

目次

石油天然气地质

- 鄂尔多斯盆地姬塬地区长 6 油层组储层微观孔隙结构类型及特征
..... 淡卫东, 汪伶俐, 尹洪荣, 张振红, 辛红刚, 张三, 李成 (1)
- 职田地区延长组长 8、长 6 油层组油气勘探潜力分析
..... 龚建涛, 刘高红, 解宇, 王丹蕾, 王冬冬 (7)
- 苏里格气田苏 48 区石盒子组八段沉积特征及演化规律
..... 孔德博, 冯强汉, 陈龙, 张佳超, 魏千盛, 雷迅 (11)

石油天然气勘查

- 利用 J-函数计算油藏原始饱和度的可行性分析
..... 刘媛, 唐资昌, 黄力, 牛志文, 李艳静, 陈旭, 刘翠凤 (13)
- 氧活化测井在塔里木油田的应用
..... 虞兵, 柳先远, 侯秋元, 王谦, 廖茂杰, 姚亚彬 (18)
- 中东地区生物碎屑灰岩储层渗透率预测方法研究
..... 郭海峰 (26)

石油天然气工程

- 元坝陆相地层钻井液密度窗口的确定与应用
..... 胡德云, 赵鹏斐, 周成华, 范翔宇, 周鑫 (31)
- 超深井水力参数设计技术及应用
..... 陈红壮, 聂育智, 孟庆生, 江维, 李洁, 王浩任 (39)
- 渗透率级差影响下的薄差层层间干扰研究
..... 王凤娇, 刘义坤 (44)
- 稠油底水油藏夹层展布研究新方法及其开发布井策略研究
..... 罗启源, 张伟, 代玲, 陈维华, 郑洁, 朱迎辉, 谢明英 (49)
- 标准层套损集中区的异常现象成因与防控措施
..... 李自平 (54)

执行主编

黄鹂

责任编辑

黄鹂

帅群

邓磊

龚丹

英文编辑

苏开科

排版

刘学英

ABSTRACTS

1 The Characteristics and Type of Microscopic Pore Texture of Chang 6 Reservoir of Jiyuan Area in Ordos Basin

Dan Weidong, Pang Jinlian, Yin Hongrong, Xin Honggang, Zhang San, Wang Lingli, Li Cheng (First Author's Address: Research Institute of Exploration and Development, Changqing Oilfield Company, PetroChina; National Engineering Laboratory for Exploration and Development of Low-permeability Oil and Gas Fields, Xi'an 710018, Shaanxi, China)

Abstract: The micropore texture of reservoirs was one of the key elements for determining ability of reserves and reservoir percolation. The analysis of its genetic type and distribution regularity was of great significance of studying the difference of reservoir features and predicting the quality reservoirs. According the study of sediment and diagenesis and the microscopic pore texture features of the Chang 6 Reservoir of Jiyuan Area in Ordos Basin, six kinds of genetic types were recognized. The reservoir with different pore texture types had different geometric shapes, wettabilities, reservoir properties and filtering flow features. The difference of pore structure is induced by different sediments and diageneses. Through the study of the distribution of diagenetic facies, the plane distribution of different pore structural types and corresponding reservoir features can be predicted. It provides a basis for oil exploration.

Key words: pore texture; Chang 6 Reservoir; Jiyuan Area; Ordos Basin

7 Analysis on Oil and Gas Exploration Potential of Chang 8 and Chang 6 Reservoirs of Yanchang Formation in Zhitian Area

Gong Jiantao, Liu Gaohong, Xie Yu, Wang Danlei, Wang Dongdong (First Author's Address: School of Earth Sciences and Engineering, Xi'an Shiyou University, Xi'an 710065, Shaanxi, China)

Abstract: Based on the analysis of hydrocarbon accumulation conditions of Chang 8 and Chang 6 Reservoirs in Yanchang Formation of Xunyi Zhitian Area, it was considered that the hydrocarbon source rock of Chang 7 Reservoir had strong hydrocarbon generating ability, there was an effective sand body with good reservoir conditions in Chang 8 and Chang 6 Reservoirs; With the mudstones in Chang 7 Reservoir and a Chang 4+5 Reservoirs as a cap rock, 2 sets of source-reservoir-caprock assemblages below source reservoir and above the source were formed. Through the analysis of exploration potential, it is considered that the oil content is determined by the reservoir physical property of the near source sandstone; In this area, the most favorable hydrocarbon accumulation mode is "oil genesis from the upper location and reservoir forming from the lower location". The favorable zone for oil-gas accumulation is located in the middle and the north of the area, Chang 8₁ Reservoir is the most favorable exploration layer.

