



# Application Prospect of High Performance Water Based Drilling Fluid in China



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## Abstract

In china, the oil field drilling generally use water-based or oil-based fluid, but china government issued <new environmental protection law>In 2015, The fact has proved that using oil base drilling fluid has been extremely limited, In this paper, based on the comparison of oil-based drilling fluids and water-based drilling fluid and comprehensive analysis Chinese domestic situation, the high-performance water-based drilling fluid is pollution smaller and more economic, the development of high performance water-based drilling fluids is a new opportunity in history of China.

**Keywords:** High-performance; Water-based; Oil-based; Drilling fluid; Environmental protection law; Oil field application; New opportunity

## Introduction

All the time, the drilling fluid in China is mainly water-based and oil-based; they have different advantages and disadvantages [1]. In different oil fields, different geological conditions and well types, water-based or oil-based drilling fluids are used respectively, this will exert their respective performance, maximize the satisfaction of economic development purposes, but china government issued <new environmental protection law>In 2015 [2], the using oil base drilling fluid has been greatly restricted, and the water based drilling fluid is less pollution and more economic. The development of high performance water-based drilling fluids is a new opportunity in history of China.

## Current Situation of Oil-Based Drilling Fluid in China

Before 2015, China did not issued and implemented the new environmental protection law, on this condition; the oil-based drilling fluid has become main application on a deep gas well, a directional well with high inclination and a horizontal well [3]. It can also be widely used as drilling fluid, perforating completion fluid and work over fluid, coring fluid and so on. The cost of oil-based drilling fluid is high in single well drilling, but in the adjacent area, the oil-based drilling fluid can be reused, so the cost is lower. Compared with the water-based drilling fluid, oil-based drilling fluid will not pollute the reservoir, and it has stronger ability on own anti-pollution and carry cuttings, which is beneficial to the stability of wellbore, strong resistance to high temperature, good

lubricity, and can be used in areas with very complicated geological conditions and oil fields.

Oil based drilling fluid disadvantage is much higher cost than water-based drilling fluids, the deployment of the difficulty is relatively large [4], now mainly used in diesel oil or toxic mineral oil as a continuous phase of water in oil emulsion drilling fluid. The biggest problem of oil based drilling fluid will pollute the environment, and due to technical processing problems in later stage, the cost is very high. In January 1, 2015, the <new environmental protection law > formally implemented in China, it is known as a “teeth” of the law, but also a most stringent environmental protection law in Chinese the history [5], it is a great challenge for the development of oil based drilling fluid, which controlled by itself on formulation and application, the oil base drilling fluid become very cautious in using on oil field, so at the same time, the sustainable development high performance water-based drilling fluid have great application prospect in China.

## Current Situation of Water-based Drilling Fluid in China

In China, the application of water-based drilling fluid is very extensive [6], especially in some old oil field [7], geological situation is relatively clear, the characteristics of water-based drilling fluid is played most incisive [8]. According to the data, the API drilling fluid system is divided into three categories, Water based type and oil

based type and gas medium type. Water based drilling fluid can be more refined into a variety of systems [9], such as dispersion or no dispersion system, calcium treatment system, polymer system, low solid system, saturated brine system, completion and work over fluid system and so on. That is to say, according to different situations using different ways to carry out drilling.

The water based drilling fluid has many advantages [10], such as low cost, simple disposition and treatment, wide range of processing agents, mature technology, many alternative types, easy control performance, and better protection of oil and gas reservoirs, so it is a common drilling fluid system at home and abroad. But the drawback is that drilling fluid caused wellbore collapsing and swelling by water in gypsum-salt and shale layer. in the current situation, relatively, the new area and complex geological conditions, using oil base drilling fluid for safe drilling environment is very necessary, because of the use of water-based drilling fluid Get stuck or too slow , the cost is higher than using oil base drilling fluid.

### Prospect of Application of High Performance Water Based Drilling Fluid in China

China government issued <new environmental protection law>in 2015 [11], so far, it's very difficult to pass the basic these audit requirements and oilfield environmental assessment on oil base drilling fluid, the high performance water-based drilling fluid came into being, actually the high performance water-based drilling fluid in foreign countries has been very mature, especially in shale gas condition, high temperature and high pressure drilling area. It can be a good solution wellbore collapsing and swelling by water in gypsum-salt and shale layer.

Such as baker hughes company developed a high performance water-based drilling fluid latidrill, in some complex wells has begun to gradually replace the oil based drilling fluid, according to the actual application, the drilling fluid can to improve the shale gas wells and horizontal well section of the wellbore quality. Compared with the oil base drilling fluid, the high performance water-based drilling fluid is better for the environment, which can improve the stability of wellbore and drilling speed, removal and treatment of oil drilling cuttings, greatly shorten the cleaning time. Such as m-iswaco company developed high performance water-based drilling fluid hydraglyde, this system can provide fast, safe, flexible

solution to difficult situation and meet the requirements of hse. It can reduce the cost of drilling fluid 40%.

### Conclusion

In short, base on the legal factors and the actual situation, the high performance water-based drilling fluid reached the best moment in china history, whether it can be comprehensive popularized, replacing the position of oil based drilling fluid, depends on the development progress of the whole drilling technology and drilling fluid waste treatment technology.

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