Workshop on
“Coal Beneficiation Technology 2007”
August 2007 - Ranchi

G C Mrig
Managing Director
Aryan Coal Benefications Pvt. Ltd.
(Former CMD – BCCL & SECL)
New Delhi

UTILISATION OF COAL WASHERY REJECTS

A NEW BUSINESS MODEL*

Introduction:

- The Coal Washery Rejects are the major environmental hazard during the process of Coal Washing.

- Considering the fact of requirement of millions of tones clean coal for the end-users, mainly power houses, this problem will have to be solved effectively.

- During 2003-2004, Aryan joined the team of M/s Dargo Associates Limited, UK for their study titled “Technical and Economic Feasibility of Low Ash Power Station Fuel in India” – funded by the Department of Trade & Industry, Government of UK, under the Clean Coal Technology Transfer Programme.

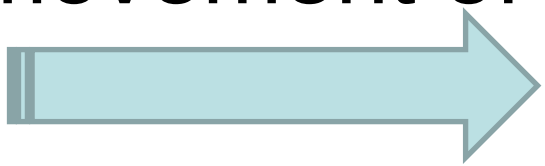
Objective of the Study:

- Technical and Financial Feasibility of Producing Low Ash Coal for use in remote power station.

- Capturing heat content in washery rejects for generating Power using Fluidized Bed-Boiler based Power Plant at pit head.

Indian Scenario:

- Power Stations receive raw coal generally in the range of 45% Ash. The fuel is moved over long distances to Power Houses.

- The distance wise movement of coal to Power Houses is 

- Distance wise requirement of thermal coal:

Distance	1996-97	2001-02	2006-07	2011-12
(Kms)	(million tones)			
Pit-head	70	89	99	155
<500	54	51	55	70
>500<1000	35	30	43	60
>1000	55	95	148	216
Total	214	265	345	501

COAL PREPARATION:

NEED FOR COAL PREPARATION:

- During of end of ‘90s, Ministry of Environment and Forests, Government of India notified that power houses located in the urban/sensitive areas and also those located more than 1000 Kms. from the pit heads should use coal which is having ash below 34%.

- This percentage was fixed after studies done by Duetsche Mortan Consult (Germany) and Mott. Macdonald (UK), indicated that Indian Coal when cleaned to 34% ash, would , in general retain 95% or more of energy.

- These studies established that cleaning coal to lower ash content would result in loss of heat value in rejects.

Demand from Consumers:

- Mining companies and Power companies have resisted the implementation of these recommendations since the reduction in cost of transportation does not compensate for the additional cost of production of lower ash fuel (34%).
- The cost of reduction of transport needs to be greater and therefore, the ash of coal to long distance Power Houses has to be lower, say around 28%.

- For producing a coal having an ash percentage of <28% the only solution available in India is Coal Washing/Beneficiation.

- The coal deposits in India are of drift origin there by external impurities are embedded in the coal matrix. Indian Coals are difficult to wash.

TECHNICAL PARAMETERS:

- There are two basic variables that determine the yield of coal in a partial cleaning process:-

