

Selection of Coal Abstracts

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COAL INDUSTRY

4603

The energy situation in the Community - situation 1983 - outlook 1984

Commission of the European Communities
Luxembourg, Commission of the European Communities, 44 pp (1984)

Energy consumption has fallen within the Community for the fourth successive year. Oil consumption has fallen more rapidly than total energy consumption relative to the gross domestic product. Coal demand has not improved, however, and natural gas consumption has fallen slightly. Nuclear energy production has risen dramatically but only accounts for a small amount of total consumption. Each fuel is discussed in turn with reference to consumption, supply and prices.

4620

Computer programs for colliery engineering staff

Owen, R.J.

Min. Technol.; 66(761); 93-95 (Mar 1984)

This paper describes a project at the NCB Mining Research and Development Establishment designed to introduce computer literacy and applications to colliery staff, particularly in engineering disciplines. The function of some of the engineering programs is described. Some speculations on the future of colliery computing are given. The development of an integrated colliery network having common workstations capable of accessing all the existing computer systems will simplify implementation of applications and reduce terminal costs. (5 refs.)

RESERVES & EXPLORATION

3811

Introducing computer graphics to the Surveying Branch of NCB Western Area

Eyre, J.

Land Miner. Surv.; 1(2); 82-93 (Nov 1983)

In 1977 the Tektronix system was chosen for 5 UK National Coal Board Areas, to create line graphics, calculate coal reserve zones and form models for simulating compatibility. Plans correlated to the National Grid show the required information. It is expected that computer graphics will dramatically increase plan production. Functions of the system include spoil heap design, subsidence prediction and preparation of mining reports. A national pilot scheme is under preparation.

3821

Computer graphics applications in the evaluation of coal deposits. In Prospecting and evaluation of non-metallic rocks and minerals

Boardman, E.L.

3. extractive industry geology conf., Warwick, UK, 21-22 Mar 1983. London, UK, Institution of Geologists, pp 209-221 (1983) Atkinson, K.; Brassington, R. (eds.)

Rapid developments in the field of computer graphics and in particular interactive computer graphics have provided a new tool for the use of the geologist in the various aspects of his work on resource estimation. This paper describes the ways in which interactive computer graphics are being utilised in the National Coal Board's Geological branch for the production of base location plans, geophysical log processing, contouring and petrogram drawing. The paper also discusses the likely future developments in these and other areas and in particular in the compilation of structure plans, horizon maps and cross sections, the estimation of coal reserves and the possible application of 3-D graphics. (3 refs.)

3837

High resolution shallow reflection techniques applied to Australian coalfields. In Coal exploration IV

Harman, P.

4. int. coal exploration symp., Sydney, NSW, Australia, 15-20 May 1983. San Francisco, CA,

USA, Miller Freeman Publications, 30 pp (1983) Argall, G.O. Jr. (ed.)

Optimised high resolution seismic reflection techniques have been used in the Blackwater coalfield in Queensland, and have enabled the detection of faults with throws down to 5 metres or less. This made it possible to effectively plan mining with respect to faults, and to interpret stratigraphic features such as coal seam splitting and deterioration. Similar surveys elsewhere in Australia have been effective in locating small scale structures. The seismic reflection method was shown to be a viable, cost effective exploration tool in Australian coalfields. (14 refs.)

3846

Comparing drilling patterns for coal reserve assessment

Armstrong, M.

Australas. Inst. Min. Metall. Proc.; (288); 1-5 (Dec 1983)

Global estimation variance found by geo-statistical methods is applied to coal data from the Bowen Basin for an assessment of reserves. It is shown that two factors (the inherent variability of the variable under study, and the total number of drillholes) have more influence over the accuracy of the reserve estimate than the form of the drilling pattern. The spacing between drill holes is seen to be of secondary importance: the dominant factor is the total number of holes. Comparisons between the relative errors show that some variables such as sulphur need a much denser sampling than others to obtain the same level of precision.

4627

Coal bulk sample acquisition by large diameter core drilling

Patterson, C.L. and others

Queensl. Gov. Min. J.; 84(986); 471-475 (Dec 1983)

A core barrel has been developed and successfully used to recover 400 mm coal cores from the Walloon Coal Measures in the Moreton Basin, Queensland. The 3.4 m long barrel has the capacity to recover approximately 600 kg of coal per run and the potential to provide small bulk samples meeting Australian Standard recommendations for float/sink testing at sizes commensurate with preparation plant conditions. The paper describes the development of the core barrel and its use.

4650

Some results and problems of geostatistics in hard coal mining in the Federal Republic of Germany. In 18th international symposium, application of computers and mathematics in the mineral industries

Leonhardt, J.; Skala, W.

18. int. symp. on application of computers and mathematics in the mineral industries (APCOM), London, UK, 26-30 Mar 1984. London, UK, Institution of Mining and Metallurgy, pp 169-174 (1984)

Seam thickness is one of the most important of the geological parameters which determine the mineability of hard coal measures. The reliable prediction of this and other characteristics of coal deposits is of substantial importance with regard to economic expectations. The prediction itself is always a "one-off" case. Nevertheless, work on actual predictions has yielded approaches that came close to a model prediction method. Variogram studies on seam thickness, carried out for 11 seams of the Ruhr district, showed that the variogram

ranges vary; the average is 1.3 km. On the one hand, a universal kriging approach was used for the geological parameters. On the other hand, the overall effective trend was eliminated before kriging the residuals. To do so, the range of values had to be optimized. Results of selected examples of prediction refer to a dirt band in a seam and to volatile matter content. (7 refs.)

