Numerical Simulation Study on Development Mode of Coalbed Methane in Qin - dong Block

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Abstract

For this end block is rich in coalbed methane, for the sake of to efficient exploitation of coalbed methane, we study way for the development of coalbed methane, and the numerical simulation software is used to block development of dynamic simulation, and analysis of the block, using the development technology policy research, so as to offer a scientific basis for rational development of the blocks

Keywords

Ooze Terminal Blocks, Coal-Bed Methane, Development Way, the Numerical Simulation

1. Introduction

The tectonic form of this block is a monoclinic structure, which is generally presented to the north - northeast, which tends to northwest. On the basis of the tectonic form of this block, some near-north-north-northward gentle folds were developed, which caused the undulating undulations of the strata, and the inclination of the rock layers was not more than 15 °, but some The formation of the formation of a greater impact on the formation of rock formation changes in the tilt is very large. In this paper, the structural characteristics of the Qinbian block, the distribution of coalbed methane and the characteristics of the rock are analyzed. Considering the stability of the gas reservoir, the characteristics of the structure, the physical characteristics and so on, the reasonable development method of coalbed methane is selected and the numerical value Simulation software for research.

2. Development status of coalbed methane at home and abroad

The United States is the world's first exploration of coalbed methane exploration, but also the most successful coalbed methane exploration of the country. In the 1970s, the United States began the development of the CBM industry and took the lead in the San Juan Basin and the Black Warrior Basin. In the 20th century, 90 years later, also successively in the Utah tower, powder river basin has also achieved great success. As of the end of 2006, the US coalbed methane production wells have reached 35,000, and an annual output of 5600 × 10^8 / a coalbed methane, reached a small scale. The exploration and development of coalbed methane in the United States mainly adopts the development method of vertical vertical wells, and in some areas, a small number of ground mining area wells and pinnate horizontal wells are adopted. Through the United States to take the lead in the role of demonstration, Canada and other countries are also competing to start the exploration and development of coalbed methane, and step by step into the industrial exploitation, they use the development of the main vertical ground development methods.

China's coalbed methane exploration and development started in the early 1990s, and first in the Qinshui Basin Jincheng mining area has achieved great success, and gradually extended to the entire Qinshui Basin. The Qinshui Basin is also the hottest area of coalbed methane exploration and development in China. The development effect of coalbed methane is relatively significant. It has formed a number of coalbed methane development areas such as persimmon Zhuang, Panzhuang, Fanzhuang and Yangquan Temple, and the highest yield of single well 16 000 m^3 / d, with an average yield of 2 000 m^3 / d. China's coalbed methane exploration and development mainly uses the ground

vertical well development mode, the ground vertical well development method is more suitable in the terrain, traffic and other convenient areas, the use of fracturing stimulation measures, the effect is obvious, indicating the use of the ground The correctness of vertical well development. This paper is the study of Qinqin block in Qinshui Basin.

3. The choice of development mode

The different development methods of coalbed methane are different, and all kinds of development methods are generally suitable for the area where the structure and hydrogeological condition are simple, the coal seam is stable, the thickness is large and the original structure is developed. The different development methods of coalbed methane are also very different. The various open methods are generally suitable for hydrogeological conditions. The coal seam is relatively stable and the thickness is relatively large, and the area of the original structure is developed. The factors influencing the development of coalbed methane mainly include the target coal seam and the thickness of the coal seam, the structure of the mine, the structure of the coal body, the development of coal seam, the content of coalbed methane, the permeability and the technology of the process. Effective and reasonable analysis, select the effective mining methods [1].

The development of reasonable coalbed methane not only greatly affects the production capacity of gas wells, but also has a great impact on the investment of the project. As of now, there are four kinds of development methods in the domestic ground, which are from the cluster wells , Pinnate horizontal wells, ground vertical wells and U-shaped wells. Combined with China's current economic and technological conditions and the practice of coalbed methane exploration and development, we have summarized and analyzed this, according to the stability of gas reservoirs, structural characteristics, physical characteristics such as cable, select a reasonable development methods, such as drainage Gas or other development methods. Qinshui basin is more suitable for vertical wells and directional wells in the development of the ground; other areas because of geological conditions are more complex and other reasons, it is recommended to choose the way straight wells for coalbed methane exploration and development [2].

4. Numerical Simulation of Coalbed Methane

4.1 Determine the model range

In order to describe the characteristics of gas-water migration and the physical properties of reservoirs, we have also laid a foundation for historical fitting and numerical simulation of reservoirs. We have studied the blocks carefully and established a very complete geological model And meshing, structural modeling refers to the process of constructing faults and strata based on geological data.

