INDO-US COAL WORKING GROUP MEETING

WASHINGTON, D.C. JUNE 5-7, 2007

ACTIVITIES FROM INDIAN SIDE

Identified Areas for Promoting Pilot Projects

- Beneficiation of Thermal Coal
- Beneficiation of Coking Coal
- Coal Fines Recovery
- Underground Coal Gasification
- Coal Mine Methane Recovery
- Coal Mines Safety

Activity / Name of the Project : **Beneficiation of Thermal Coal**

Objectives : To take up R&D study to determine the optimum level of ash% in washed coal considering economics of operation of power plant, cost of washing, utilisation of washery rejects and environmental impacts.

Project proposal : **Development of a Coal Preparation Plant Simulator**

Action Point : Documentation of R&D proposal jointly

Status : The draft proposal prepared and sent to US lead Mr. Mark Sharpe through e-mail on 30.12.2006

Comments were received from USA by e-mails dated 14.02.2007 & 19.03.2007.

Based on the inputs received from US side, proposal is under formulation at CMPDI and expected to be completed by end of May, 07.

Final proposal to be approved through SSRC (GoI) under S&T scheme.

IMPLEMENTING AGENCIES & PARTICIPATION

- Implementing Agencies:

  US Government
  - Lead : Dr. Craig Zamuda, Office of Clean Energy collaboration, Office of Fossil Energy, USDOE
  - Co-Lead : Mr. Mark Sharpe, Sharpe International, Dr. Roe-Hoan Yoon, Virginia Polytechnic Institute and State University

  India Government
  - Lead : Mr. P. R. Mandal, Adviser (Projects), MoC
  - Co-Lead : Director (Engineering Services), CMPDI

- Participation :
  - India Lead – CMPDI
  - Participants – MCL, SECL, CIMFR, BHEL

MUTUALLY AGREED SCOPE OF WORK

- Development of a simulation programme
  - To design CPP flowsheets, select equipment and determine plant operating parameters
  - To determine optimum ash level of beneficiation for a particular coal & a particular use.
  - To calculate break-even cost of washed coal at different ash levels considering the distance of the load center
  - To determine allowable break-even cost of washing for a pit-head or load-center power plant, with or without reject utilization
  - To determine the break-even cost for different levels of plant load factor achieved due to use of washed coal

NEED & JUSTIFICATION OF SUBJECT AREA

- An integrated Coal Preparation Simulation Program required to be developed for Indian coal
- Available programmes e.g. MATSIM, JKSIMMET, MODSIM or CANMET are not suitable for Indian coal
- It will act as a tool for the CPP design engineers, plant operators as well as consumers of washed coal

METHODOLOGY & RESPONSIBILITY

- USA Side:
  - Furnish activity wise time frame
  - Compilation & analysis of existing data and data generated through laboratory testing
  - Model formulation for unit operations
  - Computer programme generation & development of graphical user interface
  - Validation of the programme in terms of computational accuracy and functional aspects
  - Coordinate technology transfer & delivery of product

METHODOLOGY & RESPONSIBILITY

- India Side:

MoC

- To approve the proposal through SSRC under S&T scheme

CMPDI

- Laboratory testing and all other testing of coal for validation
- To provide office & other infrastructure facilities & necessary technical assistance

CIMFR

- Pilot plant testing at existing plant for validation

METHODOLOGY & RESPONSIBILITY

MCL & SECL:

- To identify mines and supply raw coal samples

BHEL:

- To provide data related to power plants and economics for programme development

TIME SCHEDULE

Completion time : 24 months from zero date

Zero date will start with the signing of agreement between Indian & US agencies under Indo-US Energy Dialogue or receipt of letter of approval of the project under R&D scheme, whichever is later

(Detail break-up to be worked out after consultation with all agencies involved)

PROPOSED OUTLAY

Sl. No.	Item	Total Estimate in million	
		INR*	USD (included in the INR)
1	Cap. (Equipment)	0.25	-
2	Rev. Salary (CMPDI)	6.06	-
	Rev. Salary (US)	18.45	0.45
	Rev. Travels (US)	6.15	0.15
	Rev. Testing & Lab.(US)	2.05	0.05
	Rev. Testing & Lab.(Indeginous))	11.79	-
Sub-Total (Cap. + Revenue)		44.75	0.65
3	Less (US Contribution)	0.82	0.20
4	Contingency	0.66	-
Grand Total		44.59* (= USD 1.088 million)	0.45

