

Mult-Well Pad Situation At Home And Abroad

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Abstract

Mult-Well Pad technology can shorten the construction cycle, reduce drilling costs, and significantly improve resource utilization, low permeability shale gas and other unconventional oil and gas resources in the development of low-grade has significant technical advantages, and in North America shale gas development in the success of the application. On the basis of foreign literature research, introduced the Mult-well Pad status of drilling technology at home and abroad, summarizes the characteristics of a Mult-well Pad drilling technology, and noted that the existing domestic technical reserves, equipment and tools can not fully meet the Mult-well Pad lack of job requirements. Therefore, it is recommended to establish the concept of the whole process of cost control, targeted to carry out research and development of personalized tools and supporting technologies, the formation of shale gas Mult-well Pad industry standard drilling technology and drilling as soon as possible after the evaluation system.

Keywords

Mult-well Pad ; Shale gas ; Drilling ; Equipment and Tools ; Standard

1. Introduction

In recent years, domestic and international exploration and development of shale gas gradually increase the intensity. North American shale gas Mult-well Pad development model showed that Mult-well Pad technology can effectively improve work efficiency, shorten production cycle and reduce development costs. Mult-well Pad Drilling technology as an important part of Mult-well Pad technology, efficient development process in shale gas plays an important role. Mult-well Pad drilling is the level of cluster well group security, rapid, efficient drilling as the goal, adopts a series of advanced drilling and well completion technology and equipment, using the repeatable borehole design and the effective control of risk of downhole conditions, achieve high efficiency low cost drilling one way to work.

2. The concept of Mult-well Pad technology

Mult-well Pad technology originated in North America, is the earliest in order to reduce cost and improve working efficiency, will machine production way of assembly line work migrated to unconventional oil and gas exploration and development. Mult-well Pad drilling and completion technology is focused arranged a large number of similar wells in the same area, using a large number of standardized equipment or services, or the way in the production assembly line operations drilling and completion of an efficient low-cost mode of operation. That is a "group-type cloth wells, construction of scale, integration of resources, unified management" approach, the pre-drilling drilling construction, materials supply, power supply, etc., through the reservoir stimulation well, wash well, pressure, etc., logistics and engineering operations and oil and gas wells late operation and maintenance management processes, in accordance with the factory's management organization, forming a mutual connection and management-intensive "integration" organizational ties, and in accordance with uniform standards for each step of the construction requirements to pipeline mode, multi-wells in all aspects of the construction process, while taking advantage of multi-unit bulk of the construction work, which intensive construction and development resources to improve development efficiency, reduce operating costs and construction management.

3. Features Mult-well Pad technology

Factory drilling and completion operation mode is referred to the well where the bulk of drilling, fracturing and other new multi-well drilling and completion synchronous mode of operation, and is run through the drilling and completion process of ongoing global and local optimization concept integration is still in the development and improve them. The main features can be summarized as follows:

(1) Systematic. Mult-well Pad technology is an integral element of the integration of dispersed elements of systems engineering, including not only technical factors, including organizational structure, management methods and means.

(2) Integrated. Core Mult-well Pad is the integrated use of a variety of knowledge, technology, skills, methods and tools to meet or exceed the mode of operation of a series of construction and production operations carried out by the demands and expectations.

(3) Process-oriented. Migration Factory pipeline operations to oil drilling and completion process is divided into several sub-processes, before a sub-process for the next sub-process to create the conditions, each process can be carried out simultaneously with other sub-processes, in order to achieve the spatial turn, on time overlapping parallel.

(4) Mass. Through a highly integrated technology, the effective combination of human and machine to achieve the bulk of the work uninterrupted chain of technical elements on each node processes.

(5) Standardization. Complete use of facilities or a combination of technology enables the sharing of resources, such as customized proprietary equipment standardization, standardization of well construction, drilling and completion equipment and materials standardization, standardization of ground facilities, standardization of construction processes.

(6) Automation. Comprehensive use of modern technology, new equipment and management methods and developed a comprehensive mechanization and automation technology is highly intensive production operations.

(7) Maximize efficiency. The ultimate goal of factory jobs is to significantly reduce the project costs and improve operational efficiency.

4. Mult-well Pad foreign technology

Since 2008, the United States will be Mult-well Pad technology in the North American shale gas development since, by foreign key technologies and process support, has formed a more mature Mult-well Pad mode of operation. The main technology embodied in the following four areas:

(1) Mult-well Pad overall deployment and engineering optimization. Before drilling three-dimensional seismic data and regional geological environment factors described drilling and fracturing simulation results, and other technologies to the platform number, well pattern and overall optimization of wellbore trajectory, in order to achieve the minimum area of the well field development wells to achieve network coverage of reservoir area . Mainly for the well network deployment and commercial engineering software Schlumberger's Petrel and Halliburton's Decision Space Desk-top and so on.

(2) Maximize the use of equipment and engineering work to streamline the operation mode. This mode maximizes the use of drilling equipment, a plurality of processes in parallel operation to achieve seamless, to achieve a factory job, thus shortening the construction cycle and reduce the cost of the project.

