

*The University of the Witwatersrand and North West University
present*

SHORT COURSES FOR INDUSTRY

COAL SCHOOL 3

COAL PREPARATION AND BENEFICIATION

Clean Coal Technologies (CCT) for the future?

Coal preparation and beneficiation are vital interventions to optimise the extraction and usage of all coal reserves; they enhance the value of colliery products, ensure clean coal technology aspects prior to use to maximize the acceptability of coal products, aid in marketing and thereby ensure the long term viability of coal as a vital source for process heat, energy, direct reduction and petrochemicals

*

Module in the

Postgraduate Programme for Industrial Personnel

LEADERSHIP IN FUEL & ENERGY TECHNOLOGY

Five-day course or Daily attendance

12 – 16 APRIL 2010

Hosted by

School of Mining Engineering. University of the Witwatersrand.

Venue:

***Sports Administration Building, Sturrock Park Campus,
University of the Witwatersrand***

Course Coordinators:

Mr Lionel Falcon,

University of the Witwatersrand

Prof Quentin Campbell

North West University

Mr Johan de Korte

CSIR, Pretoria

OBJECTIVES OF THE COURSE

The purpose of this course is to present the **principles, practice and importance of coal preparation** (crushing, screening and milling) **and beneficiation** (separation into different qualities) for the optimal utilisation of South Africa's remaining coal reserves.

The primary objective, therefore, is

- **To increase production** of high value products in the multi-product mines
- **To make usable coals** that, in many areas, is decreasing in quality, quantity and distribution.
- **To meet the challenge** of utilising the large quantities of coally material discarded from the beneficiation processes accumulated during the past 60 years of production.

MOTIVATION

Since the early 1970's when beneficiation became critical for the production of South Africa's high-value export grade blend-coking coals to Japan, and later High Grade Steam coal to other world markets, preparation and beneficiation mechanisms have had to evolve to meet the needs of the expanding export market.

This practice has become more challenging in recent years because of the increasingly difficult-to-beneficiate Gondwanan coal types and grades now being encountered in the region.

In an attempt to assist those involved in addressing these problems in the region, this course has been designed with a multi-disciplinary approach, bringing into account not only the foundation to coal preparation and beneficiation but also aspects which impact upon coal preparation and beneficiation; namely, the constitution of coal, coal quality and geological distribution, the nature of the remaining reserves and resources in the region, the impacts of mining and mine planning on products being delivered to the washing plants, environmental issues and the future use of products produced during the course of beneficiation. Plant design and operating factors are discussed in terms of the assessment of the future beneficiation potential for the coals of region.

WHO SHOULD ATTEND THIS COURSE

- Exploration geologists and resource managers
- Mining engineers
- Coal processing engineers
- Marketing managers
- Power generation and gasification engineers,
- Industrial combustion users of coal including those co-firing coal and biomass
- Engineering manufacturers
- Environmental scientists and engineers
- Consultants, fuel technologists
- Coal ash users
- Quality analysts
- Researchers in academia and
- Government personnel responsible for reserves, resources mining and environmental legislation.

PROVISIONAL PROGRAMME

DAY 1: COAL QUALITY IN RELATION TO PREPARATION

- | | |
|---------------|---|
| 08:00 - 08:45 | Registration |
| 08:45 – 09:00 | Introductory remarks with an outline of the course. Introduction to coal beneficiation, definition and role. <i>Mr Lionel Falcon, Wits.</i> |
| 09:00 – 09:30 | Relevance of coal to the South African economy. <i>Prof Rosemary Falcon, Wits.</i> |
| 09:30 – 10:30 | Constitution of coal – factors impacting on beneficiation. <i>Prof Rosemary Falcon, Wits</i> |
| 10:30 – 10:45 | <i>Tea</i> |

- 10:45 – 13:00 Coal quality distribution in the coalfields of South Africa - impact of beneficiation on marketable products and utilisation. *Prof Rosemary Falcon, Wits*
- 13:00 – 13:45 *Lunch*
- 13:45 – 15: 15 Coal sampling in the colliery environment; conventional chemico-physical analyses of coal. *Mr Alan Johns, Witlab*
- 15:15 – 15:30 *Tea*
- 15:30 – 17:00 Specifications, moisture bases, calculations and conversions. *Mr Alan Johns, Witlab*

DAY 2: PRINCIPLES OF COAL PREPARATION AND BENEFICIATION

- 08:30 - 09:00 Registration
- 09:00 – 10:00 The sequence of coal extraction on a colliery, from exploration through mining to beneficiation. Mining methods and their impact on beneficiation *Mr Lionel Falcon, Wits*
- 10:00 – 10:15 *Tea*
- 10:15 – 13:00 **Principles of coal preparation – Part I:** Introduction to the ancillary methods used in the preparation of coal prior to washing and beneficiation. These processes include crushing, milling, screening and sizing for market requirements. *Mr Anthony Yell, Multotec*
- 13:00 – 13:45 *Lunch*
- 13:45 – 15:30 **Principles of coal beneficiation - Part II:** Introduction to the principles of washing, up-grading and beneficiation of coal, i.e. the separation of coal from host rock and inter-grown minerals (ash) by physical and chemical means. Methods of beneficiation for **sized coal**: jigging, heavy media flotation and related equipment. *Mr Lionel Falcon, Wits.*
- 15:30 – 15:45 *Tea*
- 15:45 – 17:00 Cyclone design and application. *Mr Piet Neethling, Multotec*