- * Includes FE component of US $ 0.45 million
- Assumption :1$ = Rs. 41/-

Activity / Name of the Project : **Beneficiation of Coking Coal**

Objectives	: To set up a demonstration plant for washing of V,VI,VII, VIII seam coal of Jharia coalfields
Project Proposal	: **Beneficiation technology for Low Volatile Coking Coal of lower seams (V,VI,VII,VIII) of Jharia coalfields, BCCL**
Action Point	: Documentation of R&D proposal jointly
Status	: The draft proposal prepared and sent to US lead Mr. Mark Sharpe through e-mail on 30.12.2006
	Comments were received from USA by e-mails dated 14.02.2007 & 19.03.2007.
	Based on the inputs received from US side, proposal is under formulation at CMPDI and expected to be completed by end of May, 07.
	Final proposal to be approved through SSRC (GoI) under S&T scheme.

IMPLEMENTING AGENCIES & PARTICIPATION

- Implementing Agencies:
  - US Government
    - Lead : Mr. Mark Sharpe, Sharpe International
    - Co-Lead : Dr. Roe-Hoan Yoon, Virginia Polytechnic Institute and State University
  - India Government
    - Lead : Mr. P. R. Mandal, Adviser (Projects), MoC
    - Co-Lead : Director (Engineering Services), CMPDI
      Director (Tech.), BCCL
- Participation :
  - India Lead – CMPDI
  - Participants – BCCL

MUTUALLY AGREED SCOPE OF WORK

- To develop a suitable technology for this type of coal to yield following products :
  - Metallurgical grade coking coal (Ash ~ 18%)
  - Power grade coal (Ash ≤ 34%)
  - Low carbon rejects
- To set up a demonstration plant of around 1.0 Mty capacity

NEED & JUSTIFICATION OF SUBJECT AREA

- Production of such coal in CCL & BCCL expected to be 13 Mty (32% of total coking coal) by 2011-12
- Can not be beneficiated in existing washeries, hence despatched to power plants
- A successful demonstration plant will help to utilise it for metallurgical use

METHODOLOGY & RESPONSIBILITY

- USA Side:
  - Basic engineering, selection of equipment, system design and detail design & drawings
  - Bid process management
  - Execution of the project
  - Completion report

METHODOLOGY & RESPONSIBILITY

- India Side:

  MoC

- To approve the proposal through SSRC under S&T scheme

  CMPDI

- Laboratory testing and all other testing of coal for PGT tests
- Assistance in Preparation of NIT & Bid Process Management
- Assistance in execution of project & Completion report

  BCCL

- Identification of work site & linked mines
- To provide infrastructure facilities & assistance during execution

TIME SCHEDULE

Completion time : 36 months from zero date

Zero date will start with the signing of agreement between Indian & US agencies under Indo-US Energy Dialogue or receipt of letter of approval of the project under R&D scheme, whichever is later.

(Detail break-up to be worked out after consultation with all agencies involved)

PROPOSED OUTLAY

Sl. No	Item	Total Estimate in million	
		INR*	USD (included in the INR)
1	Cap. (Civil & Structures)	170.00	
	Cap. (P&M), US	328.00	8.0
2	Rev. Salary (CMPDI)	8.41	-
	Rev. Salary (US)	18.45	0.45
	Rev. Travels (US)	6.15	0.15
	Rev. Testing & Lab. (US)	2.05	0.05
	Rev. Test & Lab. (Indigenous)	4.29	-
Sub-Total (Cap. + Revenue)		537.35	8.65
3	Less (US Contribution)	8.20	0.2
4	Contingency	7.26	-
Grand Total		536.41* (= USD 13.08 million)	8.45

- * Including FE component of US $ 8.45 million
- Assumption :1$ = Rs. 41/-

Activity / Name of the Project : Coal Fines Recovery

Objectives : To improve yield, reduce ash and reduce moisture in fines.

Project Proposal: **Cost-effective technology for Beneficiation and recovery of Indian Coking coal Fines**

Action Point : Documentation of R&D proposal jointly

Status : The draft proposal prepared and sent to US side through e-mail on 30.12.2006

Comments were received from USA by e-mails dated 14.02.2007 & 19.03.2007.

Some more information are required from US side which have been communicated to Adv.(P) for onward transmission to US side.

