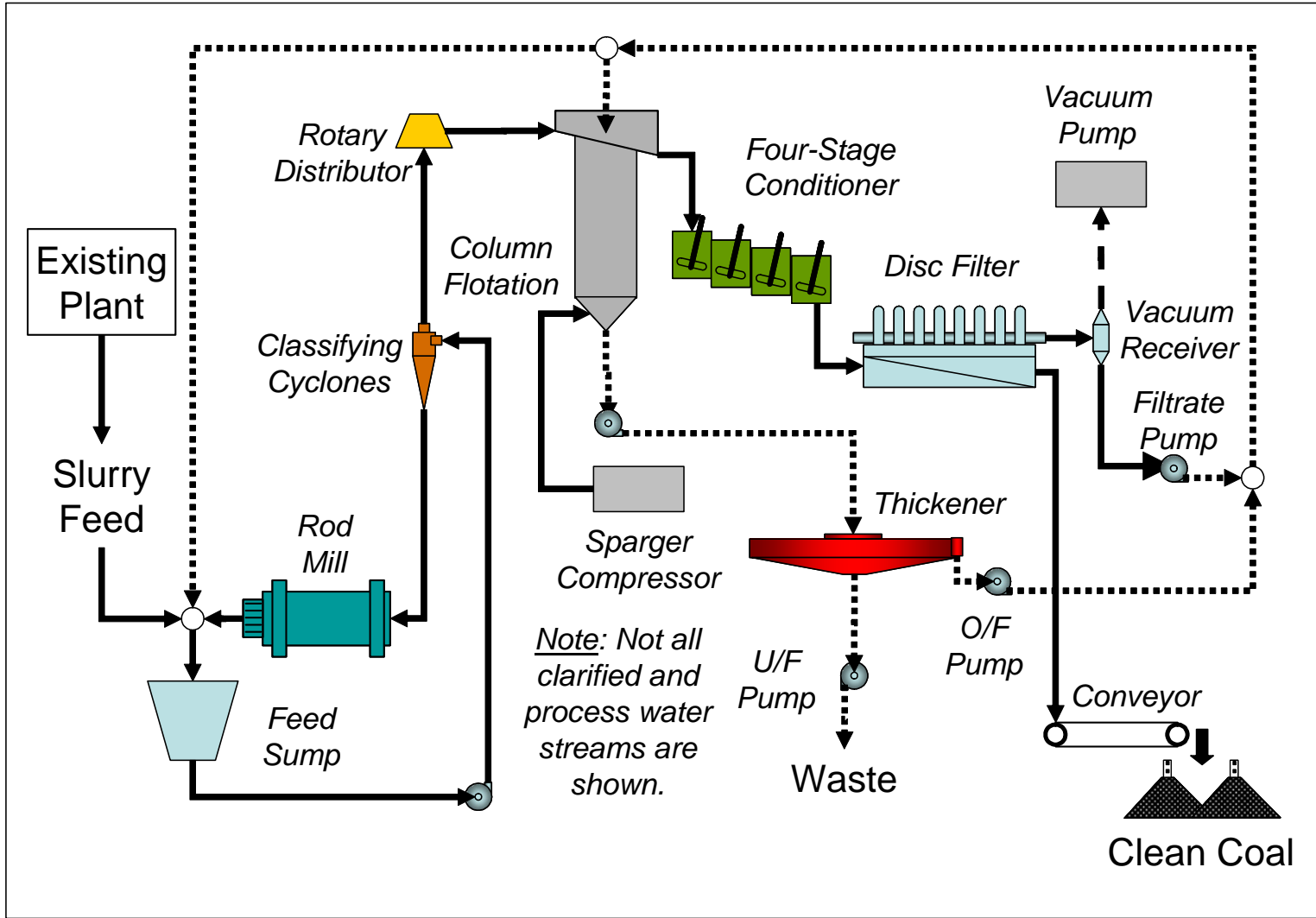


*Jim Walter Resources  
(Walter Energy Inc.)  
Brookwood, Alabama*

As a result of successful test results with the first unit, the company bought more units. Other companies may follow the suite.



# Proposed Flowsheet for Indian Coking Coal



# Summary

## ❑ CAST technologies

- Commercially available technologies
- Microcel™, Dewatering aids, Hyperbaric centrifuge
- A novel dewatering technology
  - Under development

## ❑ Proposed work

- To design and build a 75-100 tph fine coal beneficial plant
- METSO Minerals-India, Prime
  - Engineering
  - Construction
- Virginia Tech, Subcontractor
  - Lab work
  - Flowsheet design

## ❑ Benefits

- Increase domestic supply of metallurgical coal
  - Decrease import of metallurgical coal
- Improve coal quality and reduce CO<sub>2</sub> emissions

# Acknowledgement

- ❑ The National Energy Technology Laboratory for financial support
- ❑ Licensees of the technologies developed at CAST
  - Metso Minerals
  - Eriez Manufacturing
  - Nalco Company
  - Decanter Machine Company