DAY 3: FINE COAL, NEW TRENDS AND PLANT EFFICIENCY

- 08:30 – 09:00 *Registration*
- 09:00 – 10:30 **Principles of coal beneficiation – PART III:** Methods of beneficiation for **fine coal** and the equipment used. *Mr Johan de Korte, CSIR Miningtek.*
- 10:30 -10:45 *Tea*
- 10:45 – 11:45 **Principles of coal beneficiation – PART IV:** Development of a basic **flow sheet** for a beneficiation plant. Washability curves, partition curves and their applications. *Mr Johan de Korte, CSIR Miningtek*
- 11:45 – 13:00 Process and plant efficiency management. *Mr Johan de Korte, CSIR Miningtek*
- 13:00 – 13:45 *Lunch*
- 13:45 – 15:30 New trends in coal beneficiation. *Mr Johan de Korte, CSIR Miningtek*
- 15:30 – 15:45 *Tea*
- 15:45 – 17:00 South African **discards** – quantities, qualities and potential uses. *Mr Johan de Korte, CSIR Miningtek*

DAY 4 INNOVATIVE TECHNOLOGIES, ENVIRONMENTAL IMPACT AND FUTURE COAL UTILISATION

- 08:30 – 09:00 Registration
- 09:00 – 10:30 **Fine coal de-watering** – theory, methods and equipment. *Prof Q Campbell/Mr Marco le Roux, NWU*
- 10:30 – 10:45 Tea**
- 10:45 – 13:00 **Dry coal beneficiation** - methods reviewed. Air jigs, fluidised bed, etc. *Prof Milan Carksy and colleagues, UKZN.*
- 13:00 – 13:45 Lunch**
- 13:45 – 15:30 **De-sulphurisation** – economics of beneficiation prior to use versus gaseous desulphurisation. *Dr E Koper, Sasol.*
- 15:30 – 15:45 Tea**
- 15:45 – 16:30 **Global environmental concerns** and the importance of coal beneficiation on the future marketability of coal - debate and discussion. *Chaired panel, Mr Lionel Falcon and Prof Rosemary and*
- 16:30 – 17:00** Presentation of project and outline for examination. *Prof Rosemary Falcon, Wits*

DAY 5: PLANT VISIT WITH DEMONSTRATION

- 09:00 – 15:00 Lectures and Demonstration on pilot and full scale X-ray and Molecular density sorting. *Mr Lutke von Ketelhodt, Commodas.* Site visit at Mintek hosted by *Mr Carl Bergman,*

PROGRAMME FOR 2010

- 17 – 21 May - Coal Exploitation - MINN 7047
- 26 – 30 July - Coal Combustion - CHMT 7004
- 4 – 8 October - Coal and the Environment - MINN 7048
- 8 – 12 November - Coal Management and Marketing - CHMT 7006

CONTACT DETAILS

Technical Enquiries: Prof Falcon Tel: 011 717 7387 rosemary.falcon@wits.ac.za

Administration enquiries: Mrs Maggie Blair Tel 011 717 7387 margaret.blair@wits.ac.za

Industrial (non-academic) enquiries: Mrs Lesley Stephenson Tel 011 447 1490 Cell: 083 679 0697
lstephenson@mweb.co.za

COAL PREPARATION AND BENEFICIATION**12 – 16 April 2010****- REGISTRATION -****FULL WEEK – R7 500-00+VAT = R8 550 per week****OR****DAILY ATTENDANCE - R1 650+VAT = R1881 per day**

DAY 1..... DAY 2..... DAY 3..... DAY 4..... DAY 5.....

Email registration to: **MRS L STEPHENSON**. VAT No: **4270185251**

Tel 011 447 1490 Cell: 083 679 0697

Email: **lstephenson@mweb.co.za**

NAME:.....TITLE.....

AFFILIATION

COMPANY.....

ADDRESS.....

TEL:.....FAX.....EMAIL:.....

ACCOUNTS CONTACT PERSON.....

ACCOUNTS TEL NUMBER..... EMAIL.....

FFF MEMBERSHIPYes/No.....Membership No.....

COMPANY VAT NO:**NB: ATTENDANCE IS STRICTLY SUBJECT TO PAYMENT PRIOR TO THE COURSE****BANKING DETAILS:** **Please fax a copy of the deposit slip to EFT to (011) 447 6148 or email address**

Account name: Fossil Fuel Foundation

Bank: ABSA

Branch Code: 632 005

Account No: 919 978 4837

Ref: **PLEASE USE YOUR NAME OR INVOICE NUMBER ON THE EFT OR DEPOSIT SLIP****CANCELLATION OF THIS REGISTRATION**Cancellation may be made in writing 7 days prior to this course, whereon a 25% cancellation fee will be charged. No refund or credit will be issued within the 7 days of the course. Registrations are transferable. Invoices will be sent once registration forms have been submitted. **KINDLY NOTE: ATTENDANCE IS STRICTLY SUBJECT TO PRIOR PAYMENT**