IMPLEMENTING AGENCIES & PARTICIPATION

- Implementing Agencies:

US Government

- Lead : Dr. Craig Zamuda, Office of Clean Energy Collaboration, USDOE
- Co-Lead : Mr. Mark Sharpe, Sharpe International, Dr. Roe-Hoan Yoon, Virginia Polytechnic Institute and State University

India Government

- Lead : Mr. P. R. Mandal, Adviser (Projects), MoC
- Co-Lead : Director (Engineering Services), CMPDI
  Director (Tech.), BCCL

- Participation :
  - India Lead – CMPDI
  - Participants – BCCL

MUTUALLY AGREED SCOPE OF WORK

- To establish an efficient technique for beneficiation of Indian Coking coal fines and cost-effective recovery of clean products & effluent solids in an existing coking coal washery of BCCL (Sudamdih/ Moonidih Washery)

NEED & JUSTIFICATION OF SUBJECT AREA

- Existing Froth Flotation technology is process sensitive & unsuitable for oxidized coals.
- Existing dewatering equipment have become ineffective

METHODOLOGY & RESPONSIBILITY

USA Side:

- Basic engineering, selection of technology & equipment, system design, detail design & drawings
- Bid process management
- Execution of the project
- Completion report

METHODOLOGY & RESPONSIBILITY

India Side:

MoC

- To approve the proposal through SSRC under S&T scheme

CMPDI:

- Laboratory testing and all other testing of coal for PGT tests
- Assistance in preparation of NIT & Bid Process Management
- Assistance in execution of project & completion report

BCCL:

- Identification of work site/ washery
- Provision of infrastructure facilities & assistance during execution

TIME SCHEDULE

Completion time : 18 months from zero date

Zero date will start with the signing of agreement between Indian & US agencies under Indo-US Energy Dialogue or receipt of letter of approval of the project under R&D scheme, whichever is later.

(Detail break-up to be worked out after consultation with all agencies involved)

PROPOSED OUTLAY

US Agency has indicated the cost for setting up of a 800 tph plant. Requirement is for a 80 tph module that can be fitted as add-on to an existing plant.

Activity / Name of the Project : Underground Coal Gasification

Objectives : a) To set up a pilot project for in-situ coal gasification in CIL command area with technological assistance starting from site selection, commissioning and utilisation of the gas

b) Assistance in project implementation

Location : Coal - ECL/CCL/SECL

Lignite – NLC Command area

Action Point : Coal – Preparation of Project Report jointly with CMPDI

Lignite– Responding to global tender floated by NLC for engagement of consultant

Status : As discussed in Working Group meeting held in April 2006, a workshop was organised in November 2006 to focus on criteria for identification of suitable site for UCG. Modalities for identification of site is under finalisation.

Activity / Name of the Project : Coal Mine Methane Recovery

Objectives : Resource modeling techno-economic evaluation / project economics

Location : CMPDI, Ranchi

Action Point : Preparation of Bankable Project Report

Status : An R&D project proposal titled “Development of CMPDI capacity for delineation of viable CMM/AMM blocks in existing and would be mining areas having partly de-stressed coal in virgin coal seams” submitted to R&D Board of CIL.

Apex Committee for R&D Board has recommended the proposal for approval by the R&D Board of CIL.

After it is approved by the R&D Board, Indian side will establish contact with US side.

Coal Mine Methane (CMM) and Abandoned Mine Methane (AMM): Steps taken for development

- A Project Proposal for delineation of viable CMM/AMM blocks in the existing & would be mining areas under CIL R&D funding has been approved by the apex committee of R&D board of CIL.
- This proposal is for:
  - ✓ Capacity building and
  - ✓ Formulating legal & regulatory frame work so that stake holders (Govt, mine owner & coal gas recovery company) have defined roles and functions.
- After approval of the project proposal by R&D board of CIL, contact would be established with Mr J. Kelafant, the US lead.

Activity / Name of the Project : Coal Mine Safety

Objectives : Legislative perspective of new innovative mining techniques and their applications in Indian coal mines

Location : DGMS HQ, Dhanbad

Action Point : Formulation of guidelines and safe operating procedures for new innovating mining

Status : Initial electronic exchange of relevant material done. The subject has also been taken up through CMTF.

New Issues for Discussion

- Regulatory framework for safety in
  - Coal Mine Methane Recovery
  - Highwall mining
    - ✓ US side may exchange information on the rules & regulation (both Federal & State) which are in vogue for the above mentioned areas of operation

- Data regarding underground mining in the areas previously hydro-fractured for CBM extraction
  - ✓ US side may be requested to furnish few case studies on the subject

- Setting up a Demonstration Plant for fine coal recovery at Sawang washery, CCL
  - ✓ US vendors may be requested to participate in the global tender to be floated for supply of two major imported equipment

Coal Mine Methane Recovery

CMM and AMM: EoI

- Prognosticated CMM resource of 150 BCM largely in working and potential UG mining blocks are available in the following coalfields:
  - Jharia
  - Ranijanj
  - Bokaro
  - S. Karanpura
- As a prelude to global bidding for allotment of these blocks for commercial recovery of CMM, an Expression of Interest is being invited shortly.

