**Scholars Bulletin**
(A Multidisciplinary Journal)
An Official Publication of "Scholars Middle East Publishers",
Dubai, United Arab Emirates
Website: http://scholarsbulletin.com/

**ISSN 2412-9771 (Print)**
**ISSN 2412-897X (Online)**

# Remaining Oil Comprehensive Evaluation of Xing 12 Block in Daqing Oil Field

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**Abstract:** Daqingoil fields has been developed for many years and for the most part has experienced well pattern thickening and pattern modification for many times and in part areas has developed by injecting water, polymer and chemical flooding,now many oil fields comeinto high-cut stage, the distribution of remaining oil is very scattered and developing is too difficult,in order to exploit this part oil we have do manyscientific researchand have accumulated some experience and basic approach,all this is helpful for the same kind oil field's exploitation.
**Keywords:** remaining oil, types, control factors.

## REGIONAL GEOLOGICAL OUTLINE

Xings hugang structure is a three class structure in the south of Daqing Placanticline, Xing 12 block pure oil areas located in southern Xingshugang oil field, oil area is 9.6 km2, total geological reserveis 2798.3*104t, table outer geological reserves is 365.3*104t [1, 2]. The reservoir belongs to anticlinal structural reservoir, the whole region totally developed SaII, SaIII, PuI three formation groups and can be subdivided into 72 sedimentary units. Xing 12 block pure oil areas drilling in the case of 14 faults,direction of faultsare mostly north westdirection,fault dip is from 40 to 60o degrees,fault extension length of the shortest 0.2km, the longest 7.2km,the faults' distance is generally about 30m. According to the analysis of data from cores, the reservoir lithology, physical property changes larger and the heterogeneity is strong [3, 4].

## REMAINING OIL TYPES AND CONTROL FACTORS

### Macro control factors of remaining oil

There are many factors that affect the distribution of remaining oil. We usually divide them into two categories: geological factors and development factors. The geological factors include: heterogeneity, structure, fault and so on [5, 6].From the point of view of reservoir heterogeneousoil displacement angle, remaining oil distribution is mainly controlled by the reservoir plane, layer and layer non uniform oil displacement andthe reservoir heterogeneity and the exploitation of non uniformity is the result of reservoir plane, interlayer and intra layer uniform two factors of oil displacement.

The main factors, such as the size, geometry, porosity, permeability and other parameters, such as the variation of the parameters and the distribution of the reservoir are the main factors which cause the heterogeneity of the reservoir. Single sand body thickness, porosity, permeability and so on are the main controlling factors of heterogeneity.To the reservoir properties, the single sand body vertical impermeable interlayer is the controlling factors of reservoir heterogeneity.

The development factors mainly include: the imperfection of the injection production system, the injection production relation and the well pattern, the production dynamic and so on. The remaining oil enrichment areas affected by the dynamic factors of production are: water injection diversion area, the second line area of water injection, the production well net and the well control reserves of single well. These well areas are mostly high yielding areas, but they have a great influence on the human factors.

### Emaining oil types and control factors

**Residual oil of poor reservoir(Fig. 1,Fig. 2)**

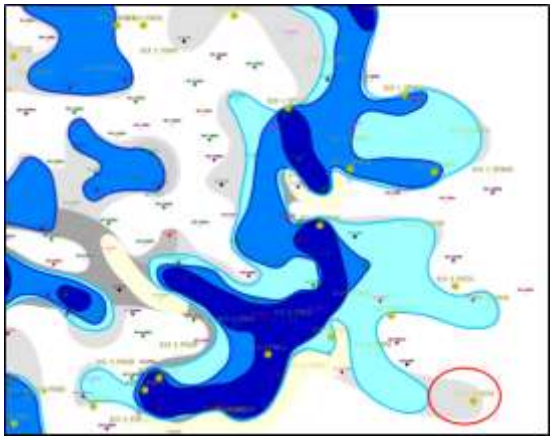

**Fig. 1Residual oil of poor reservoir**

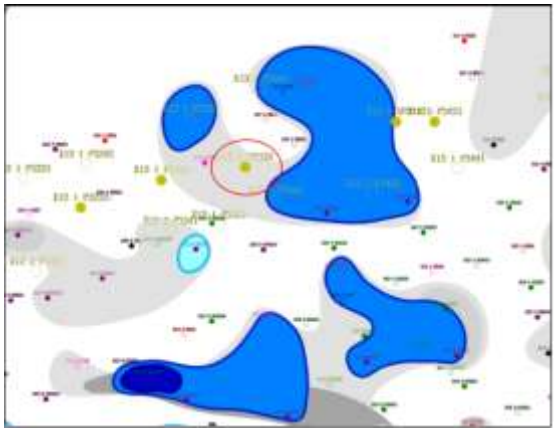

**Fig. 2Residual oil of poor reservoir**

Thin reservoir, poor physical property, although the distribution area is large, the original well pattern injection production is not perfect, but due to the large well spacing, the use of bad or not to use and formation of Residual oil of poor reservoir.