MINING

3871

The miners and new technology

Burns, A.; Feickert, D.; Newby, M.; Winterton, J.

Ind. Relat. J.; 14(4); 7-20(1983)

In this article the authors develop a theoretical framework for the analysis of issues raised by the new technology and report on research undertaken for the NUM into automation in coal mining. The problems workers face from new technology are summarised under the headings of job contraction, job control, job content, and health and safety. Most British coal comes from deep mines and entails three distinct activities: winning coal from the face; haulage of coal from the face; and preparation of coal at the surface. Traditional methods produced a sense of interdependence amongst workers which has already been considerably eroded by mechanisation, and the NCB is now introducing a new level of automation using the computer-controlled systems of MINOS, IMPACT and FIDO to improve efficiency. The article looks at the impact of such developments on the labour force, and the implications for other industries as a result of the influence of the NUM on the British labour force. (71 refs.)

3888

Britain's underground innovations

Rhodes, H.L.

Engineering (London); 224(2); 85-90 (Feb 1984)

The author outlines development in mining technology in the UK over the past decade, with particular emphasis on control systems in use underground. The growing impact of electronics, computers and radio control systems in British mines is illustrated by a number of examples.

3891

State of coal winning technology within the coal mining industry of the Federal Republic of Germany with special consideration of thin seams and thick seams

Kundel, H.; Pfannenstiel, P.-K.

J. Mines, Met. Fuels; 31(9); 368-382 (Sep 1983)

Statistics for coal winning in West German deep mines over the past 30 years are shown in tables. Longwall working is now used exclusively. Details of the winning machinery are given. The special problems posed by thin seams (< 1.3 m) and by thick seams (> 2.5 m) and the solutions that have been found are discussed.

3898

Aspects of swinging longwall faces through large arcs at Bagworth Colliery

Goddard, F.

Land Miner. Surv., 2(1); 29-37 (Jan 1984)

The paper describes a mining operation unique in the UK, that is, the swinging of a longwall face through a large arc in order to obtain more favourable working conditions. The practicability of the strategy has been demonstrated at Bagworth

Colliery, and it is seen that this option can have a major impact in terms of efficiency and profitability.

3904

Development stages of drilling equipment for shaft sinking

Weber, W.

31. meeting of the DEBRIV Committee "Hydrology-geophysics-drilling", Erkelenz, FRG, 21 Oct 1982. *Braunkohle*; 35(7); 207-215 (Jul 1983)

Shaft sinking activities have been enhanced in the last few decades. Drilling methods are particularly important in this field. A number of drilling methods are reviewed with regard to their preconditions and limits of application and state of the art. Modern drilling techniques permit sinking of shafts down to a depth of 1500 m and up to a diameter of 8 m. Drilling after preliminary sinking of a dirt removal hole can be considered as being technically mature, while blind drilling still needs to be improved (e.g. control during pole tool drilling, improved haulage during drilling without drill rigs, etc.). Blind shaft drilling is of particular importance as most of the shafts to be sunk in the future will not be undercut. (In German)

3918

Longwall support requirements

Unrug, K.F.

J. Mines, Met. Fuels; 31(9); 334-344 (Sep 1983)

The author describes the interaction between mechanical supports and roof strata on a longwall face and suggests that a classification system reflecting the quality of roof strata is a useful aid in the planning of longwall faces. The system in use in Poland is presented and examples of its application are given.

3924

Pneumatic stowing by mechanical front discharge at the Nordstern-Zollverein Combined Mine

Voss, K.-H.; Sielaff, H.D.

Glückauf; 120(1); 21-22, 24-26 (12 Jan 1984) Available in English in *Glückauf + translation*; 120(1); 6-8 (12 Jan 1984)

Pneumatic stowing is expected to assume increasing importance and application in the coming years in West Germany. The objective of the development project described in this paper was to improve existing methods of pneumatic stowing. The development of a mechanical front discharge system appears to have achieved this goal in that it permits high face outputs with good face OMS results and allows shift expenditure for stowing to be kept very low. Results obtained at Nordstern-Zollverein Combined Mine are presented. The new method increases safety in that men no longer need to enter the goaf-area during the stowing operation. (In German)

3926

Combination of backfilled light supports and rockbolting when developing a cross-cut

Krahe, J.; Groebel, K.H.

Glückauf; 120(2); 71-75 (26 Jan 1984) Available in English in *Glückauf + translation*; 120(2); 16-17 (26 Jan 1984)

A Westerholt Colliery development work was carried out in a cross-cut subject to severe deformation resulting from the working of several seams. A field trial of light supports during this operation showed that in combination with reinforcing measures, they can be exposed to high loads. A comparison of material costs for

various support systems in conjunction with additional reinforcing supports showed that the advantage lies with backfilled light supports plus rock bolting. Further trials are required to determine the performance of the system in different conditions. The light weight of the supports is of considerable benefit in transporting and erecting. (In German)

3931

The planning of face supports in terms of rock mechanics

Herwig, H.