Clearing House

- A MoU has been signed between GoI and USEPA in Nov'06 to establish CBM clearing house in India under the aegis of M2M.
- Under this MoU, the MoC is the lead and agency and as per the Govt. decision, the clearing house is to established at CMPDI, Ranchi.
- The USEPA team visited CMPDI, Ranchi in Feb'07 for discussions in this connection.
- The cooperative agreement between MoC and USEPA will be signed shortly.

Coalmine Methane

Assistance and Collaboration Area

- Resource modeling of coal seams under de-stressed condition by expert in the field
- Development of a model project report with well defined functional areas of each stake holders
- Economic appraisal
- For concurrent and harmonious exploitation of coal and CMM recovery, there is an urgent need to develop a regulatory frame work in India. Since these activities are going on in different parts of USA, assistance in developing regulatory frame work for India is required.

Setting up of a Demonstration Plant for fine coal recovery at Sawang Washery, CCL

PROJECT DETAILS

- Location : Sawang Washery, CCL
- Capacity: 25 Tonnes per Hour
- Process equipt.: Column Flotation
- Dewatering equipt.: Horizontal Traveling vacuum Belt Filter
- Size of fines: (-) 0.5 mm
- Mode of Implementation :

  By split tendering procedure

  - For procurement of above two equipment
  - Construction, supply of balance indigenous equipment including erection & commissioning

Operating parameters

- Column Floatation equipment
  - ✓ Capacity : 25tph (dry basis)
  - ✓ Ash % of concentrate : 16 % (max)
  - ✓ Organic efficiency : min. 95% (at 16% ash)

- Horizontal Traveling vacuum Belt Filter
  - ✓ Capacity : 20 tph (dry basis)
  - ✓ Total moisture in dewatered product : 22% (max)
  - ✓ Recovery of solid in the dewatered product : 95% (min)

Assistance required

- Global tenders for procurement of two major imported equipment will be floated shortly by CMPDI
- Supplier of these equipment will be required to assist during erection & commissioning and to give performance guarantee of supplied equipment
- US side may advice concerned US vendors to participate in the global tender.

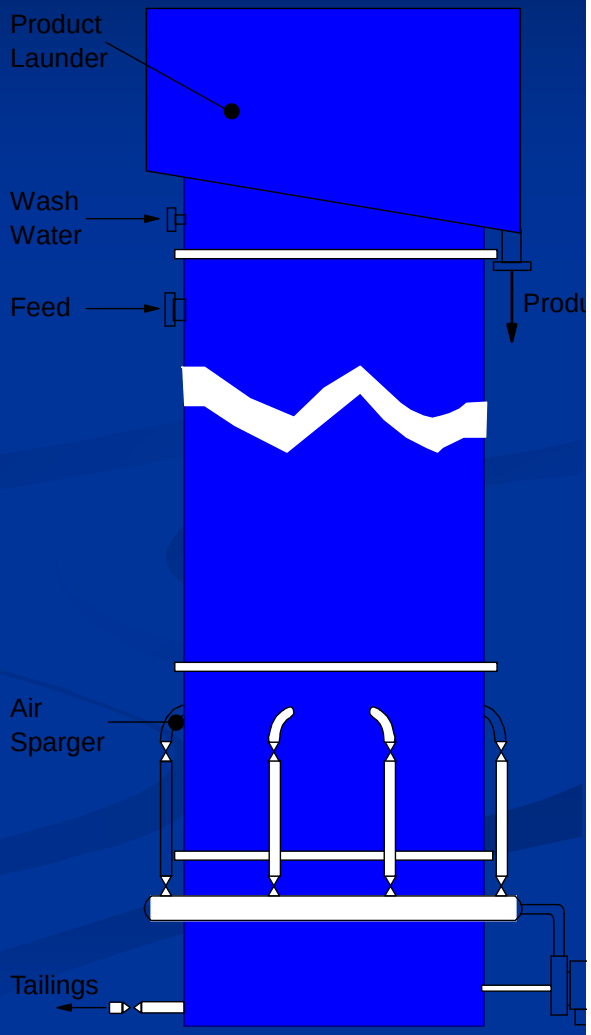
OR

US side may offer /suggest other more advanced alternative technologies. In such case the project proposal needs to be re-approved by MoC through SSRC under R&D scheme

