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The Discussion of The Relationship Between Tight Coal Bed and The Generation of CBM(Coalbed Methane) In The Boli Basin

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Abstract: Boli basin is rich in coal and sizable CBM production . Tight coal bed is developed in the basin and its relationship with coalbed methane generation is rarely mentioned in other papers.According to the relevant experimental samples and related essays, this essay had a discussion on the density of boli basin coal bed and its relationship of CBD in boli basin.As we draw the conclusion that under the geological conditions of the Boli basin that tight coal bed is good for the generation of CBM and its production.This conclusion may be as a good reference of researching and exploitation of coalbed methane to other similar basin which has the same geological condition as boli basin.

Keywords: *densification,coal bed,land sea interaction,CBM(Coalbed Methane)*

I. THE DEVELOPMENT OF COAL BED IN BOLI BASIN

China is a coal producing country, and its coal reserves stands the second place, coal production ranks first of the world.Hei Longjiang province is a coal producing province.Boli basin is located in the eastern part of Hei Longjiang province, the current area is 9020km^2.The geographical coordinate is: longitude 130 degrees -132 degrees 30 minutes, between 45 degrees north latitude 30 degrees 25 '-46'.It's the upper Jurassic coal-bearing basin sedimentary center in the east of Hei Longjiang province, also is the important base of coking coal[1-2].Boli Basin possess the features like early settling time,huge sedimentary thichness,frequent transgressive,wide range of transgression,strong volcanic activity.The evolution of sedimentary basin is controlled by tectonic evolution.The particle size of the sediment generally from the bottom up is thinner in the vertical ; sedimentary environment has obvious differences in the plane ,western part of the basin is mainly continental deposit ,transitional facies are mostly found in the central, and marine sediments are mainly in the East[3].

Western Boli is divided from the bottom up into Di Dao formation, Chengzihe formation, Muling formation, Dongshan formation.Eastern Boli is divided from the bottom up into Pei De group, Seven Hulin River group, Yunshan group. Chengzihe、Muling and Didao group of the Lower Cretaceous have coal accumulated.The coal of Boli formed in the early Cretaceous, the Mesozoic coal formed in late Jurassic.Large amount of layers of coal bed exist in the basin, but the thickness is small, and the structure is simple to medium.The underlying strata layers of BoLi Basin coal strata are former Paleozoic, Paleozoic and Triassic .Coal Bed is consisted of the lower cretaceous strata :Mu Ling group Cheng Zihe group and Di Dao group.There are large numbers of coal bed in the basin while the thickness is not so thick and the structure is simple to medium.The thickness of coal totally measures as 2500 ~ 3700m[4-5].

There are all kinds of coal in Boli basin such as:gas coal fat coal and coking coal ,meagre coal, lean coal and anthracite. Mostly seen are coking coal and meagre coal coal, estimated percentage is about 85% or more of the total,owning a great ability of generating gas[6].Different stages of coalification coal zoning is obvious. In section from top-down the degree of coalification is increased. On the plane,coal rank is the highest on the top of the exploration area.To eastward,the degree of coalification is gradually reducing, the

changing of coal rank is vast, and the stripe in same degree of coalification is relatively narrow; And all these are on the contrast in the westward.

II. THE FORMING ENVIRONMENT OF BOLI BASIN

In 1962, the Mesozoic-strata-team of Heilongjiang Province coal pipe Geological Bureaut found paralic strata in the east.It's because Boli basin is located next to the sea and under the effect of the sea level.According to the files, there are six kinds of facies in the area: residual slope product, alluvial fan, river, lake, fan delta, lake delta, etc..Boli Basin alluvial fan is well developed, vertical profile has multi period of forming, and they normally distributed in the bottom of the formation, large alluvial fan are found at the bottom of the Pei De, Didao and Chengzihe and Muling group[7].The lake sediments is widely distributed and could be seen in all continental sedimentary,especially developed in the upper part of the Muling and Chengzihe group.Lake delta is seen in the upper group and Chengzihe muling group. Didao group has a typical fan delta, it's alluvial fan directly into the lake formed, which occasionally contain marine fossils, and could see carbonaceous mudstone and thin coal layer. The delta deposition developed in Cheng Zihe layer, Zhushan, Yunshan group of the Boli basin is one the major sedimentary types and poly coal forming environment of the Heilongjiang Province .When we see from the horizontal,middle-west of Boli basin in the early metaphase mainly coal-bearing continental sedimentary in early-middle stage of early Cretaceous, eastern basin is influenced by the early cretaceous transgression, developing a set of marine facies and land sea interaction in coal-bearing sedimentary sequence.

From the horizontal perspective, central- western Boli Basin and the Jixi Basin are mainly coal containing continental sedimentary strata in the early and Middle Early Cretaceous,Eastern Boli Basin development a set of marine— land-sea interaction with coal depositional sequence by the early Cretaceous marine transgression.In the vertical mainly exists two big stage of evolution, early stage is the Basin fault settlement stage, mainly Jixi group and Longzhaogou group coal bearing sedimentation[8].

Two transgression occurred in Heilongjiang Province in the eastern part of the late Early Cretaceous,During the transgression,with plate tectonics of marginal-Pacific occurring, the sea level changes occasionally.During the regression,may form a series of coastal marshes or intermontane lake basin,create advantages conditions for forming the coal field.