Glückauf; 120(3); 125-127 (9 Feb 1984) Available in English in *Glückauf + translation*; 120(3); 25-26 (9 Feb 1984)

Planning procedures for face support systems have been developed from the findings of operational research on 126 faces. The procedures relate only to faces where the immediate roof is mudstone. With solid roof strata and low strata pressure, the specific supporting pressure should be at least 400 kN/m². If the immediate mudstone roof is less than 2 m thick and the strata pressure is high, the specific supporting pressure must be more than 300 kN/m² and the distance between the front end of the roof bars and the coalface must be shortened. The roofbar/coalface distance should be less than 0.5 m if the mudstone roof stratum is more than 2 m thick. (In German)

3933

Automatic hydraulic support control at Götterborn Colliery

Sänger, A.

Glückauf; 120(3); 133-135 (9 Feb 1984) Available in English in *Glückauf + translation*; 120(3); 28-29 (9 Feb 1984)

Experience of working a 1.05 m seam at Götterborn Colliery, Saar, is recounted. An Eickhoff drum shearer was used and a two-leg articulated shield system with automatic controls was introduced. The operation of the automatic control system is described and the advantages obtained by its introduction are outlined. (In German)

3949

Computer applications in strata mechanics

Neve, P.; Isaac, A.K.

Min. Sci. Technol.; 1(2); 137-147 (Jan 1984)

Research into strata behaviour has been actively pursued at University College, Cardiff, for the past twelve years. Computers have been integrated into all aspects of the research, providing a comprehensive facility to aid the study of strata behaviour and support system interaction. Four computers have been combined with software packages, developed at Cardiff, to provide a powerful yet flexible system. Raw data may be entered either manually through a keyboard, or more efficiently by data capture devices, enabling automatic logging of peripherals. Data processing is performed by interactive software, producing results in tabular and graphical form. Commercially available graphics software and high quality output devices, enhance result presentation and permit quick interpretation. A mainframe computing system has permitted the development and application of the finite difference computer model to predict strata behaviour and support system interaction. The successful application of computing technology to this area of mining engineering is reflected in the high volume of data automatically processed which releases significantly more time for analysis and interpretation. (7 refs.)

duct are introduced, and consideration is given to the effects of variables in auxiliary ventilation - fan characteristics curve duct diameter, standard of installation and duct length - on the effective resistance of the duct and the volume rate of air flow at the face.

4811

Use lower shearer drum speeds to achieve deeper coal cutting

Ludlow, J.; Jankowski, R.A.

Min. Eng. (Littleton, Colo.); 36(3); 251-255 (Mar 1984)

The use of low shearer drum speeds to achieve deeper cutting is becoming more widespread in the US. It has been found that these slower speeds and increased pick penetration lead to a reduced dust make, and can also give an appreciable increase in production. The principal engineering impacts of reduced drum speeds are increased loads on all power and load transmission elements.

4861

British collieries set new trends in electrical engineering

Buntain, D.

Aust. Coal Miner; 5(9); 24-26 (Sep 1983)

At all levels of operation in British mines (from the coal face to the surface), the power rating of machinery is gradually increasing. This in turn demands higher standards of practice and safety. One innovation, presently employed at ten NCB collieries, is the use of cycloconverters. Transistorised circuits control thyristors to change a fixed frequency ac power supply into a variable frequency feed to motors driving rope haulage engines rated at up to 375 kW. The motors also provide the train's braking power so that mechanical brakes can be used for emergencies. The use of electric trolley/battery locomotives underground will allow greater flexibility of access. The author describes the use of radio signalling in transport and haulage; coalface machine power requirements; radar monitoring of coal supplies and rope-slip detection units in haulage machinery. (6 refs.)

4872

Transient belt stresses during starting and stopping : elastic response simulated by finite element methods

Nordell, L.K.; Ciozda, Z.P.

Bulk Solids Handl.; 4(1); 93-98 (Mar 1984)

An introduction to the modern analysis techniques used in determining the magnitude of the dynamic transient forces propagated in a conveyor belt during its starting and stopping phases. Transient forces can be generated which impair the integrity of the conveyor system. Prediction, control, and allowance for these forces is essential for a successful design. Prediction of the transient behaviours has been accomplished with the aid of a computer modelling tool tradenamed BELTFLEX. The program simulates the rheological effect of longitudinal vibration in the belt resulting from changes in the equilibrium forces. Practical applications and case studies are noted. (18 refs.)

4880

Surface and underground automated mine surveys

Hodges, D.J.; Nicholson, T.J.; Kettman, M.R.

Min. Eng. (London); 143(271); 465-470 (Apr 1984)

During the past decade mine surveying technology has been revolutionized by the application of electro-optical systems of distance measurement, gyroscopic methods

of azimuth control and programmable calculators and computers. As a result productivity, accuracy and efficiency have been increased dramatically. Mine surveying is now on the verge of a further revolution with the introduction of automated systems of data measurement acquisition, processing and plotting. The automated survey systems used by the Department of Mining Engineering, University of Nottingham, are discussed and the results of surface and underground trials conducted with these systems are outlined. (7 refs.)

4883

Experience abroad - machine design and performance

Glasby, H.

Min. Eng. (London); 143(271); 497-504 (Apr 1984)

The paper describes how operational experience gained abroad has influenced the design and performance of Anderson Strathclyde longwall shearers and armoured flexible conveyors, and aims to promote new thought when considering future heavy duty installations in the UK. A brief review is made of the company's shearers currently in use in the UK and overseas, and examples are given of longwall machine developments which were instigated overseas. The specifications of a number of AM 500 shearers supplied recently to meet particular overseas requirements are given, and a brief mention is made of the requirements of the AFC within a heavy duty package. The main electrical influence so far has been a demand for increased installed power but is now seen to be a need for improved control and monitoring facilities. Operational results from several AM500 machines overseas are quoted, with a detailed account of considerations behind, and the results from a heavy duty installation in the USA. Finally, reasons are examined for the better results generally overseas compared with those in the UK.