Key words: hydrocarbon accumulation condition; high-quality hydrocarbon rock; effective sand body; exploration potential; favorable zone

11 **Sedimentary Characteristics and Evolution Rules of the 8th Member of Shiheze Formation (P₂X₈) in Block SU 48 in Sulige Gas Field**

Kong Debo, Feng Qiangqhan, Chen Long, Zhang Jiachao, Wei Qiansheng, Lei Xun
(First Author's Address: School of Geosciences, Yangzte University, Wuhan 430100, Hubei, China)

Abstract: On the basis of predecessors' study on the sedimentary environment in the block and core observation data, it was considered that braided river delta sedimentary environment was developed in Psh₈ of Block Su 48, it was further divided into 2 subfacies, such as delta plain and the delta, and 7 microfacies, such as distributary channel, abandoned channel, overbank deposit, underwater distributary channel, inter-tributary bay, distance sand beach and sand sheet and et al. Through electrical logging curve, work area logging facies and plane distributive diagram of sedimentary microfacies of each sublayer are established for analyzing its evolution regulation in depth. It is considered by the comprehensive analysis that during the deposition of Psh₈, the shoreline is northward, the lake level rises, a sand retrograding deposition style is created.

Key words: Sulige Gas Field; Block Su 48; sedimentary facies; 8th member of Shiheze Formation; evolution rule

13 **Feasibility Study of J-function Used for Calculating Original Reservoir Saturation**

Liu Yuan, Tang Zichang, Huang Li, Niu Zhiwen, Li Yanjing, Chen Xu, Liu Cuifeng
(First Author's Address: Geophysical Research Institute of BGP, CNPC, Zhuozhou 072751, Hebei, China)

Abstract: Based on theoretical foundation of J-function, the factors controlling the original reservoir saturation, such as oil column height, pore texture, reservoir type and fluid properties, etc, were analyzed. The result indicated that in the same reservoir and under the condition of similar physical property, with the increase of oil column height above the free water level, the original oil saturation gradually raised. However, for different reservoirs, the smaller the pore throat radius was, the bigger the curvature was and the J-function raised with it and original oil saturation reduced, at the same time, the more complex the oil and water relation was, the more diversified the fluid property change was, which could affect the applicability of J-function. Case study shows that the method using J-function to calculate saturation is not suitable for all reservoir types unconditionally, and it has a good applicability to the bulk reservoir with bottom water, while for the layered reservoirs with edge water, the calculated oil saturation is lower, it can not reflect the rules of saturation variation within the reservoirs, therefore its applicability is poorer.

Key words: J-function; original saturation; oil column height; pore texture; reservoir type

18 **Application of Oxygen Activation Logging in Tarim Oilfield**

Yu Bing, Liu Xianyuan, Hou Qiuyuan, Wang Qian, Liao Maojie, Yao Yabin (First Author's Address: Oil & Gas Evaluation Center of CNPC Logging, Xi'an 710000, Shaanxi, China)

Abstract: In the early period, the main injection profile logging series involved five parameter logging and radioactive isotope logging in Tarim Oilfield. In five parameter logging, the small layer injection rate could not be calculated in layered injection allocation. While the effect of radioactive isotope logging was poor in the well which has mac-

rosopic throat wells and wells with serious contamination. Therefore oxygen activation logging was introduced in Tarim Oilfield. In this article, the principle, interpretation method and application effect of oxygen activation logging are studied, the result shows that oxygen activation logging is suitable for all kinds of string structures, the calculation accuracy is high, in the borehole with serious contamination, it can accurately identify water absorption layers.