  - The aperture of the Raw Coal Screen;
  - Density of Separation

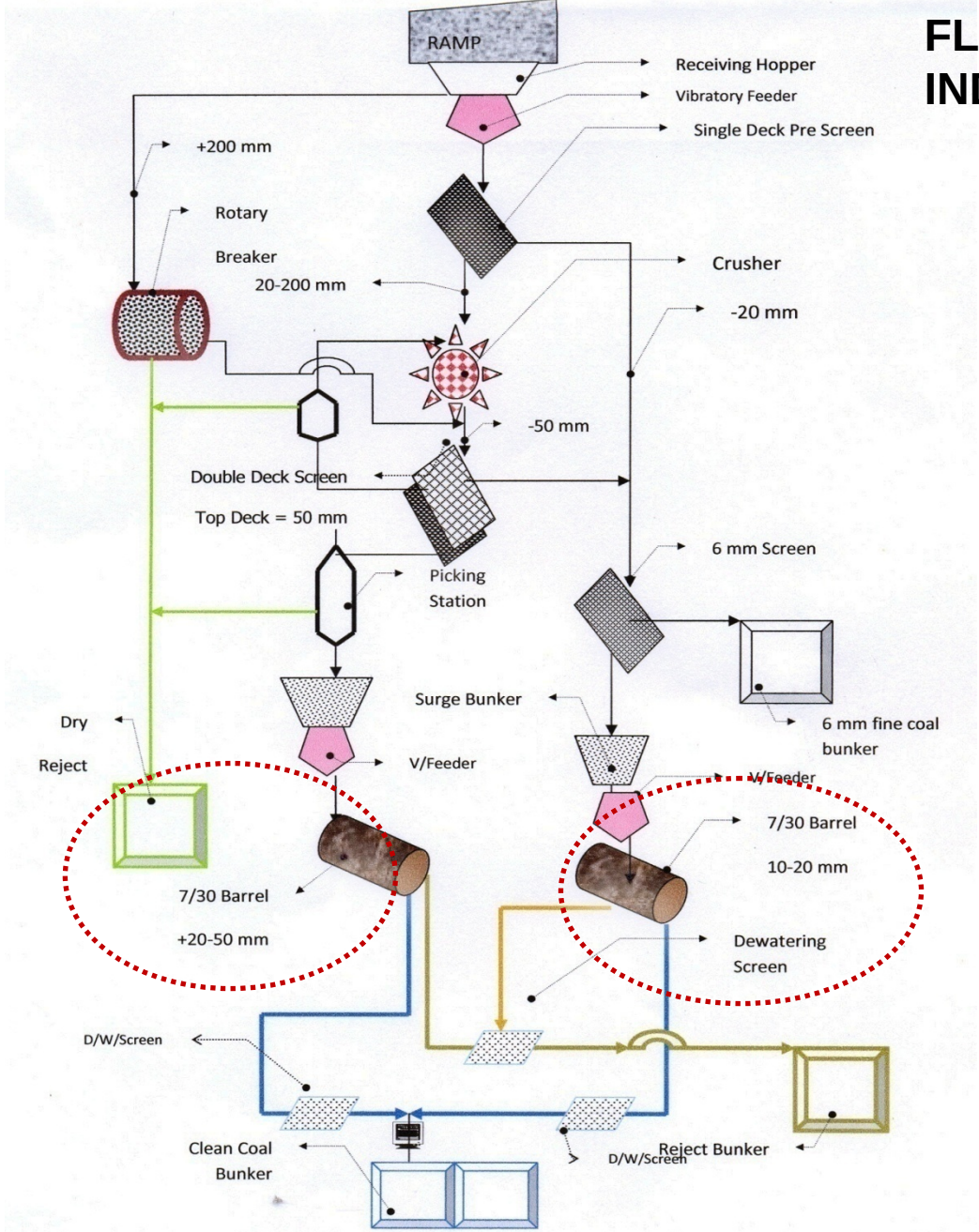
Technological Assistance:

- Computer simulation programmes are available for deciding on the optimum screening apertures and the density of separation.

- The main conclusion of the simulation in respect of Gevra/Dipka coalfields of South Eastern Coalfields

- Both water based processes and Dense Medium processes can achieve 27-28% ash coal from coal of Gevra/Dipka area which is having an average ash % of 42%.
- Dense Media Process gives the highest recovery.
- For Dry Screening special Flip-flop screens are required.
- Jig and Dense Media Baths require special screens for effective result.
- Barrel Washer – It can wash coal in narrow range. a.) 5 to 12.5mm b.) 12.5 to 30m and c.)20 to 50mm. For example, A Line Diagram of our Indaram Washery

FLOW DIAGRAM OF INDARAM WASHERY



ARYAN's ROLE:

- Aryan Group from a modest beginning in 1999 in the area of coal washing is poised to have a total capacity of 32 million tones by the end of 2007-08.
- There is a long list of satisfied customers which includes, Punjab State Electricity Board, Karnataka Power Corporation Ltd., Rajasthan Vidyut Utpadan Nigam, Gujarat State Electricity Corpn. Ltd, Maharashtra State Power Generation Co. Ltd., ACC, L&T, La-Farge, Prakash Industries, etc.