PREPARATION

4076

Continuous circular coal blending beds. In ABMEC '83

Osborne, D.; Frommholz, W.

Conf. on mines transport, Bretby, UK, 27-30 Jun 1983. Rickmansworth, UK, Mining Industry Promotions, vol. 1, pp 15/1-15/12 (1983)

This paper sets out to outline the development of the endless coal blending bed, of which three have recently been purchased by the UK National Coal Board for the Grimethorpe and Woolley projects. These systems work using a relatively new method of stacking called the "Chevron System", which is a combination of the well-known Chevron and Cone Shell methods. The paper outlines the reasons for selecting circular stockpiles as opposed to longitudinal systems, the method of work, the theory behind them together with the background based on more than fifty circular stockpiling systems, which have been built by the Company.

4886

Review of oil agglomeration techniques for processing of fine coals

Mehrotra, V.P. and others

Int. J. Miner. Process.; 11(3); 175-201 (Oct 1983)

Oil agglomeration shows promise as a process which will minimise fine coal losses during preparation, and for recovering combustible matter from refuse ponds. This

paper, based on a literature review, presents : a) physical-chemical and process engineering principles of oil agglomeration; b) a comparative summary and specific process highlights of the more developed oil agglomeration processes; c) a critical evaluation of oil agglomeration in terms of selection of oil, process benefits and economic aspects.

4889

High-speed decanter centrifuges upgrade coal preparation plant

Moir, A.

Min. Mag.; 150(2); 160-163 (Feb 1984)

The application of high-speed decanter centrifuges in coal preparation plants is discussed. Their use for classification of coal slurry, dewatering slurry, dewatering flotation products and dewatering pipeline slurry is described, and examples of the results obtained are given.

4914

Effect of froth structure on coal flotation and its use in process control strategy development. In 18th international symposium, application of computers and mathematics in the mineral industries

Kawatra, S.K.; Seitz, R.A.

18. int. symp. on application of computers and mathematics in the mineral industries (APCOM), London, UK, 26-30 Mar 1984. London, UK, Institution of Mining and Metallurgy, pp 139-147 (1984)

For many reasons the recovery of fine coal continues to become increasingly important and virtually all new coal preparation plants incorporate flotation into their basic flowsheet. Since flotation is currently the most effective and economical method for recovering fine coal from run of mine fines (minus 600 microns) this trend is likely to continue. In flotation, particles are transferred from the pulp to the froth by two mechanisms : bubble attachment and entrainment. Similarly, particles are lost from the froth to the pulp by the two reverse mechanisms : bubble detachment and drainage. Consequently, the behaviour of particles in both the pulp and froth is important. In order to take full advantage of the control of reagent additions to flotation circuits the effect of the various reagents used must be understood with respect to these mechanisms. The analysis of the behavior of coal flotation presented in this paper reveals the critical role that froth structure plays in coal flotation and that the froth structure is controlled by reagent additions. These results show that in order to achieve optimal separation of coal from gangue by flotation it is necessary to optimize both the pulp chemistry and the froth structure. (21 refs.)

TRANSPORT & HANDLING

4103

Process and control of pulverised coal firing systems. In Coal technology Europe. Volume 1 - combustion

van der Sloot, B.W.A.

3. European coal utilisation conf., Amsterdam, The Netherlands, 11-13 Oct 1983. Rotterdam, The Netherlands, Industrial Presentations Group, vol. 1, pp 75-84 (1983)

A short description is given of the firing system of modern pulverized coal fired boiler installations. When designing coal systems for such boilers designers aim at : minimizing the primary air flow (for low

energy consumption); having available sufficiently hot primary air flow for drying the ground coal and thus making it transportable; keeping the velocity of the air/coal mixture above minimum value to prevent the pulverized coal from settling and drifting; and ensuring proper controllability of the pulverized coal flow.

4111

The use of air cannons to solve coal flow problems in both mass and core flow bunkers with specific reference to the phenomenon of "silo quaking". In Second international conference on design of silos for strength and flow

Rappen, A.; Wright, H.

2. int. conf. on design of silos for strength and flow, Stratford-upon-Avon, UK, 7-9 Nov 1983. London, UK, Powder Advisory Centre, vol.1, pp 423-433 (1983)

This paper gives sound reasons, based on three case studies, to support the growing opinion amongst silo designers that the air cannon correctly applied is probably the most effective flow aid device currently available. Applications cover both core (funnel) and mass flow especially with regard to bunkers on coal-fired ships. Particular attention is drawn to the phenomenon of "silo quaking" which was observed on a range of large capacity mass flow coal silos at a Dutch power plant. It is the authors' opinion that air cannons are the only effective means of dealing with this problem. (5 refs.)

4922

M and R for aluminum coal cars : no problem McGraw, M.G.

Electr. World; 197(12); 69-70 (Dec 1983)

Maintenance and repair on lightweight aluminum coal cars, which have been in use for two decades, pose no problem for engineers despite new interest in increasing their use in order to reduce transport costs. Participants at national meetings described their experience in building and repairing aluminum cars. Specification sheets are available for a coal-hauling family of rail cars, including gondolas and hopper cars. 1 figure. (DCK)

4935

Computer-aided design techniques

Halvorsen, N.M.