Key words: oxygen activation logging; Tarim Oilfield; function fitting

26 **Permeability Predicting for Bioclastic Limestone Reservoir in the Middle East Area**

Guo Haifeng (Author's Address: Geoscience Center of Great Wall Drilling Company, Beijing 100101, China)

Abstract: It was a challenge to reliably predict the permeability of bioclastic limestone reservoirs in the Middle East because of their complex pore structure and strong heterogeneity and hence permeability varying in many orders of magnitude at the same porosity was induced. By taking M Formation in H Oilfield of Iraq for example, an improved permeability prediction method based on conventional logging data and core-log integration data was presented. On the basis of reservoir sorting, with the rock typing, multi-models were then created based on the principle of "different models for different formations and different types" to transform the pore structure evaluation into properly selecting the particular permeability model. The analysis shows that porosity, resistivity and Gamma Ray are found to be sensitive to the change of pore structure and it can be used in model selection. The conventional log-derived permeability agrees with core data and the permeability prediction accuracy of conventional logging is accordingly improved in M Formation.

Key words: bioclastic limestone; permeability prediction; pore structure; rock typing; conventional logging; model selection

31 **Establishment and Application to Density Window for Safe Drilling in Continental Strata of Yuanba Area**

Hu Deyun, Zhao Pengfei, Zhou Chenghua, Fan Xiangyu, Zhou Xin (First Author's Address: Research Institute of Drilling Engineering, Southwest Petroleum Engineering Co. Ltd., SINOPEC, Deyang 618000, Sichuan, China)

Abstract: Geological structure of continental strata in Yuanba Area was complex. Well collapse accident was easily caused because of the cliffy trend of formation and fragile rocks. This article build transformation model of dynamic and static mechanic parameters for the continental strata in Yuanba Area through logging method, and optimize calculation model of pore pressure, fracturing pressure and collapse pressure in Yuanba Area was selected. Combined with the particularity of continental formation in Yuanba Area, the article build density window of drilling fluid in consideration of effect of broken degree, formation rock mechanic properties, dip angle, well deviation angle, and hole deviation azimuth. By calculating the safe density window of the lost circulation interval in Well YL702, the result shows that the theoretical calculation of the new safe density window is consistent with real drilling conditions, and the rationality of the model is verified. Therefore, it provides reference for studying the borehole stability in the area.

Key words: continental strata; Yuanba Area; drilling fluid density window; collapse pressure; break down pressure; in-situ stress; lost circulation

39 **Technique for Designing Hydraulic Parameters in Ultra-deep Wells and Its Applications**

Chen Hongzhuang, Nie Yuzhi, Meng Qingsheng, Jiang Wei, Li Jie, Wang Haoren
(First Author's Address: Shelf Petroleum Equipment & Services Co. Ltd., Dezhou 253000, Shandong, China)

Abstract: Ultra-deep drilling was limited by well structure, smaller borehole size. In small hole drilling, due to the narrow annular clearance, a strong effect of rotation of drill pipe was induced on the annular velocity distribution. So the conventional hydraulic parameter calculation model would cause higher error in calculation result. In this paper, numerical stimulation were carried out on the annular flow velocity and pressure gradient of both inside and outside the drill pipe. As a result, the characteristics of annular velocity distribution were determined. Meanwhile, influence factors of pressure gradient were computationally analyzed. Finally, compared to the real drilling parameters of Well Shuntuo 1 and Well TP253, the results of numerical stimulation are very similar. Therefore, the design model of hydraulic parameter calculation has high calculation accuracy and it provides guidance for the design of hydraulic parameters for ultra-deep wells.