List of Washeries of Aryan Coal Benefications Pvt. Ltd.		
Location	Capacity (MTPA)	Technology Used
Dipka, Dist.: Korba (CG) ISO 9001:2000 Certified	12.00	Rotary Breaker, Barrel Washers, Jigs
Pandarpauni, Dist.: Chandrapur(MS) ISO 9001:2000 Certified	3.00	Rotary Breaker, Barrel Washer, Dense Media Bath & Spiral Classifier
Chakabura, Dist.: Korba (CG)	6.00	Barrel Washer, Jig

List of Washeries by **Aryan Energy Pvt. Ltd.** – sister concern of Aryan Coal		
Location	**Capacity (MTPA)**	**Technology Used**
Talcher, Dist.: Angul (Orissa)	2.00	Barrel Washers
Indaram, Dist.: Adilabad (AP) ISO 9001: 2000 Certified	1.00	Rotary Breaker, Barrel Washer
Gauri, Dist.: Chandrapur (MS)	2.00	Barrel Washer

List of Washeries by **Kartikay Coal Washeries Pvt. Ltd**. – sister concern of Aryan Coal		
Location	**Capacity (MTPA)**	**Technology Used**
Wani, Dist.: Yeotmal (MS)	2.00	Dense Media Drum

More projects are on pipeline.

UTILISATION OF COAL WASHERY REJECTS:

FLUIDIZED BED COMBUSTION (FBC) BASED POWER GENERATION – AT PIT HEAD:

- The reject from the washery would be burned in fluidized bed based boiler to raise steam for Power generation.
- The ash would be between 50-60% and a GCV of 1300 -2400 Kcal/kg.
- Fluidized Bed Boiler Types would be used for these generating stations.

Working Principle of Fluidized Bed Boilers:

- The main principle behind Fluidized Bed Boiler is that Coal is burnt in a fluidized bed maintained by blowing air through inert bed into which coal is introduced.
- This arrangement provides very good contact between the air and coal particles ensuring rapid combustion.
- There is also good contact between the fluidizing air and the steam coil. For poor quality coal, combustion efficiency is improved, and combustion temperature is also lower.

Various types of FBB:

- There are three main types of fluidized bed boiler:

Sr.	Type of FBB	Description	Generating Station Capacity
1	Bubbling Bed	Air velocity just sufficient to maintain particles in suspension	Up to 50MW
2	Circulating Fluidized Bed Combustor (CFBC)	Air velocity much higher and inert particles and ash blown to the top of the boiler.	Up to 200MW
3	Pressurised Fluidized Bed Combustor (PFBC)	Operate at several times atmospheric pressure	Still under development

CASE STUDY:

Aryan & GVUNL:

BACKGROUND:

- Since 2004, ACBPL is undertaking the coal washing job for the Wanakbori and Ukai Thermal Power Stations of Gujarat Urja Vikas Nigam Limited.

- On an average we wash 5 Million Tonnes of Raw Coal per annum for them.

- After getting the desired product to the end-user, on an average basis, 1 Million Tonne of rejects are generated per annum.

- These are lying idle as there are no takers for these rejects and creating lot of environmental problems.

