

Philosophical Thinking about Oil & Gas Exploration

Lijun Song*, Bingqiang Yuan and Haifu Wang

Geosciences and engineering Faculty, Xi'an Shiyou University, Xi'an 710065, China

Abstract

In this paper, the mechanism of hydrocarbon accumulation, exploration thinking, exploration process, exploration method and prospector's quality have been philosophically recognized. The researches show that the core target of oil and gas exploration is predicting the existence of the oil and gas reservoir, the research on elements of hydrocarbon accumulation and the time-space matching relation between the accumulation process and them is the basis of forecasting reservoirs, the overall coupling analysis of the oil and gas accumulation process and the geodynamic environment evolution in geological history would perfectly predict the existence of the reservoir, the oil and gas exploration process is a information warfare of comprehensively utilizing a variety of limited information, the adaptive exploration techniques and methods should be adapted to the detailed exploration objects and the overall quality of prospector is the basis of being a explorationist.

Introduction

The goal which hydrocarbon exploration workers crave is how to develop the oil and gas exploration scientifically and efficiently! As a university teacher majoring in the field of oil and gas exploration, on the basis of summarizing the previous exploration experience, understanding[1-2] and my personal practices, I philosophically summarize and review the mechanism of hydrocarbon accumulation, exploration strategy or thinking, exploration process, exploration methodology and the quality of prospectors for helping the people who engaged in or planned to work on the petroleum exploration.

Philosophical Thinking about themes of Oil & Gas Exploration

Thinking about oil and gas accumulation

The core target of oil and gas exploration is to predict the existence of the oil and gas reservoirs, the main task is to definite where petroleum reservoirs exist. Exploration practice has confirmed that the oil and gas is mainly from organic and store in the multiple inter-space in the rock, like pores, caves and fractures of solid rock in sedimentary basin. However, due to the size of pore, cavity, fracture has a great gap, so the quantity of the enrichment of oil and gas in them is poles apart. The rock granularity is finer, its pore size is smaller, and the single well production in this rock is relatively smaller, such as Shale reserve. However, high porosity of rock are not all enrichment of oil and gas, only in the high porosity of rock, oil and gas was used to migrate into them and until now it is still hard to migrate elsewhere, oil and gas enrichment in them may be possible.

There is no doubt that the good impermeable cap layer is on the rocks rich in oil and gas to hinder them migrate elsewhere. There is trap of oil and gas, it likes a house or a fruit, the shape, size and even distribution site are of great differences. Similar to a houses, some distributed in hydrocarbon source rocks like the cave in loess, some on the migration channel oil and gas like the house on both sides of road, others are far from the position of the oil and gas migration channel; Similar to a fruit, some with smaller size within the hydrocarbon source rocks just like Peanuts or Sweet potato in the soil, others with larger scale in migration channel like wax gourd grew in Vines. However, these traps may not contain oil and gas, it is because the trap was an instantaneous intermediate product in the history of geology,

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and along with the evolution of the geological history, it may be changed or even damaged or disappeared. Only traps and generated hydrocarbon had good configuration relations in time and space, the oil and gas rightly migrated into the trap, and then the oil and gas trap with the hydrodynamic equilibrium between inside and outside trap preserved up to now. These traps containing oil and gas are Petroleum Reservoirs, which petroleum prospectors are looking for. Therefore, the basis of predicting existence of Petroleum Reservoirs is the research of time-space matching relation between the hydrocarbon accumulation elements and the accumulation process of them.

Thinking about oil and gas exploration strategy

The formation and destruction of the accumulation elements such as source rock, reservoir rock, cap rock and trap, and all the petroleum process of generation, migration, accumulation and adjustment are all controlled by basin formation, evolution and transformation resulted from the regional tectonic evolution stemmed from continental dynamics environment and its evolution. The above processes are a part of the earth's development evolution process. As a result, the elements of hydrocarbon accumulation and their time-space matching relation between hydrocarbon accumulation processes, must be putted in the time-space combination relationship of the geological history stage and its geodynamic environment evolution to the overall analysis, namely the formation and destruction of the accumulation elements and all the petroleum process of generation, migration, accumulation and adjustment all should be analyzed overall, dynamically, dialectically from the point of continental dynamics or the framework of basin tectonic-sedimentary evolution and transformation. In order to better discriminate the existence of petroleum in a trap and predict reasonably presence or absence of petroleum reservoirs with reasonable understanding the formation and damage of accumulation elements, and the relationships between the petroleum generation, transportation and accumulation,

