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Application of Deep Heavy Oil Testing Technology in the K119 Wells

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Abstract: In this paper, the basic geology, chemical principle, comprehensive utilization of well logging, mud logging, testing, and geological information, such as gas injection of deep heavy oil testing process to evaluate the application of the K119 well, through the K119 deep heavy oil well construction step, and the evaluation of the effect of the testing process, explore the advantage of deep heavy oil testing, process, deepen the understanding of deep test process of heavy oil. Using the method of mathematics, chemistry, and combined with a large amount of operation data, in this paper, the test process of heavy oil deep in the K119 to evaluate the application of the well, deeply recognize that USES the injection-production integration process can reduce the cold damage to reservoir, reduce construction work; Heat pipe has very good heat preservation effect, it can extend the production cycle; CO_2 can improve the reservoir properties, has the very good viscosity cleanup action; Electric heating technology can improve the pump efficiency and prolong the well stimulation cycle.

Keywords: Deep heavy oil; K119 well; Steam injection. Thermal recovery; Rod pump.

INTRODUCTION

Deep try oil and heavy oil reservoir development has always been a world difficult problem, because this kind of thin reservoir and reservoir can be generally poor physical property of crude oil, serious sand production, active edge-bottom water, such as the difficulty, especially the crude oil viscosity is too high, the normal temperature degassing viscosity over tens to hundreds of thousands of MPa, s more, by conventional test process can't be, early in the production of oil Wells in oilfield related reservoir, production is not caused by the poor fluid for success. To try oil work with great difficulty, if we do not take for deep heavy oil reservoir is a new testing process, get the real data of reservoir is likely to miss one or more fields, thus bring a lot of damage to oil field reserve replacement, and at the same time it brings great influence to oilfield stable production. Therefore research on this subject not only has theoretical significance; to guide the deep mining of thick oil also has important practical significance [1-3].

In this paper, the basic geology, chemical principle, comprehensive utilization of well logging, mud logging, testing, and geological information, such as gas injection of deep heavy oil testing technology in K119 to evaluate the application of the well, the deep research of heavy oil testing, application effect and advantages of technology, to deepen the understanding of deep test process of heavy oil, lays the foundation for the deep mining of thick oil[4, 5].

SUMMARY OF OIL AND GAS RESERVOIRS

K119 wells in Jiyang depression depression Zhanhua sag village sag, the southern slope of K119 Museum Tao Group sand body structure parts, connected with the eastern Chenjiazhuang uplift in the north, Paleogene strata in Northeast dipping, overlap on the north slope of Chen Jia uplift, Neogene drape in Chenjiazhuang uplift, the deposition of the Shahejie Formation in the stratigraphic onlap and the well in the western oil and gas migration channel, to the southwestern slope belt bypassing the exploration, clear of the west channel of oil and gas migration oil and gas range.

CONSTRUCTION PLAN

Consideration

①Because the K119 purpose layer for heavy oil well, it is difficult to flow and easy to cause formation sand production, real parameters for reservoir, choose appropriate perforation mode and test mode.
②The K119 well test results are in-depth analysis and research, and to consider a variety of possible factors, combined with the block near well try oil exploration situation, formulate the next test measures.
③K119 purpose layer of poor physical property, oil well, direct steam injection thermal recovery oil, steam injection pressure is high, there is no admission injection of risk, so be factors affecting reservoir, well-developed reservoir preprocessing scheme.
④Deep heavy oil steam injection due to high pressure, fast heat loss, want to consider the optimal selection of

steam injection string and steam injection equipment and selection of parameters.

⑤In deep heavy oil Wells drainage and production process, want to consider what measures to take, can the heavy lifting to the ground, to ensure the drainage effect.

Construction plan

①Perforation test plan: in combination with drilling and logging data, considering the purpose layer reservoir property, based on the prediction of reservoir temperature and pressure, the objective layer adopts 127 bullets and APR testing perforating technology.

②Testing process: according to the test results and the field admission information, according to the piece of oil exploration situation, analysis the main factors influencing the K119 well test results is high crude oil viscosity, poor reservoir property.The K119 well testing is proposed using steam injection of thermal compound chemical technology test.

③Reservoir treatment: in the formation of hot water should be added expansion agent;All chemical compatibility test must be done well before into the well.Injected into formation oil soluble viscosity agent, high temperature membrane expansion agent dissolves the near wellbore area of heavy oil, reduce the steam injection start-up pressure, improve the displacement efficiency of steam.To inject liquid CO2 formation, to achieve further viscosity.

④Gas injection equipment and parameter choice: using piecewise steam injection tubing string, deep heavy oil Wells all wellbore heat steam injection, reduce wellbore heat loss. Using steam injection string production integration process, reduce the operation process in the well fluid to the formation of cold damage, saving operation time.

⑤Drainage measures: in order to decrease the drag of produced fluid into the pump, to improve the pump efficiency, electric heating system. When the production after a period of time, if the electricity heating technology can not only meet the requirements of K119 well shaft lifting, can at the same time by mixing chemical agent in viscosity.

PROCESSING STEP

On January 6-12,2013, successively completed the wellhead, scraping, drifting, for mud, casing pressure, scraping, wash well, tubing pressure testing, for the bulk liquid, such as test perforating under test process;March 8-11, bet on mining integration pump (figure 1);On March 11-15, wellbore and reservoir pretreatment;On March 19-29, steam injection, shut-in.On March 29 - on May 20, has entered into the phase of drainage and pumped[5, 7].

