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Strengthening Drainage and Utilization of Coalbed Methane and Further Promoting Control of Coal Mine Gas to A New Platform

The editor’s notes: A Visit to Mr. Wu Yin, Director of Inter-ministerial Leading-Group Office
The editor’s notes: Recently, the inter-ministerial coordination leading group for control of coal mine gas held the fifth meeting. It summarized the results and experiences of work made in 2007 and set the key points and targets for work in 2008. The journalists of our editorial department visited Mr. Wu Yin, Director of the Group Office, in order to have a further understanding of the contents of the key work in development and utilization of CBM in 2008. The following is a report for the reference of the readers.

Research and Application of Under-balanced Drilling Technology in Drilling Horizontal CBM Well
Xian Baoan¹, Sun Ping¹, Wang Yibin² and Bao Qingying¹

¹. Langfang Branch, China Petroleum Prospecting and Development Institute, Hebei 0650007; 2. China Geology University (Beijing), Beijing 100083)

Abstract: Sensitivity to damages and non-recoverability of coal reservoir determines that measures should be taken to protect the system in the process of well drilling, completion and production. The under-balanced drilling technology was successfully applied in FP1-1 well by using an oil pipe in a vertical well to carry out annular air injection, so as to achieve rapid and steady injection and provide great protection of coal seams as well as stability of well wall. The paper proposes to reinforce the structure of horizontal well and to spread application of under-balanced drilling of horizontal well in development of CBM. The paper points out the new research direction of more economical and effective under-balanced drilling.

Keywords: CBM; sensitivity of reservoir; under-balanced drilling; annular air injection; horizontal well

Study on Directional Drilling Technology for Coal Seam

Sun Xin

( National Institute for Occupational Safety, Beijing 100029)

Abstract: The paper describes general principle of advance directional drilling in coal seam, and analyses application requests and problems for attention of this technology in VCBM production., and evaluates principal risk factors and cost in directional drilling.

Keywords: Coal seam; directional drilling; steering

Well Pattern Optimization Design for CBM Development

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Abstract: CBM Well Pattern Optimization is the key issue for CBM development. Proper well pattern can have a good effect on well productivity. But bad well pattern can make a CBM project ineffective. This article provides the principles and methods, of well pattern optimization, lists examples to calculate well spacing, on the basis of Shan-xi Block, gives optimization design to guide CBM development.

Keyword: CBM development; well pattern; well pattern optimization; well spacing

Study on Weakly Bounding between Methanes in Coalbed Methane

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¹. Xi’an Branch CCRI, Shanxi 710054; 2. Institute of Process Engineering, Chinese Academy of Sciences, Beijing 100080)
Abstract: To find out the effect of intermolecular interaction between CH₄ can affect the adsorption of CBM on coal, 12 possible structures of the (CH₄)₂ dimers have been optimized at the MP2/6-311++G(3df,3pd) electron correction level by quantum method, and two minimum geometrical structures have been found on the potential energy surface. The intermolecular interaction energies of the 2 minimum geometrical structures have been corrected further by the basis set superposition error (BSSE). The vibration frequencies and atomic charges of the 2 minimum geometrical structures have been analyzed in the paper. The (CH₄)₂ is a typical weakly bound molecule based on its small dissociation energy 1.81 kJ·mol⁻¹. The paper also offers some theoretical foundation for coalbed methane adsorption theory.

Keywords: Methane dimer; quantum chemistry; weakly bound molecule; coalbed methane

The Characteristics of Coal Reservoir and Analysis of Geological Control Factors in Luan Coal Mining Area

Huang Guanglin
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Abstract: Based on large quantity of information collected during coal exploration and recently drilled CBM wells, systematic study has been carried out on physical characteristics of coal reservoir in this mine area, and discussion has been made on corresponding geological control factors. The main coal seams are thick and regular. The degree of thermal evolution and the gas content are high, and permeability is good. The tectonic movement history, the depth of coal seams, thermal evolution degree and hydro-geological conditions are major control factors for CBM enrichment, and determine the physical characteristics and influence the gas productivity.

Keywords: Luan mine area; CBM; reservoir; geological controlling factors

Conventional CBM Logging Technologies and Their Applications

Liu Limin, Wei Qingxi and Xu Rengui
(Henan Polytechnic University, Henan 454000)

Abstract: The paper mainly describes the standard and comprehensive technologies for logging CBM open holes and their applications in exploration and development of CBM. The paper also analyzes methods and principles of using logging information to interpret coal seams, CBM seams, gas content, permeability, porosity, ground stress, argillaceous content and the relevant rock mechanics parameters. A part of parameters of some specific cases are analyzed by logging interpretation methods.

Keywords: CBM; logging technology; standard logging; comprehensive logging technology

Study on Prediction of Gas Outflow from Coal seams at Great Depth

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Abstract: Taking No. 121 coal seam in Zhaogezhuang mine, Kailuan Mining Administration as an object of research, the paper studies all the geological factors that affect the CBM emission from this seam. The statistical unit division method was applied in combination with quantitative theory for screening the main factors that affect the emission of CBM from the coal seam. A multivariable mathematic model for gas emission was established. After checking its accuracy, prediction of gas outflow from the virgin coal district was predicted. The results indicated that this method was feasible; the model was reliable; and the calculation accuracy was high, which can provide new scientific thinking for extraction of coal seams at depths in zhaogezhuang mine.

Keywords: quantitative theory; gas emission; multivariable mathematic model; Prediction

Study of Economic Evaluation of CBM Development Project
Yang Wenjing
(Beijing Guohua Power Limited Liability Company, Beijing 100025)

Abstract: The paper studies the preliminary economic evaluation of CBM development project. It concentrates on financial evaluation of CBM projects. It also analyzes the compositions of CBM project, estimates of investment, cost and all the expenses. It makes a preliminary assessment of specific CBM projects by using economic assessment method, which provides a criterion for scientific decision-making for investment to the projects.

Keywords: CBM; economic assessment; IRR

Experimental Study on Predicting Outburst Hazards by Using Ideal Crosscut for Opening A Coal Seam
Li Lei and Jiang Chenglin
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Abstract: In view of the energy changing in the process of coal and gas out burst, we have proposed a model and a corresponding prediction index, f, or ideal crosscut for opening coal seam in an outburst prone mine. Through simulation experiments, we have predicted the outburst hazards in opening a coal seam by an ideal crosscut. And by using quantitative approach, the magnitude of possible dynamic phenomena in opening a coal seam by the ideal crosscut could be classed into three categories: non-outburst proneness, extrusive emission; and outburst proneness.

Keywords: Ideal coal seam crosscut; methane expansion energy initially released; extrusion; outburst

Knowledge on CBM Exploration and Development in Xinjiang Area
Feng Shaohua and Li Xiaofeng
(No.161 Coalfield Geological Exploration Team of Xinjiang Coalfield Geology Bureau, Wulumuqi 830009)

Abstract: Xinjiang coal-bearing strata belong to the Middle-Lower Jurassic series with abundant coal and CBM resources. The paper describes briefly the coal quality characteristics of coal seams in all the coal basins. It analyzes the CBM blocks favorable to exploration and development of CBM in all the coal basins. It also makes suggestions for exploration and development of CBM.

Keywords: Xinjiang; CBM; quantity of resources; exploration and development