Bulk Syst. Int.; 5(11); 45, 47 (Mar 1984)

The use of computers in the design of belt conveyor systems has resulted in the production of efficient and practical conveyors. There is a discussion of two computer programs developed at Noyes Bros, with data to verify the accuracy of the predictions and some evidence that such computer systems are cost effective.

4939

Latest techniques are reliable and inexpensive

Foster, C.

Solids Handl.; 6(2); 59, 61, 63, 65, 67 (Mar 1984)

The latest coal and ash handling techniques which make the burning of coal (rather than oil or gas) more acceptable to industrialists and boilerhouse operators are described. Coal delivery, storage and transfer procedures are discussed, together with methods of ash removal.

PROPERTIES

4137

An assessment of laser holography for the measurement of fine gasborne particles
Jury, A.W. and others

Powder Technol.; 38(1); 39-52 (Mar 1984)

Laser holography offers an accurate means of measuring the size, concentration and velocity of fine particles suspended in gas streams and therefore has a novel potential use in studies of hot fuel gas cleaning methods. A theoretical analysis of holographic image resolution principles was carried out in order to apply the technique to examination of particulates emanating from a coal gasifier. Laboratory tests show that fine particles down to 2 μm in a simulated off-gas line can be recorded for analysis. The effect of a hot gas environment on background noise and size resolution is also discussed. Results of hot gas tests are presented and compared with results obtained using a laboratory particle sizer on samples collected isokinetically. Size distributions measured holographically show good agreement with laboratory results.

4975

Schmidt hammer rebound data for estimation of large scale in situ coal strength

Sheorey, P.R. and others

Int. J. Rock Mech. Min. Sci. Geomech. Abstr.; 21(1); 39-42 (Feb 1984)

The paper reports an investigation to determine whether a correlation exists between the Schmidt hammer rebound and the in situ large-scale strength. The results showed a reasonable correlation between the large-scale in situ crushing strength of 0.3 m cubes of coal and the lower mean of rebound values obtained. The regression is seen to be linear within the range 2.75 - 13.14 MPa of in situ strength. In situ large-scale testing procedures are cumbersome and expensive, and the Schmidt hammer rebound method can offer a quicker and cheaper means of estimating this strength. Laboratory 25 mm cube coal strength shows a greater scatter with rebound values than the large-scale in situ strength, and gives a non-linear regression.

4984

Improvement of ROM coal quality (Verbesserung der Rohkohlenqualität)

Klee, H.

BMFT-FB-T - 83-262 Bonn, FRG, Bundesministerium für Forschung und Technologie, 93 pp (Nov 1983)

There are no recent investigations on hand concerning inadvertent and undesirable size degradation to which coal is subjected underground. Investigations were initiated by the incessant size degradation of the fraction over 10 mm. Investigations were based on ROM coal samples obtained and analyzed in accordance with standard regulations. The target concept of expressing by some mechanical equivalent the load exerted on ROM coals at the underground in order to thus eliminate raw material-induced factors cannot be implemented for the time being. Progressive hardening of the coal was not observed. Size degradation is a linear function of the intensity of mechanical load. Some 49 % of total size degradation takes place during coal-getting, against approx. 51 % during underground transport. Considerable degradation is brought about by chain conveyors and spiral chutes. (In German)

5019

Direct determination of element impurities in the volatile products of the pyrolysis of coals

Laktionova, N.V.; Egorov, A.P.

Khim. Tverd. Topl.; (5); 119-121 (Sep 1983)

Method is described for the direct determination of the microelements in the volatile products of coal pyrolysis. The nature of the bond between microelements and the organic matter of coal is discussed. It was demonstrated that silicon, titanium, iron, magnesium and aluminium are present in the volatile products of gas coal which were separated in the 100-200 C temperature interval; boron and silicon are present in the volatiles separated in the 400-600 C range. In the pyrolysis of anthracite the element impurities are found only in volatile products separated in the 400-800 C range. (5 refs.) (In Russian)

PROCESSING

4197

Briquetting of coal fines from preheat-pipeline charged coke batteries

Aktay, A.I.

Ironmaking Proc. Metall. Soc. AIME; 42; 383-396 (1983)

The briquetting of coal fines generated during coal preheating and pipeline oven charging was investigated as a possible method of handling these fines for recycling in the carbonisation process. Bench-scale briquetting tests were carried out to evaluate the process variables affecting fine coal briquetting. In general, the crushing strength of the briquettes increased with thermal ageing and increasing amounts of binder. Pilot-oven tests were carried out using various amounts of briquetted coal fines in the coking blend. The results indicated that coke stability increased slightly with the addition of briquettes composed of blended metallurgical coal. This indicates that briquetted coal fines from preheating and pipeline charging can be used as a carbonisation feed material.

4218

Reactivity of coals in hydrogenation

Ouchi, K.; Ibaragi, S.; Kobayashi, A.; Makino, K.; Itoh, H.

Fuel; 63(3); 427-430 (Mar 1984)

Three coals of different rank (77.9 - 89.5 wt% C, daf) were hydrogenated at various temperatures to examine the influence of coal rank on the hydrogenation reactivity. Extraction of the heat treated coals with pyridine, benzene and n-hexane was also carried out to estimate the total amount of the intrinsic solvent-soluble fraction in the original coal. In the extraction of preheated coal, the largest amount of pyridine-soluble fraction was obtained for the coal of medium rank (83.9 % C). This coal also showed the highest conversion, in terms of pyridine solubility, on hydrogenation. As the pyridine soluble material from hydrogenation must contain the intrinsic soluble fraction present in the original coal, it cannot be concluded that medium-rank coal shows the highest reactivity in hydrogenation. Conversion to benzene and n-hexane soluble materials is only slightly affected by the intrinsic soluble fraction, so it is better to estimate hydrogenation reactivity from the yields of these materials. On this basis, the lowest-rank coal shows the highest reactivity in hydrogenation. (8 refs.)