*Corresponding Author: Lijun Song, Geosciences and engineering Faculty, Xi'an Shiyou University, Xi'an 710065, China; E-mail: slj2003150@126.com

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Thinking about the process of oil and gas exploration

Someone vividly treat reservoir prediction process as Deeper Investigation (also known as tracking down melon by following vine) or Looking for a person in hotel. But the process of reservoir prediction is more complex than it, because the people and the melon is tangible and visible, however the whole process of hydrocarbon accumulation, adjustment and destruction are not visible and the underground Petroleum Reservoirs only exists as a image in mind. Therefore, before the discovery well finished drilling, the undiscovered oil and gas field is at best only as a kind of thought in the geologists' mind, it means the first place we found oil is our mind [1]. Although the prospectors' mind won't directly created the oil and gas, it can create the thoughts or ideas of discovery oil and gas, which makes the oil and gas would be discovered and developed [2].

Invisible underground petroleum reservoirs is objective existence! Prospectors understand the underground petroleum reservoirs based on exploration information, oil exploration process is interaction process of information as an effective media between prospectors and exploration object, especially the oil and gas reservoirs. This acquaintance can be observed directly through the drilling core and logging data to obtain the prospecting objects and its internal petroleum information, and also through indirectly measuring the physics parameters of gravity, magneto-electric and seismic. Reservoir characteristics were revealed by various methods in different ways and angles, but each method has its different multiplicity and bias, such as the drilling can truly reveal the information of underground, but its defect is a bite of the see.

Therefore, petroleum exploration process is an information warfare, that is the limited information from various means would be comprehensively used to predict the existence of the trap and the presence of oil and gas in them. With the increasing of Information along with the development of exploration activities and the emergence of new technology, the understanding to objective object would be determined from the uncertainty to certainty, and the prediction reservoirs would gradually approaching the underground objective reservoirs, until the commercial value reservoirs can be discovered. So far, petroleum reservoir in human's mind become the actual reservoir in nature. If there is no the idea, thinking, model of Petroleum Reservoir in my mind, we will never find petroleum reservoirs [2].

Thinking about the petroleum exploration methodology

There is no the exactly same two basins or reservoirs in the world [2]. For petroleum prospectors, the breakthrough of petroleum exploration can only be achieved by using adaptive techniques and methods for the actual situation, the geological law of oil and gas accumulation, of specific exploration object, on the basis of dialectically analyzing the unique relationship, process, development and transformation between various elements and factors of petroleum accumulation, the particularity of contradictions of the external dynamic environment and the internal factors of petroleum exploration object. Therefore, the highest realm of oil and gas exploration methodology is " Invisible is than visible ", in other words, there is no fixed style for the same exploration process of different exploration object, so the flexible measures should be adapted for the specific issues of exploration process.

Thinking about the essential qualities of explorationist

For petroleum prospectors, the successes of modern petroleum exploration do not depend entirely on their petroleum geological theoretical level and technical level, but depend on their overall quality, mainly including their professional knowledge level, psychological quality and thinking methods. Therefore, only the prospector can become an explorationist in the future, who should master the professional knowledge and skills of petroleum geology, understand of various petroleum detection technology and experimental methods, especially have personality characteristics of positive thinking, strong subjective initiative, persistent attitude, abundant observation, practical ability of imagination and creative thinking.

Conclusion

The researches on the mechanism of hydrocarbon accumulation, exploration thinking, process, method and prospector quality show that the predicting the existence of the oil and gas reservoir is core target of oil and gas exploration, knowledge on time-space matching relations between the accumulation process and elements are the basis of forecasting reservoirs, the overall coupling analysis about the oil and gas accumulation process and the geodynamic environment evolution is the key of perfectly predicting the existence of the reservoir, the adaptive exploration techniques and methods should be adapted to the detailed exploration objects in the oil and gas exploration process, which is a information warfare, and the prospector's overall quality would be the basis of a explorationist.

Competing Interests

The authors declare that they have no competing interests.

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References

1. Pratt WE (1952) Toward a Philosophy of Oil-finding. AAPG Bulletin 36: 2231-2236.
2. Wang GH (2008) Philosophy and Thinking of Oil Exploration. Beijing: Petroleum Industry Press