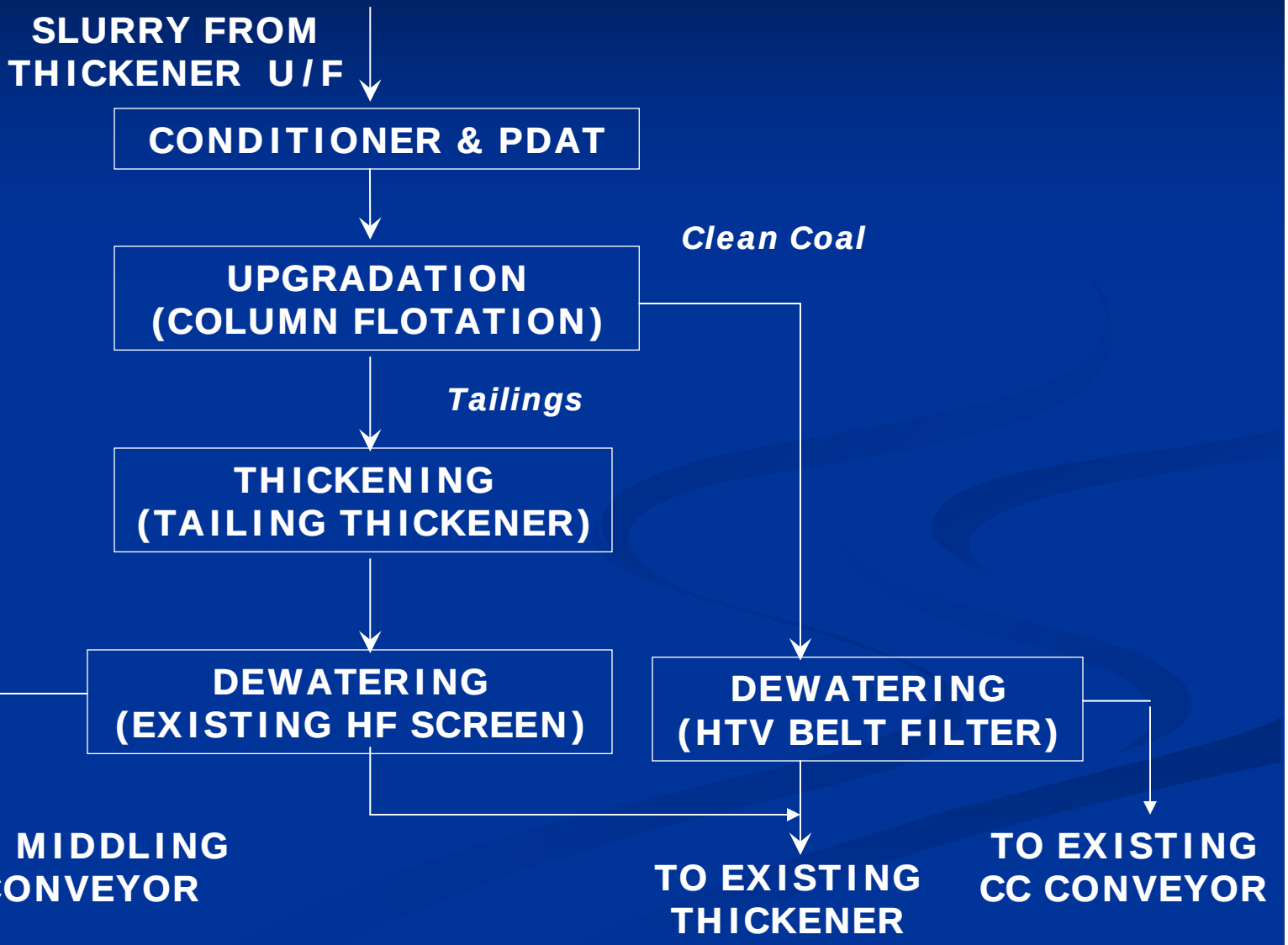
Thank You

COLUMN FLOTATION
Features

- CF is a pneumatic flotation machine and works on counter current mechanism,
- Causing greater probability of particle bubble attachment
- Giving high-efficiency of separation



FLOW SCHEME


SLURRY FROM THICKENER U/F
CONDITIONER & PDAT
UPGRADATION (COLUMN FLOTATION)
Clean Coal
Tailings
THICKENING (TAILING THICKENER)
DEWATERING (EXISTING HF SCREEN)
DEWATERING (HTV BELT FILTER)
TO MIDDLING CONVEYOR
TO EXISTING THICKENER
TO EXISTING CC CONVEYOR