4232

British Gas HICOM methanation process for SNG production. In 1983 international gas research conference

Ensell, R.L.; Stroud, H.J.F.

International gas research conference London, UK, 13 Jun 1983. DE - 84000825 CONF-830664 - Rockville, MD, Government Institutes, Inc., 472-481 pp (1983) Hirsch, L.H. (ed.)

The British Gas HICOM process (formerly HCM) is an efficient and cost-effective means of making substitute natural gas (SNG) from gases derived from certain coal gasification processes. For example, with the British Gas/Lurgi Slagging Gasifier, coal-to-SNG thermal efficiencies of about 70 % are possible. In this process a methane-rich gas is made directly from the purified gasifier product gas by reaction with steam over a British Gas catalyst with the temperature rise controlled by hot gas recycle and split-stream operation. The current HICOM configuration was developed from in-depth evaluation of full-scale plant designs. Pilot plants, that directly simulate full-scale reactors, have completed over 15,000 hours on stream with single tests of over 2000 hours and a good catalyst life has been achieved. A demonstration of the HICOM process is scheduled for 1984 in which 5300 m³/h of gas from a British Gas/Lurgi Slagging Gasifier will be treated. (2 references, 6 figures, 3 tables)

4236

Materials for coal conversion systems

Bradley, R.A.; Judkins, R.R.; Hammond, J.P. Oak Ridge National Lab., TN (USA)

DE - 84003400 DOE/NBM - 4003400, 31 pp (1983)

The materials performance data derived from laboratory and pilot plant testing provide much of the information necessary to select appropriate materials for construction of coal conversion plants. Sufficient information is available on materials for a prudent, possibly conservative, choice of materials for the various components of large demonstration or commercial plants. Some areas, such as letdown valve trim materials for coal liquefaction, refractories for slagging gasifiers, and heat exchangers for waste heat recovery in gasification systems, need significant improvement. However, other areas, such as improved pressure vessel steels or knowledge of the temperature effects on corrosion of various alloys in coal oils and coal gas atmospheres, need work to improve the economics, not the technological feasibility of the process. Maintenance of the current materials research and development efforts together with a more exhaustive study of the lessons learned from the pilot plants should lead to additional and more reliable guidance for the materials engineers involved in designing future plants.

4307

Coal structure vs flash pyrolysis products Calkins, W.H.

186. national meeting of the American Chemical Society, Washington, DC, USA, 28 Aug 1983. CONF-830814 - Vol. 4 Prepr. Pap. - Am. Chem. Soc. Div. Fuel Chem.; 28(5); 85-105 (1983)

The fast pyrolysis of coal produces tar, char and a range of low molecular weight gases in various proportions and amounts depending on the pyrolysis conditions (temperature, pressure) and the coal being pyrolyzed. Much research effort has been devoted to study of the reaction kinetics and effect of process variables, attempting thereby to elucidate the pyrolysis mechanism.

Less effort has been focused on coal chemical structure and its relationship to the pyrolysis reactions and pyrolysis products. It was to attempt to better understand coal structure and its influence on pyrolysis products and pyrolysis mechanisms that this project was undertaken. This paper reports only on that portion of the work concerned with the aliphatic hydrocarbon products and particularly the light olefins. (7 tables, 12 figures, 16 refs.)

4326

Use of reverse combustion for borehole linking in in-situ gasification of black coal

Rauk, J.

Koks, Smola, Gaz; 28(9); 196-200 (Sep 1983)

Evaluates use of reverse combustion for borehole linking in in-situ gasification of thin and thick black coal seams in the USSR. Experiments carried out at two test stations are described: the Lisichanskaya station and the Yuzhno-Abinskaya station in the Kuzbass. Black coal seams at both test sites are characterized: depth, thickness dip angle, mechanical properties and particularly permeability to air used for borehole linking. The following aspects of borehole linking are discussed: distribution of boreholes, average air pressure, average air consumption, average borehole linking rate, air consumption and energy consumption per 1 m borehole. Data on borehole linking at the test stations are given in 2 tables and in a scheme. Reverse combustion used for borehole linking in black coal seams is a suitable method in coal seams with a high moisture content as no seam draining is necessary (compressed air removes water from the borehole area). Use of compressed air instead of water positively influences coal combustion and coal gasification. The method is inefficient when coal seams are situated at depths exceeding 130-200 m. Weak points of the method are evaluated: excessive air and energy consumption (air losses range from 30 to 60 %), cost of high pressure compressors which produce compressed air (pressure from 11 to 12 MPa) used for borehole linking, unstable rate of borehole linking. (7 refs.) (In Polish)

5058

In-furnace SO₂ control for pulverized-coal boilers

Yeager, K.

EPRIJ.; 9(2); 43-45 (Mar 1984)

Furnace sorbent injection is currently under development as a potential SO₂ control method for coal-fired utility boilers. In this process, a pulverised calcium-based material such as limestone is injected directly into the furnace cavity. Because of its conceptual simplicity, the process promises to show capital cost savings over conventional flue gas desulphurisation systems. The development of the process is described and the results of pilot scale tests are shown.