The simulation area is located in the Qinpu basin in the south of Qinshui basin, the boundary of the block is the boundary of the delineation, and the boundary is not closed. The tectonic form of this block is a monoclinic structure, which is generally presented to the north - northeast, which tends to northwest. On the basis of the tectonic form of this block, some near-north-north-northward gentle folds are developed, and the boundary can be regarded as constant pressure boundary (Fig. 1)

The three targets are 3 # coal seam, 15 # coal seam, the top and bottom of the sand are mudstone, are closed boundary treatment. W2, W3, W4, W6 wells are 3 # and 15 # coal seam, W1 well drainage layer is 3 # coal seam, W5 well drainage layer 15 # coal seam. The W7 ~ W11 wells are in the 3# coal seam, and the W12 ~ W16 wells are 15 # coal seam. As the coal seam location is more certain, layer division is also very clear. Divided into two layers that are 3 # and 15 # coal seam.

4.2 Create a layer model

According to the field data, remove the top of the reservoir corresponding to the depth, reservoir thickness, gas content and drainage wells wells. Using the commercial geological modeling software, the establishment of the corresponding geological model. Coal seam thickness: According to the 3# coal seam, 15# coal seam thickness contour map to get the thickness of each grid value. Coal seam roof elevation: According to the 3# coal seam, 15# coal seam six parameters of the bottom of the

bottom of the floor depth of each grid floor plate elevation value, minus the thickness of the grid value, the top plate elevation value. Based on the above data, the reservoir block envelope is obtained, as shown in Fig. Layer model and construction model are established in the region [3].