Key words: ultra-deep well; hydraulic parameter; velocity distribution; pressure gradient

44 **Study on Interlayer Interference under the Influence of Permeability Contrast in Thin and Poor Pay Zone**

Wang Fengjiao, Liu Yikun (First Author's Address: Key Laboratory of Enhanced Oil and Gas Recovery of Education Ministry, Northeast Petroleum University, Daqing 163318, Heilongjiang, China)

Abstract: With a thin and poor formation development zone in Daqing Oilfield as an example, an interlayer interference mechanism model was established combined with heterogeneous characteristics of thin and poor pay zone, the changing rule of degree of reserves recovery under different permeability contrast was studied. It was compared through a single layer development model finally, a multi-layer permeability contrast boundary was determined for the thin and poor pay zone. Study showed that interlayer interference phenomenon increased with the increase of permeability contrast. Daily oil production and water cut changed with the serious changing of permeability contrast after the breakthrough of water and oil front of contingent reservoir. Compared with the development effect of each individual layer, the individual layer recovery degree reduced 6.59 percent at the permeability contrast of 20. With the increase of permeability contrast, reserves recovery descent was logarithmic. In consideration of reservoir property and actual production requirements of reserves recovery degree, it is determined that the permeability contrast should be limited within 20 for efficient development in thin and poor pay zones. A good practical application effect is obtained, and it provides guidance for high-efficient development of thin and poor reservoirs.

Key words: thin and poor pay zone; interlayer interference; permeability contrast; degree of reserve recovery; effective displacement

49 **New Method of Studying Interlayer Distribution in Heavy Oil Reservoir with Bottom Water and Its Well Spacing Strategy for Development**

Luo Qiyuan, Zhang Wei, Dai Ling, Chen Weihua, Zheng Jie, Zhu Yinghui, Xie Mingying (First Author's Address: Shenzhen Branch of CNOOC Limited, Guangzhou 510240,

Guangdong, China)

Abstract: Heavy oil reservoir with bottom water accounted for a significant proportion in the east of the South China Sea, its production contribution has been raised year by year, there were relatively less experiences for the bottom water reservoir development and management. At the same condition of reservoir development, different reservoirs with bottom water had great variations in development effects, even if it was in the same reservoir, effect of development well was obviously different, which has restrained the development of bottom water reservoirs in the east of the South China Sea. The interlayer distribution was depicted in combination of dynamic mode with static mode, the study of production of performance was integrated with interlayer, it was considered that the interlayer was one of major factors of inducing the above differences. On the basis of above study, the optimized strategies for horizontal and vertical well spacing, numerical simulation study and the analysis of practical production plan indicate that the optimized well spacing strategies can be used for improving the effect of the development of reservoirs with bottom water, it can provide guidance for the reservoir adjustment in the late period and setting the strategies for well spacing in the early period.

Key words: heavy oil reservoir; bottom water reservoir; interlayer; distribution; production performance; well spacing optimizing

54 **The Abnormal Phenomenon Origin and Measures for Prevention for Concentrated Casing Failure Area in Datum Bed**

Li Ziping (Author's Address: The 1st Oil Production Plant, Daqing Oilfield Co. Ltd., PetroChina, Daqing 163001, Heilongjiang, China)

Abstract: Casing failure was serious in Sazong Development Area of Daqing Oilfield, especially casing failure in N₂ bottom datum bed, which had the characteristics of concentrated area and time of casing failure. There were many concentrated casing failure areas, which seriously affected the normal production in the oilfield. By analyzing abnormal phenomenon in the concentrated casing failure areas, it indicated that the abnormal phenomenon was closely related to water entering into the oil shale in the datum bed. The test data of oxygen activation logging, formation pressure, packer leak finding, datum bed blowdown, well testing by interference and test by interwell tracer etc prove that a big area, high pressure and good communication of fast flow channel has been formed in datum bed of concentrated casing failure area. Static formation pressure analysis shows that bigger difference of regional formation pressure in concentrated casing failure area, water entering into the datum bed, formation pressure difference are the major factors causing concentrated casing failure area. In consideration of the genesis of concentrated casing failure area, the preventive measures for controlling the water entering into the datum bed and keeping pressure balance are proposed and the measures are used in the west of Nanyi Area, the concentrated casing failure area is effectively controlled.

Key words: datum bed; casing failure; casing failure mechanics; Sazhong Development Area

Translated & Edited by SU Kaike (苏开科)