X12-2-SP3733, X12-1-P3332 well not flooded, belong to poor oil layer, injection production is not perfect.

Control factors: the change of physical property control the remaining oil, the plane and vertical physical changes affect the flow characteristics, thereby affecting the distribution of remaining oil.

**Building structure block type remaining oil(Fig. 3)**

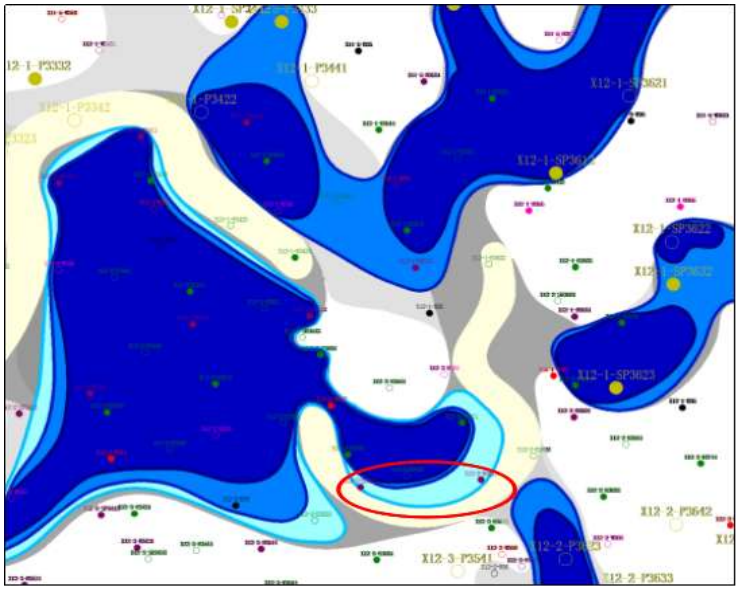

**Fig. 3Building structure block type remaining oil**

X12-2-B3521, X12-2-B3611 well affected by the impact of building structure, flooded condition is low.

Control factors: because the lateral accretion block controlling the remaining oil, water injection by diagonal sandwich occlusion, the remaining oil in the upper part of the relative enrichment.

**Abandoned channel block-based oil(Fig. 4)**

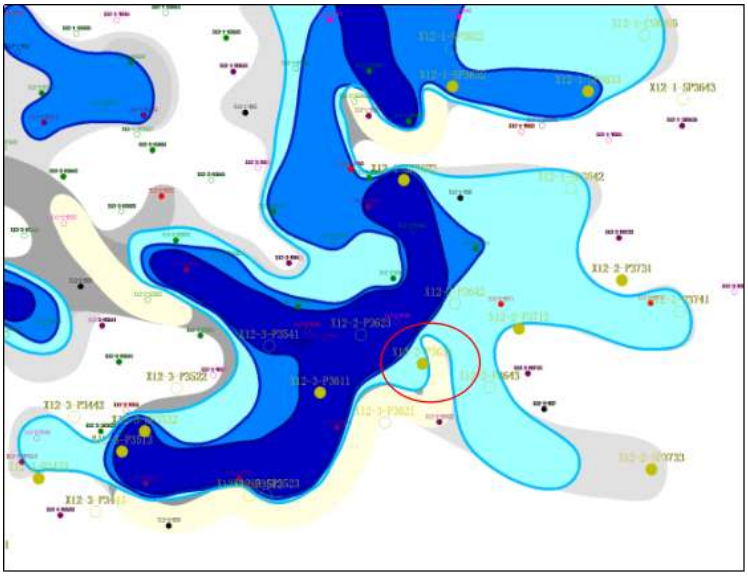

**Fig. 4Building structure block type remaining oil**

Recognition of abandoned channel is an important achievement in the research of the plane micro phase of the time unit. One is to reveal the general nature of abandoned channel, because in the past has not yet identified the abandoned channel in the rivers single sand body. Two, it is revealed that the abandoned channel has a great influence on the formation of remaining oil in the sand body. It has a certain and even serious blocking effect to the channel sand body and also has important influence on the connectivity of the single sand body, the direction of water drive oil and the formation of the remaining oil.