(3) Efficient equipment and technology. In order to meet the Mult-well Pad drilling requirements, foreign research and development and use of mobile modular rig.

(4) Multi-well fracturing optimization design techniques. Launched the Mult-well Pad horizontal well fracture the overall layout of the group, many optimization fracturing parameters, fracturing,

fracturing order, construction parameters, processes, management and other fluid pressure in the back, that the core group as well to optimize the overall unit, and consider the well group controls the largest reserves, the highest degree of reserve recovery, fracturing improve timeliness and production results, reducing fracturing costs and improve overall development efficiency.

5. Mult-well Pad technology present situation in China

Since 2012, China has oil in Sulige South Cooperation Area, Sulige gas field blocks and 53 Su Weiyuan - Changning shale gas demonstration area were Mult-well Pad Exploration and drilling practice. Among them, Mult-well Pad Sulige South cooperation and explore the region's most mature application mode of operation.

South Sulige natural gas cooperation zone development block cooperation between China and the French Total oil company, in 2012 by drawing on the experience of other blocks Sulige gas field development, combined with Total's advanced applicable technologies and meticulous management philosophy, explored the characteristics of the zone has Mult-well Pad mode of drilling and completion operations, achieve economies of scale to develop "three lows" gas fields.

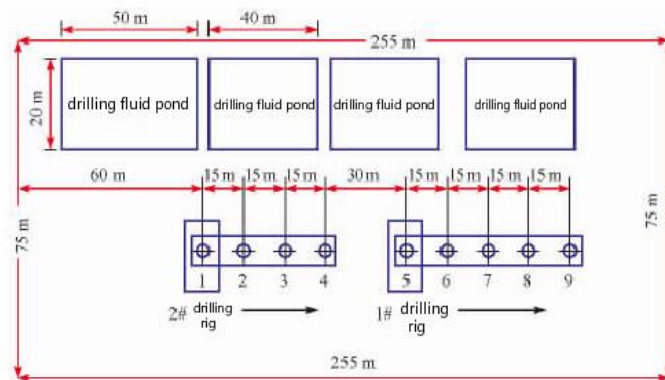


Figure1 9 Well's Mult-well Pad well field arrangement

In Fig. 1, the upper portion of the entire well field 9 wells 800m surface, consists of a small 30-type drilling rig is complete, simply use a pool of well fluid, and within a month or so to complete, the average single well construction time of only 3d , greatly reducing the construction cost. Vertical wells drilled throughout the year 10, the shortest construction cycle 20.74d; 1000m drilled horizontal displacement of large displacement directional wells 56, 1400m horizontal displacement of large displacement directional wells 52, after nine "Well factory" drilling operations, the average construction cycle shortened to 32.5d and 33.7d, respectively shortened 10.1d and 10.3d; three horizontal wells drilled, the average construction cycle 65d, compared with 2011 108d shortened 43d. Fracturing use of pipeline operations, with three well as a unit, a unit after fracturing is completed immediately start the next unit of fracturing operations, it has achieved significant fracturing effect. In 2012, the average cluster wells fracturing fluid into the well volume 5000 ~ 7000m³, fracturing period 6 ~ 8d. Cong test gas wells fracturing operations from the early period of the current 50d shortened to about 35d.

6. Mult-well Pad existing in the application of technology in China

In recent years, our country in terms of technology, Mult-well Pad conducted a lot of research and application of exploration, made a lot of achievements and useful knowledge, but compared with other countries, still in the exploratory stage of the application, there are obvious shortcomings , mainly reflected in:

- (1) Ancillary equipment instruments can not fully meet the needs of Mult-well Pad jobs.
- (2) Have not really realize streamlined construction operations.
- (3) They have not yet formed a mature, Mult-well Pad mode of operation.

7. Multit-well Pad technology development Suggestions in China

(1) The whole process of establishing a low-cost basic concept. Multit-well Pad concept only to study the formation of such mode of operation, to the greatest extent possible to reduce costs and achieve economies of unconventional oil and gas resources and effective development.

(2) Learn from the successful experience of development of tight gas reservoirs. Abroad has become mature, Multit-well Pad technology, it is also useful reference, but not blindly copy from studying abroad Multit-well Pad technology is also necessary to fully summarize, successful model to optimize the development of tight gas reservoirs in China.

(3) Integration and the development of appropriate supporting technology. Existing engineering technology in the conventional oil and gas exploration and development in the formation, we can not fully meet the needs of unconventional reservoirs Multit-well Pad technology, the need for the characteristics of a Multit-well Pad technology matching set of the corresponding technology.

(4) Establishment Multit-well Pad technology projects unit. Multit-well Pad technique involves many aspects of technology, management, etc., is a need to actively cooperate with all parties involved in systems engineering, it is proposed to establish a Multit-well Pad technology projects in the Department of unconventional oil and gas resources development demonstration zone, has overall responsibility for the Multit-well Pad Research and experimental application of technology, in order as soon as possible from a technical demonstration, management model, industrialization demonstration, regulatory demonstration, formed in line with China's national conditions Multit-well Pad technology.

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