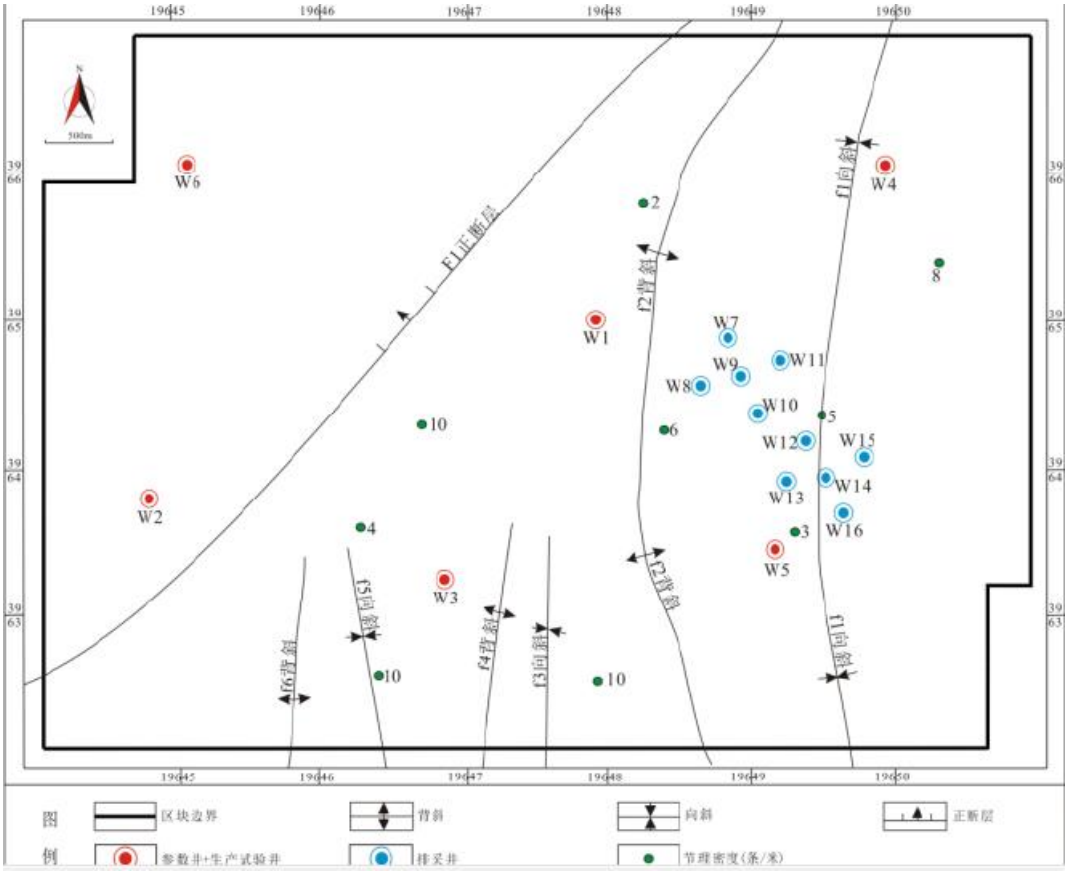

Figure 1 block tectonic outline map

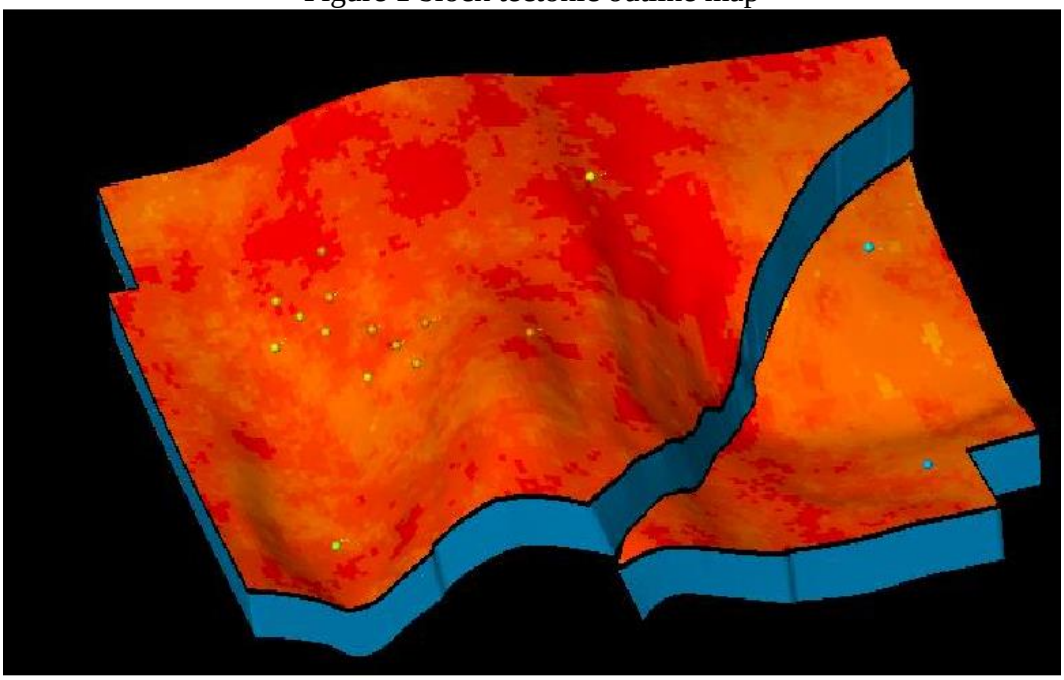

Figure 2 this terminal block reservoir 3 d envelope zone map

After the corresponding geological model is established, the porosity is derived from the data in Table 1 and Table 2, and after the modeling software is introduced, the corresponding position porosity is obtained by discretization data.

Table 1. 3 # coal bed porosity

Hashtag	W1	W2	W3	W4	W5	W6
Apparent density	1.46	1.44	1.42	1.5	1.42	1.46
Porosity,%	3.94	5.26	5.96	5.06	5.32	3.93

Table 2. 15 # coal bed porosity

Hashtag	W1	W2	W3	W4	W5	W6
Apparent density	1.49	1.41	1.44	1.42	1.4	1.49
Porosity,%	5.11	5.32	5.26	5.92	5.41	5.11

4.3 Establishment of Numerical Model

In the reservoir numerical simulation model, the most widely used models are as follows: black oil model and component model. The specific model is mainly based on the volatility of crude oil. The black oil model is mainly used for the simulation of nonvolatile or low-volatile oil and gas reservoirs, such as ordinary heavy oil and medium oil. The component model is suitable for oil, High content of oil and gas reservoirs, such as volatile reservoirs or condensate gas reservoirs. Coalbed methane is a light gas reservoir, the component quality is lighter, and the volume coefficient is larger, so use the component model to calculate [4].

5. Conclusion

(1)According to the stability of gas reservoir thickness, structural characteristics, physical characteristics and other factors due to the analysis of the cable, choose a reasonable development mode, Qinshui Basin is more suitable for vertical vertical wells and directional wells development.

(2) With the horizontal well technology mature, the current level of oil and gas reservoirs in the current cost of oil than the vertical well, both to improve the economic efficiency, make full use of resources.

(3)The numerical simulation software is used to simulate the development of the block, and the analysis of the block is carried out by using the development of technical policy research, which provides a scientific basis for the reasonable and efficient development of the block.

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