

# Research on China's Petroleum and Natural Gas Exploitation Technology and Development Progress

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**Abstract:** With the continuous development of society, petroleum and natural gas are being widely used in all aspects of life. Nowadays, both industrial production and people's lives are inseparable from petroleum and natural gas. The increase production of petroleum and natural gas has become one of difficult problems which has to be overcome now. This paper analyzes the current status of China's petroleum and natural gas exploitation technology, and discusses the development trend of petroleum and gas extraction technology.

## 1. Introduction

Enhancing pupils' awareness of environmental protection, the importance of natural gas is increasingly apparent. The pollution-free of natural gas meets people's demand for energy and achieves the goal of green development. The wide use of petroleum makes it a strong pillar for economic and social development, and a country's petroleum production determines the country's strength. Comprehensively analyzing China's current petroleum and gas exploration technology to innovate and study out new technologies, is a way to achieve continuous development of the nation, and it is also a mission and responsibility of the multitude petroleum and natural gas workers. How to maximize the utilization of resources and increase the production of petroleum and natural gas under limited resources? After years of development, China's petroleum and gas development companies have achieved stage success. A series of oil and gas exploration technologies, such as low-permeability gas reservoir development technology, carbonate gas reservoir development technology, and abnormal high-pressure gas reservoir development technology, have fully guarantee China's Oil and gas supply.

## 2. Current status of China's oil and gas exploitation technology

### 2.1. Current status of oil and gas exploitation theory

In the early stage of China's modern economic assumption, due to the weakness on oil and gas exploitation technology, the supply and demand of oil and natural gas was imbalance. In order to meet the needs of economic development, China had to rely on foreign experts and scholars to develop oil and natural gas. However, changes in international situation has also led to changes in international relationship between countries. Foreign experts and scholars have also taken away the recorded data and manuscripts when they left China, and declared that China would never develop oil and gas exploration technology. . The independent research and development of oil and gas exploitation technology has become a problem that has to be solved in front of China's petroleum and gas workers.

### 2.2. Petroleum and gas exploitation technology

At the beginning of reform and opening up, China's oil and natural gas exploitation was often in a state of short supply. Mining areas were concentrated in low gas storage or concentrated in shallow areas. However, with the unceasing efforts of several generations of oil and gas people, China's oil and gas exploitation technology has been greatly improved. The oil and gas exploitation area has expanded from shallow to deep Ocean and underground. Now, China has the ability to

exploit high-efficient and pollution-free combustible ice in seabed. In the process of mining the submarine combustible ice, it is very prone to explosion. However, with the scientific research and exploration of Chinese researchers, this problem has been overcome. China has become the first country in the world to achieve continuous exploitation of combustible ice, which is not only a breakthrough of China's oil and gas exploitation technology, but also with this technology China is defined as a technical power country in oil and gas exploitation.

### **2.2.1 Carbonate gas reservoir exploitation technology**

Carbonate gas reservoir exploitation technology is mainly applied to underground heterogeneous oil and gas storage layers. The geological characteristics of such storage layers are that water and air are complex and the air is humid. The specific application of carbonate gas reservoir technology in oil and gas exploitation is: using the fracture gas reservoir evaluation technology to detect the geology of the gas reservoir layer and summarizing the characteristics, and taking the assessment result of the gas storage layer as a reference to complete the analysis of modeling. The application of carbonate gas reservoir exploitation technology effectively tackled tough problem in oil and gas mining, meanwhile it also greatly improved quantity of China's oil and natural gas extraction.

### **2.2.2 Crack mining technology**

Carbonate gas reservoir exploitation technology is widely used in the development of carbonate gas reservoirs in China. Due to the rational optimization of deforming, gas lift, gas production string and mechanical oil recovery equipment, it not only extends the service life of oil and gas wells, but also greatly increases the production of oil and natural gas. This oil and gas exploitation technology is relatively easy to operate and low in cost, and plays an important role in the exploitation of new oil and gas wells.

### **2.2.3 Exploitation technology of low permeability gas reservoirs**

Low-permeability gas reservoirs are abundant in China, but due to the action relations between water and gas in the formation, coupled with the low permeability of the reservoir, the production of low-permeability gas reservoirs is low in the actual exploitation of oil and gas. How to make this type of oil and gas get the right development? The research is carried out by using the law of water, oil and gas distribution, the distribution law of gas reservoir water, and the distribution of underground gas reservoirs in oil and gas trenches.