5062

Effect of coal particle size on coal hydrogenation

Yoshida, R. and others

Nenryo Kyokai-shi; 62(678); 851-855 (Oct 1983)

The effect of coal rank and particle size on coal hydrogenation with a vehicle oil was investigated. Three coals of different ranks with carbon contents of 73.0 - 87.4 % were used. The results showed that for these coals the effect of particle size

was not apparent when they were pulverised to -48 Tyler mesh in the preparation of coal pastes. (The tables and captions in this paper are in English). (In Japanese)

5063

The effect of blending of different types of coal on the hydrogenation under high pressure. 1. The application of red mud-sulphur catalysts

Nakata, Y. and others

Nenryo Kyokai-shi; 62(679); 913-922 (Nov 1983)

An investigation of the effect of blending of two different coals in various ratios on the hydrogenation reaction was carried out using a red mud-sulphur catalyst. Three Japanese coals and an Australian brown coal were used in the study. The conversion of the blended coals was compared with that obtained with each of the coals alone. A blend of the Yallourn brown coal and Shin-Yubari coal showed a synergism: it is considered that hydroaromatics from the Japanese coal promote the hydrogenation of the Yallourn coal. (The tables and captions in this paper are in English). (In Japanese)

5064

The effects of blending different types of coal on the hydrogenation reaction under high pressure. 2. In the absence of a catalyst

Nakata, Y. and others

Nenryo Kyokai-shi; 62(680); 982-988 (Dec 1983)

In the second part of this paper, the results of blending Shin-Yubari coal with Yallourn brown coal or Taiheiyo coal or Sohyakoishi coal at various ratios on the hydrogenation reaction in the absence of a catalyst are reported. A significant decrease in conversion was found when the brown coal was included in the blend. There was a slight decrease in conversion with the other blends. The principal reason was thought to be the hindrance of hydrogen diffusion due to the liquefied oil and unreacted material. In contrast to the conditions reported in the first part of the paper, it was observed that a negative synergism occurred under the condition of an insufficient supply of hydrogen. (The tables and captions in this paper are in English). (In Japanese)

COMBUSTION

4394

Alternate energy conversion systems

Larson, J.W.

Am. Soc. Mech. Eng., (Pap.); (83-PET-1); 8 pp (1983)

The variety of advanced coal-burning power plant concepts currently under consideration for utility electric generation are described. These concepts include fluidized beds and combined cycles evolved from conventional steam and gas turbine systems now used in utility service. Performance comparisons are presented between the advanced concepts and an advanced steam plant. Application of these advanced concepts to repowering of existing plants is discussed.

WASTE MANAGEMENT

4420

Mine dump

McDonald, G.W.; Fredrickson, D.E.

CIM Bull.; 76(860); 63-66 (Dec 1983)

An account is given of the reclamation of

coal from waste heaps in Nova Scotia. Details of the plant built at Summit Mine where the tip contains some 2.7 million tonnes of waste are presented. Scrap and oversize are first removed and the remaining material is slurried with water to a density of 1.45. The slurry is cycloned to separate the saleable thermal coal from the rejects which are returned to designated areas of the dump for contouring and revegetation. Flow sheets of the recovery circuits are shown.

4455

Sensitivity of air pollution control costs to site-specific variables for coal-fired power plants. In VI congrès mondial pour la qualité de l'air - textes des conférences

Bloyd, C.N.; Rubin, E.S.; Skea, J.F.

6. world congress on air quality, Paris, France, 16-20 May 1983. Paris, France, Société d'Etudes pour le Pétrole et l'Industrie Chimique (SEPIC), vol. 3, pp 433-440 (1983)

The costs of air pollution control for a modern coal-fired power plant depend significantly on plant-specific factors reflecting differences in coal characteristics, emission regulations, plant design and operating parameters, and local economic factors. This paper presents the results of extensive sensitivity analyses carried out to evaluate the impact of key plant parameters on the capital cost and annual revenue requirement of selected control systems for dry flyash collection, sulfur dioxide removal and solid waste disposal. The analysis employs analytical models recently developed to assess the economic impacts of alternative air pollution control strategies. Results are displayed in terms of cost sensitivity to a variety of economic, physical and regulatory policy variables. (5 refs.)

5216

Evaluation of alumina extraction from coal waste: composition and availability. Information circular/1983

Sorensen, R.T.; Schaller, J.L. Bureau of Mines, Boulder City, NV (USA). Boulder City Engineering Lab.

PB - 83-265181 26 pp (Aug 1983)

This Bureau of Mines report presents the results of a study to rank technologies for extraction of alumina from bottom ash and coal shale. The available literature on composition and availability of coal waste was reviewed, and papers pertinent to alumina extraction are referenced. Types of coal waste were categorized by method of waste generation, coal content (heating value), location, coal type (ash nomenclature), and alkaline earth content. The differences and similarities among the categories of coal waste are summarized as to factors that may affect aluminum extraction, especially factors concerning chemical composition, current production, storage problems, and accumulated tonnage. Data available on physical characteristics and mineralogy did not correlate well with the individual categories of coal waste, and discussion on these two aspects is limited to the differences between coal ash and coal shale.

5227

Influence of particle coagulation, an effect of steam condensation, on dedusting efficiency

Mielczarek, M.; Koch, R.