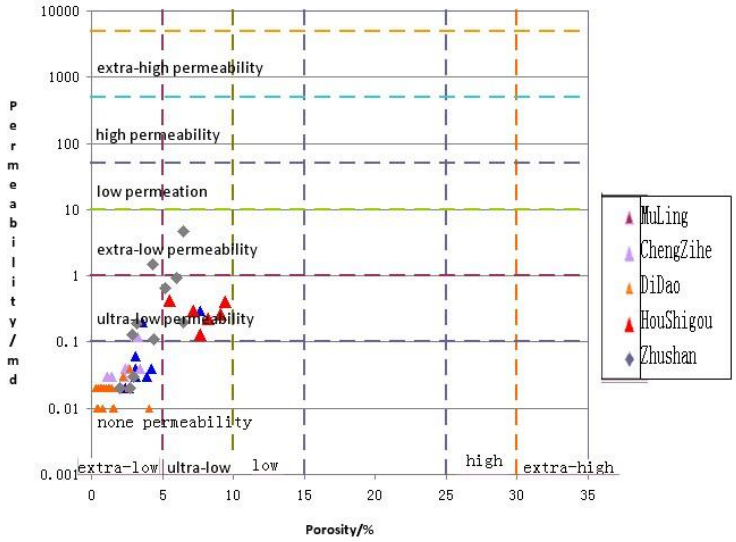
III. BOLI BASIN'S COAL BED ENVIRONMENT

Land-sea interaction happens frequently in the region,coal-bearing strata sedimentary is controlled by transgression sedimentary or regressive sedimentary formed by sea level rising or falling , and formed the land sea interaction facies as well as coal-bearing stratigraphic sequence[9].We can see from the evolution of the sedimentary system that,early Cretaceous has a wide range of transgression,shallow sea area barely have transgression,which belongs to the continental environment.The middle zone of the these two is the coastal bay and the lagoon developing zone, and part of the area is delta and coastal plain.Flood plain generated coal in continental environment area.River Delta is the main coal accumulating environment of sea-land transition.Because of the fluctuation of sea water, the instability of the environment, the less development of the vegetation, causing the shortage of the source of coal material, only form the thin coal and coal line.As the sea level moving frequently, the environment is not stable, coastal vegetation isn't well developed, causing the insufficient of coal-forming material source, thin coal formation and facies transition fast,interlater spacing unstable, distribution continuity of coal bed is poor. Boli basin is a large fault basin, coal accumulating happened when chasmic activity was still going on, occuring a second level uplift and depression, they control the coal accumulating and riching coal center.

The lava accumulation development shows that the late Mesozoic fault and volcanic activity of the study area were intense and frequent.Mesozoic Magmatic Rocks in Boli basin not only widely distributed in the mountain area, but also is widely distributed in the sedimentary strata of Mesozoic fault basin.In eastern Heilongjiang magmatic activities form small scale of stock and hypabyssal intrusive sills and dykes, in addition the granite porphyry, diorite porphyrite.These eruptions generally have little effect or could be said as " thermal cover" to be favorable preservation conditions, and may also promote the thermal evolution of organic matter.Magma upwelling, and emitted from the surface in staging times, forming volcanic rocks, volcanics, pyroclastic rock intrusion into the shallow crust of the earth intrusion into the rock mass, and geothermal gradient of the retroarc basin district increased[10].Just because this reason causing the abnormal high temperature that make the studying area is affected by the high temperature and the rapid metamorphism since Mesozoic coal formed. Due to magma activity, metamorphic grade of coal has such characteristics on the surface, namely obvious zonation along the vertical direction , the vitirnite reflectance of the coal showed regular changes with increasing of the depth. It also illustrates the quality of coal is under significant influence by regional metamorphism .

IV. DENSIFICATION

Chinese coal bed belongs to low permeability reservoir, especially those depth over thousand meters the coal bed belong to more dense depth of gas flow in porous media of low permeability gas reservoir has obvious slippage effect, and the effect of coal matrix shrinkage effect on coal bed permeability is also nots allow to ignore China coal bed belongs to low permeability reservoir.The depth of coal bed in Boli basin is relatively deep, the compaction is obvious, from the core measured sample data we see the when coal bed occurs the permeability of strata becomes low.



V. INFLUENCE ON COALBED METHANE

Coal-bed methane is referred to the coal-generating gas in the coal bed. Coal bed as the reservoir of CBM, its properties directly affect the occurrence characteristics of coalbed methane and development conditions. The size of the coalbed methane adsorption quantity is related to the degree of coal pore development 、 pore structure characteristics and pore morphology .The thickness of the coal bed is also the important factor for evaluating the coalbed methane development, is proportional to the amount of resources. Although in the region ,the coal thickness is big,single layer thickness is small.

With the increasing of the degree of coal metamorphism, the increasement of CBM grows.According to estimations, from the process in lignite to anthracite, the evolution of the methane gas generates about 142 — 198m3 . Boli basin has numerous kind of coal , the ability to generate gas is high. But because of the low permeable and pore ,the presence of large amounts of pore space is possible, and it's good for coalbed methane storage.

CBM permeability is relatively poor，and this will be a serious restriction factor of the CBM development in this basin.Therefore in the development of coalbed methane in this region, the hydraulic fracturing techniques are commonly used to improve coal bed permeability .The coal microscopic pore is developed very much in the basin which is not conducive to the migration of coalbed methane .Near the tectonic zone, by the influence of fracture structure, the number of fracture and density of joints are developed, result in a well-developed coalbed gas migration channel.

VI. CONCLUSIONS

After all these analysis, we see Boli basin is a frequently transgression、wide transgression、strong volcanic activities ancient ferns development ,causing the coalfield structure activity, result in a better coalbed gas migration channel and it's good for CBM accumulating, but at the same time it will destroy the sedimentary thickness of coal bed and affect the development of coal bed.On the other hand, because of tectonic movement, the development of coal bed is restricted.While the magma thermal motion, making coal metamorphism degree high, it is easier to form the coalbed methane.In short, under the geological conditions of Boli basin, and tight coal bed is conducive to the generation of coalbed methane but there's no obvious and significant influence on its formation and production.

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