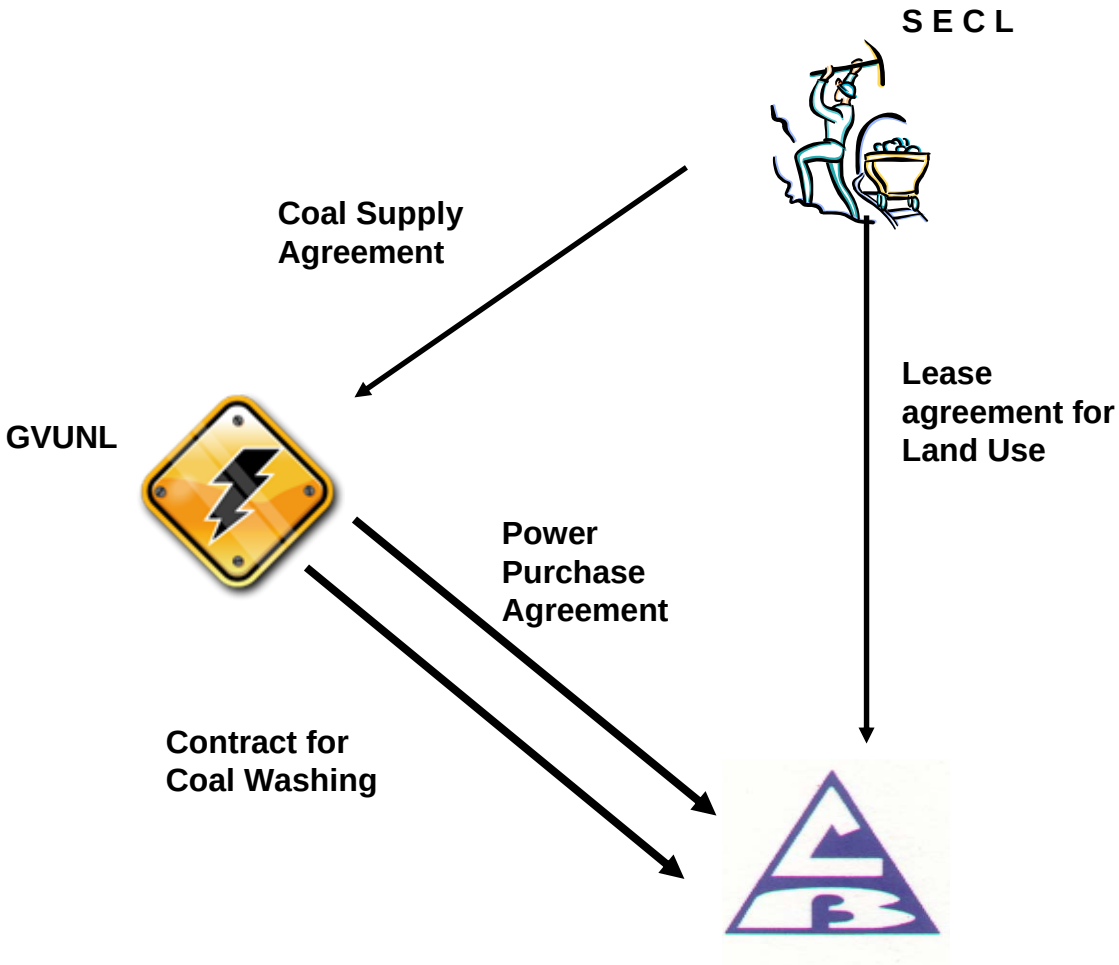
THE SOLUTION:

- Our studies showed that we can use these rejects as fuel for production of power by putting up a Thermal Power Station at the pit-head.

- Our experimental project, the 30 MW Chakabura Power Project is successfully commissioned during February 2007.

- During February 2007, Aryan signed an agreement with Gujarat Urja Vikas Nigam Limited for putting up a 2x135 MW Coal Reject based Thermal Power Plant for GVUNL. This contract was awarded to Aryan against GVUNL's tariff based tender.

Business Model:



Salient Features of this Project:

- Environment Friendly usage of Coal Rejects
- Will avoid risk of non-availability of coal.
- Cheaper power as compared to conventional coal based power projects.

- The power generated could be wheeled to GSECL through Central Grid.

- 1st phase to be commissioned by January 2009

- 2nd and final phase to be commissioned by end of 2009 / Early 2010.


Thank
You!