Scholars Bulletin

Meandering river point bar physical simulation water flooding experiment and analysis

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Abstract: In order to more intuitive understanding of the meandering river point dam reservoir characteristics and effect of water flooding, based on the actual reservoir configuration characteristic, design large scale core physical model. This experiment has the model size is big, high degree of simulation, and the characteristics of the high degree of injection-production controllable, a note four mining method is adopted to improve the water flooding experiment. Water flooding stage is 40.2%, the total recovery degree according to its characteristic curve can be divided into three stages. On analyzing the characteristic of the reservoir internal structure and the structure of degree of water flooding stage of single well production and the influence of residual oil distribution. Combined with the actual scene, and based on the blocking effect of abandoned channel classifying production well, abandoned channel blocking effect is different with different values can result in water flooded production well, the point at the bottom of the dam caused by the different remaining oil distribution. The experimental results show that the production well of different store condition, its recovery degree is different, the influence of seepage channel advantage is also different.
Keywords: physical model; point bar; residual oil; architecture.

Introduction

In China most of continental river delta sedimentary system in oil and gas fields, which is important to meandering river point bar reservoirs, its mining research is of great significance. For meandering river dam, the study found that, even in the moisture content up to 90% of the cases in this district, there are still a lot of coring well for low water even without water [1]. For the mining of meandering river point bar at present is mainly by water flooding, polymer flooding and the method of chemical flooding, by adopting the combination of vertical Wells and horizontal Wells [2]. From cores types are divided into a one-dimensional, two-dimensional and three-dimensional rock cores, displacement solution is mainly by water flooding, polymer flooding and chemical flooding etc. [3-11]. Domestic scholars Shu Qinglin with numerical simulation to simulate different the occurrence of the side interlining block effect of the infusion [12]. Domestic scholar professor Yan Baiquan from the meandering river point inside the dam configuration is analyzed, combining with the reservoir internal structure characteristics of remaining oil are classified in some dam, put forward "thin interlayer space structure and poor permeability and permeability series + 3 level interface + gravity" to control the residual oil pattern [13-15]. About flooding reservoir physical model experiment is more, but mainly consider the physical characteristics of reservoir, the reservoir internal structure characteristics of the experiment. This experiment mainly from the internal structure, combined with the feature of underground reservoir internal structure, build large meandering river point bar model, analysis the internal configuration, structure characteristics and the influence of edge at the bottom of the seepage channel of water drive and significance.

Experimental scheme

This experiment follow north area east of the underground structure characteristics, the sandwich has changed the density, occurrence, and other microfacies change, according to the 1:20 narrowed, the establishment of physical model, the model and its internal structure and well spacing position as shown in figure 1.Model size to 60 cm * 60 cm * 6 cm, vacuum oil saturation after dyeing, to take out points of oil and water zone when reading interface, record the volume of oil saturation, calculate the core porosity is about 26%. Experiments, the core, in the constant temperature box temperature 45 ℃, at the same time in core injection side access pressure gauge, pressure readings, and injection pressure changes from 0.02mpa to 0.08mpa, the core plane five point method is adopted to improve the mining, intermediate injector USES ISCO260D constant pressure constant current pulse metering pump injection water, injection rate of 1 ml/min, continuous constant pressure constant current injection, fluorescent agent was carried out on the

injection water dyeing at the same time, in order to cut after the experiment of core, the displacement in the process of infusion in side interlining, abandoned channel and sand body in the flow and water flooded extent. Record in the process of displacement, the variety of single well recovery degree and moisture content, when single well water cut oil field requires 91.8%, single well closed and other normal drilling, well until the moisture content is 91.8% of each well, the end of water flooding, polymer flooding stage.