Only on the premise of comprehensive understanding of the oil and gas exploration area can the low permeability gas reservoir be exploited. Based on the development of petroleum and natural gas reservoir, the later gas wells technology of fracturing formation is adopted for exploitation. It should be noted that since the oil and gas production wells will damage the gas storage formations during construction and then affect the low permeability gas reservoirs, it is necessary to do a good job in protection and defense when applying the development technology of low permeability gas reservoirs.

### **2.2.4 Development technology of abnormally high pressure gas reservoir**

Because of the strong potential energy and the large pressure in the well, the high output of abnormal high pressure gas wells is determined. Specific application of the development technology of abnormal high pressure gas reservoir: accurately investigate the specific situation of underground gas reservoir, collect and analyze the data parameters of oil and gas in underground reservoir, and establish a mathematical model in the area with high oil and gas reserves; Analyze the existing characteristics of the core, study the address of the bottom layer of the gas reservoir, accurately sketch out the three-dimensional model to ensure high recovery rate. At the same time, by virtue of the high pressure and high production drilling supporting technology and the high and steep structure anti-slant fast hitting technology, the phenomenon of erosion caused by the weakening of the pressure and sand damage in the wells can be overcome, and the quality and quantity of oil and natural gas exploitation can be guaranteed by using this technology in abnormal high pressure underground gas reservoir.

### **2.3. Equipment for oil and natural gas exploitation**

Science and technology are inexhaustible driving force for a country's upward development. In the exploitation of oil and natural gas, science and technology is also playing a decisive role. The high efficiency and safety of exploitation technology is the inexhaustible power for China's oil and natural gas exploitation. The annual increase of China's oil and natural gas output is largely attributed to the continuous improvement of oil and natural gas exploitation equipment and technology, in addition to the hard work of front-line workers in oil and natural gas exploitation. Presently, the exploitation of oil and natural gas in China has not only turned the situation of short supply, but also been able to carry out deep oil and gas exploitation. Although there are still many problems to be improved in China's oil and natural gas exploitation, it cannot be denied that China has reached the international leading level in both oil and natural gas exploitation technology and equipment.

## **3. The trend of gas development technology in China**

### **3.1. Increase in development capacity of low permeability gas reservoirs**

The development of permeable gas reservoir is very difficult, so it is the most important part to overcome the difficulties of such oil and gas exploitation. In order to improve the development ability of low permeability gas reservoir, the first step is to select the location of the exploitation site, and areas with large oil and gas reserves should be the first choice. The second is to have a comprehensive and in-depth understanding of the underground oil and gas storage situation, through the application of computer mathematical modeling technology, to detect the amount of underground gas storage. When doing the analysis of underground natural stocks, the water and gas wells mining technology should be strengthened and improved.

### **3.2. Improvement of development capacity of sulfur-containing gas fields**

The sulphur-bearing gas field has good permeability and high oil and gas stock, and the geological situation has a good frame structure, and thus has a bright prospect of exploitation. The first problem to be dealt with during oil and natural gas exploitation is to treat sulphur. If sulphur is improperly treated, it will corrode equipment and gas production pipelines. Therefore, it is necessary to timely grasp the temperature conditions and pressure of the gas wells and scientifically analyze the sulphur-containing mechanism of the oil and gas storage area, develop a method to slow down and suppress the negative effects of sulphur, in order to better control the sulphur content, and enhance the purity of oil and gas by strengthening the sulphur treatment capacity.

### **3.3. Strengthening the development level of condensed gas fields and high-pressure gas fields**

Condensed gas field and high-pressure gas field have been included in the planning of oil and natural gas exploitation in recent years, but this kind of natural exploitation situation is not optimistic, because the storage layer of condensed gas field and high-pressure gas field has been compacted, and the geological structure of common oil and natural gas is quite different. The permeability of the gas layer is determined by the pressure of the oil and natural gas reservoir, so the pressure of the gas wells must be paid attention to during oil and natural gas exploitation, in order to avoid the loss caused to the conventional use of equipment and pipelines, to avoid further harm. Prepare the condensed gas field and high-pressure gas field before mining, collect and analyze the relevant data of the pressure layer, solve the potential hazard in time, and prepare the emergency management work in place.

## **4. Conclusion**

In the practice of petroleum and natural gas exploitation in China for many years, petroleum and natural gas exploitation technology in line with geological conditions and China's national conditions has been formed. The differences in the addresses of oil and gas storage determines that

the exploitation of petroleum and natural gas should be adapted to local conditions. In the tough battle of petroleum and natural gas production and quality assurance, petroleum and gas companies must pick up their responsibilities, pay more attention to the research on exploitation of petroleum and natural gas, and facilitate a high speed and steady development, to provide a powerful impetus for the social and economic development. The above is my rough discussion about the status quo and future development trend of China's petroleum and gas development.

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