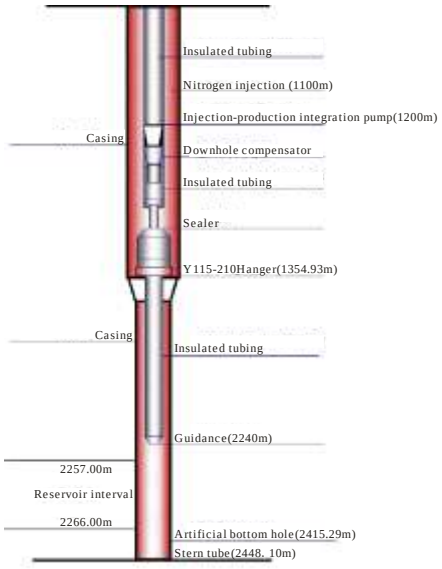

Fig-1: Injection-production process of K119 Well schematic diagram

EVALUATION

During the K119 well pump suction drainage, since April 10 until May 21, the cumulative amount of produced liquid after 656.22 m, the 221.74 m after oil, accumulative total 434.48 m after water, can be seen by the figure, the oil Wells in the thermal recovery of steam injection trial process, obvious effect, stable production, achieve the expected test, prove the success of deep test process of heavy oil[8-10].

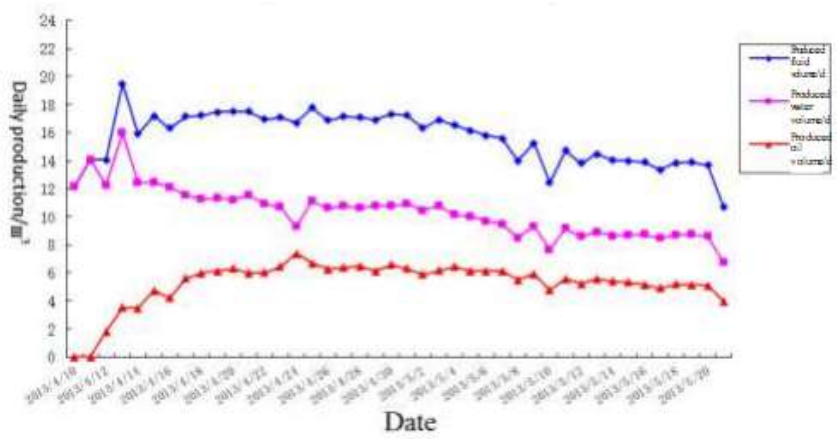

Fig-2: K119 Welldrainage

Injection-production integration process evaluation: (l) make full use of steam injection formation after the advantages in high temperature condition, the fixed string smoke, go directly to full exploitation of the Wells in the oil production peaks;(2) to avoid the transfer pump pressure well, wash well homework when working this well reservoir of cold injury;(3) the insulation oil pipe has the very good effect, can reduce the heat loss of the wellbore this well, improve the producing fluid temperature, extend the production cycle of the well;(4) turn extraction method is simple, can save a lot of work hours, reduced our team the worker's labor intensity, saving the cost of our team work.

Injection-production integration advantages of rod pump: (1) the shaft adopts injection-production integration of the pump has simple structure, strong applicability; (2) the pump barrel allows flow area is large, small flow resistance, to ensure the effect of the gas injection well construction; (3) using the pump can effectively prevent this well conversion scale, dirt, smoke; (4) the pump to pump inspection, only mention of rod string, hot oil pipe string, to reduce the production, save the cost.

CO_2 viscosity cleanup process evaluation: (1) complement formation energy: CO_2 after entering the wellbore formation, part of the dissolved in crude oil, and formation of crude oil form miscible, the volume expansion of crude oil, have the effect of the dissolved gas drive. (2) The viscosity cleanup: after CO2 dissolved in crude oil, crude oil viscosity decreased, but also to overcome the capillary resistance of crude oil and friction, so as to improve the flow ability of oil. (3) This well reservoir has certain acid defuse plugging effect: acidic after CO2 dissolves in water, and react with formation matrix, dissolution part of impurities, can improve the permeability of reservoir this well.

Well casing liquid nitrogen injection, can reduce the heat loss of gas injection, injected into formation oil soluble viscosity agent, high temperature membrane expansion agent, dissolve the near wellbore area of Wells of heavy oil, reduce the steam injection start-up pressure, and improve the displacement efficiency of steam.

Electric heating technology evaluation: (1) the Wells using downhole electric heating technology can effectively reduce the wax, to eliminate the phenomenon of well card, make this well can normal production, improves the well production rate and the single well production, development effect is obvious; (2) electric heating compared with other technologies, has high efficiency, and the process operation is simple, low cost, the economical production; (3) can be adjusted according to the out of the well fluid situation electric heating power, very good to ensure the normal and stable production of oil Wells.

CONCLUSIONS

1. K119 well by steam injection thermal recovery test technology, industrial oil flow, proves that deep heavy oil testing process successfully.
2. injection-production integration technology can avoid or reduce to smoke when working pressure well, wash well, and reduce the cold damage into the completion fluid to reservoir, a longer peak oil production period.
3. Insulated tubing has very good heat preservation effect, can reduce wellbore heat dissipation, improve the producing fluid temperature, extend the production cycle.
4. CO2 has the very good viscosity cleanup effect, can improve the flow capacity of crude oil, and improve the reservoir properties.
5. mining process, the electric heating oil recovery technology is exploitation of heavy oil and high pour-point oil, high waxy oil effective way, it can improve the pump efficiency, prolong the well stimulation cycle effect is remarkable.

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