Configuration factor analysis

In 1985 A. D. Miall think the river can be divided into twelve kinds, this paper proposes A new research method, namely "configuration elements analysis", interface classification, three facies type and configuration elements content constitutes the basic framework of this kind of analysis method and research content. The configuration elements can be understood as: configuration elements = lithofacies combination + sand body geometry. And put forward the basic configuration elements OF eight rivers, respectively (CH), gravel river dam and gravel bed form (GB), sand bed form (SB) and downstream accretion bed form (DA), lateral accretion OF sediment (LA), gravity flow sediments (SG), laminated sand sheet (LS) and fine particle deposition (OF) the coast. The eight elements combined into 12 kinds OF river sedimentation model, model 1 by SG and SB and GB respectively combination, combination model by 2 GB, pattern 3 by GB, SB, and combination OF model 4 by CH, LA, and combination OF patterns by CH 5, LA and SB, 6 by SB, OF and LA combination, 7 by LA and combination OF model, pattern, 8 by CH, SB, and combination OF model 9 by SB and FM, 10 by SB and FM combination mode, 11 by SB combination pattern, 12 by SB and LS model.

This experiment model configuration mode 7, composed, LA and OF meandering river sedimentary model represents the argillaceous fine grained. Sediments are mainly fine sand, silt and clay, abandoned channel development around the flood plain deposits, main configuration for lateral clip, at the same time distribution of multiple point dam, there are multiple category 4 and 5 interface. One point dam is due to the formation of the meandering river water in the process of flow, due to the constant movement of the river with sediment, the concave bank continuously eroded, convex bank deposit.

Single well analysis

To observe the recovery degree of single well and injection of the relation between amount of PV curve rule discovery, as shown in figure 3.Well oil production per unit time the most, 91.8% moisture content of the first to meet the requirements of oil field, the first stop, because of no. 3 well underground distribution of sand body of good physical property, high permeability, favorable for the formation of seepage channel

advantage, no shade of abandoned channel, the infusion can drive the seepage channel advantages of remaining oil is more, so the watered-out degree is high, the seepage channel advantages, weak water flooding degree, low water, so the enrichment of remaining oil [16]. In the stage of water flooding recovery degree affected by seepage channel advantages of single well, and at the bottom of the side interlining wash surface seepage channel, not all advantages seepage channel in the form at the bottom of the selective advantage and uncertainty, the forming principle of complex. Different single well affected by underground configuration and physical form different seepage channel advantage, single well production of different degree. Well no. 1 and no. 4 in the early and middle stage of water flooding, recovery degree and the relationship between the cumulative injection PV curve change rule is roughly same, show that the phase of well no. 1 and no. 4 per unit time of oil production is roughly same, but the late 1 well recovery degree is higher than the recovery degree of 4 Wells in no. 1 well oil production extra late 4 well oil production. No. 2 well in stage of water flooding, the recovery degree continuous increase, and other well before the close of the last stage, 2 well obviously increase oil production and recovery degree. In the stage of water flooding, the no. 1 well recovery degree of 10.68%, 2 well recovery degree was 17.99%, no. 3 well recovery degree of 5.41%, no. 4 well recovery degree of 6.79%, among them 2 well oil production per unit time is the slowest, but the highest recovery degree, 3 Wells because of its good properties, therefore, the early stage of the water drive oil production per unit time is up, but in the end of the minimum water flooding recovery degree.

Experimental data show that after the no. 3 well stop well, recovery degree of well no. 1 and no. 2, respectively, the output of per unit time increases. In the well no. 1 and no. 4 well stop well after the next stage, no. 2 well recovery degree and yield increased significantly at this stage. In 3 Wells is turned off, well no. 1 and 2 of the injection pressure, displacement seepage channel more advantage of remaining oil, Wells in no. 1, no. 3 and 4 Wells are shut down, no. 2 well will greatly improve the recovery degree of the output per unit time is greatly increased.

Experiment discussion

Water flooding phase seepage channel is very important to the formation of the advantages, the formation of the seepage channel at the bottom side interlining advantage of selective and uncertainty, the forming principle of complex, part of the dominant channel connected to each other, sharing injection pressure. The formation of the seepage channel advantage affect recovery degree of each well. Closing high water Wells, can lead to pow seepage channel injection pressure increases, the advantages of blocking effect of abandoned channel is reduced, the recovery

degree of single well and output per unit time are improved greatly.

On the above conclusions, in the actual injection-production relationship combined with the actual internal configurations corresponding, combined with the feature of underground reservoir structure, the influence of dominant channel and the effect of the distribution of remaining oil, abandoned channel to fully understand the effect of single well. Reasonable injection-production scheme is put forward, in order to improve the recovery degree of water flooding, fully aware of the injection-production condition of multipoint dam block.

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