Chem. Tech. (Leipzig); 35(11); 586-589 (Nov 1983)

Proposes a method for removal of very fine

dust (particle sizes smaller than 1 μm) from gases during hot gas cleanup; gases are additionally moistened with steam followed by cooling to below the dew temperature. This leads to coagulation of fine dust particles; the enlarged dust particles can be removed with standard dust wet scrubbers. Laboratory experiments are presented showing that maximum degree of coagulation was reached by 1×10^{-12} kg of water per particle, enlarging particles of 0.5 to 7.5 μm in diameter to 4 to 16 μm . The proposed coagulation method proved to be efficient for dusts of both high and low wettability. Technological steps in designing dust coagulation equipment are enumerated. (8 refs.) (In German)

5254

Precipitation or filtration - a comparison. In Second CSIRO conference on electrostatic precipitation

Porter, J.R.

2. CSIRO conf. on electrostatic precipitation, Bowral, NSW, Australia, 17-19 Aug 1983. North Ryde, NSW, Australia; Commonwealth Scientific and Industrial Research Organisation, pp 22/1-22/19 (1983)

The last 5 years has seen, in Australia, a substantial growth in the application of fabric filtration to the collection of fly ash after coal fired boilers, a role traditionally that of the electrostatic precipitator. This trend has been seen both in major new plant as well as retrofits to existing plant. This paper aims to outline, in a quantifiable way, many of the factors involved in the selection of pollution control equipment for fly ash applications. The paper takes as case studies a typical utility boiler and a typical industrial boiler and examines the effects of coal quality, specification data and statutory requirements on the economics of dust collection from these two cases. (8 refs.)

ENVIRONMENTAL ASPECTS

4507

Acid rain and damage in forestry. A documentation (Saurer Regen und Forstschaeden. Eine Dokumentation)

Essen, FRG, Gesamtverband des Deutschen Steinkohlenbergbaus, 146 pp (Apr 1983) 2 rev. ed.

In general, the co-action of various air contaminations (synergism) is mentioned as the cause of damage in forests. The joint occurrence of air pollutants (e.g. SO_2 , ozone, acid rain) leads to damaged leaf surfaces in conifers and deciduous trees resulting in an eluviation of the trace elements Mg or K. According to the view held by the Gesamtverband, the participation of individual or of the total of airborne pollutants cannot be regarded as the only cause of forest mortality. They think that other components like e.g. diseases, soil conditions, fungus infestations, drought years and mono-cultures, are just as responsible. (In German)

4509

The SO_2 problem from the viewpoint of the energy economy. In SO_2 und die Folgen Zimmermeyer, G.

Seminar of Gesellschaft für Strahlen- und Umweltforschung on SO_2 and the consequences, München, FRG, 20-21 Jan 1983. GSF-A - 3/83 Neuherberg, FRG, Gesellschaft für Strahlen- und Umweltforschung m.b.H., pp 77-89 (Apr 1983)

The measures taken so far by the German bituminous-coal-processing power economy with regard to prevention are unparalleled

as compared to those of other European countries and the preventive measures taken in the forest itself. The allegation, defended with such force practically in the Federal Republic alone, of SO_2 being the global cause of the observed forest damage, may catch on politically even if scientists, especially in the United Kingdom and the USA, throw in considerable, substantiated doubts. But science has the responsibility to corroborate any requests for further reduced emission and substantiate the prospects of their success. (In German)

4522

Acid deposition - a challenge for Europe - proceeding

Ott, H.; Stangl, H. (eds.)

Symp. on acid deposition - a challenge for Europe, Karlsruhe, FRG, 19-21 Sep 1983. Brussels, Belgium, Commission of the European Communities, 433 pp (1983) Report n° XII/ENV/45/83 Preliminary edition

The seriousness of the problem of acid rain is reflected by the magnitude of the environmental effects. These are manifested in the deterioration of buildings and corrosion of metallic structures, the acidification of lakes, and the dying off of forests. This symposium examines the present status of the problem and advocates a course of action to prevent the escalation of the problem; including research into the effects of air pollution on flora, fauna and ecosystems, chemistry of pollutants, cost-effectiveness studies of abatement techniques, mechanisms of soil pollution, monitoring of effects and new, clean technologies. Papers are grouped under the main headings of : origin, transport, conversion and deposition of air pollutants; effects of air pollutants and acid deposition; abatement strategies; and recommendations. Papers are in English, German or French.

PRODUCTS

4544

The use of alternative fuels in diesel engines

Murayama, T.

Nippon Kikai Gakkai Ronbunshu, B Hen; 49(445); 1825-1831 (1983)

Trends in research into alternative fuels for diesel engines are outlined, focussing on the various liquid fuels that are obtained in place of petrol and on ways of improving fuel performance. After an account of gasoline-based operation, descriptions are given of various alcohol-based systems, including dual-fuel feed, mixed-fuel feed, forced ignition and modified alcohol systems. Other topics briefly examined include : emulsion fuels, application of the vacuum boiling effect, various types of biomass and their esterification, coal liquids and coal/oil mixture. (23 refs.) (In Japanese)

HEALTH & SAFETY

4581

A deep core drilling hammer for search and supply boreholes in friable rock

Funkemeyer, M.; Wallussek, H.

Glückauf; 120(1); 30-32, 34-35 (12 Jan 1984) Available in English in Glückauf + translation; 120(1); 9-10 (12 Jan 1984)

The paper considers the drilling of boreholes in connection with rescue work in