X12-2-P3633 well is located on one side of abandoned channel, the obvious low water flooded, only one direction of water injection and the other direction of water injection are covered by abandoned channel.

Control factors: Abandoned channel block and control the remaining oil, abandoned channel sand body play a certain role in the sand body and has an important impactto the single sand body connectivity, water drive oil direction, the formation of residual oil.

**Residual oil with variable difference of channel boundary(Fig. 5,Fig. 6)**

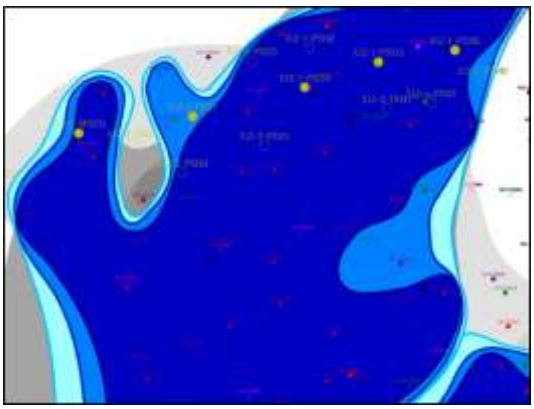

**Fig.5Residual oil with variable difference of channel boundary**

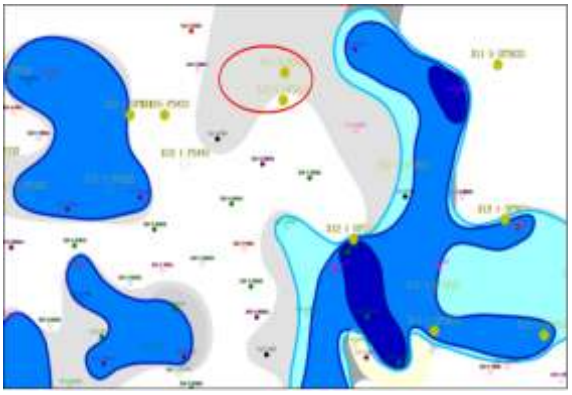

**Fig.6Residual oil with variable difference of channel boundary**

In the side of the river, the sand body of river channel is changed to the mudstone and pointed out. When the drilling from the channel sand body pinchout line of tens of meters, or even hundreds of meters, between the channel sand body pinchout line and well, easy to form abundant remaining oil,especially when drilling for oil production well.

X12-1-B3221 well is not flooded, X11-5-B3522 wells for low water flooding, mainly because of the river side injection is not perfect physical deterioration, pressure relief capability is not strong, resulting in the injection of water is difficult to achieve, the remaining oil more.

Control factors: the remaining oil is controlled by various micro phase boundary, the micro phase boundary plays the role of the percolation barrier and the residual oil is mainly concentrated in the vicinity of the boundary seepage barrier.

**The advantage of remaining oil seepage channel shielding type(Fig. 7)**

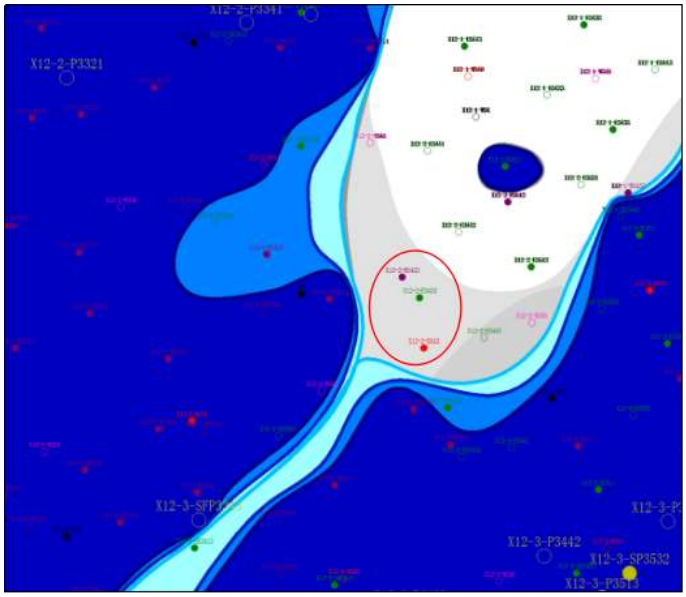


**Fig. 7 The advantage of remaining oil seepage channel shielding type**

Due to the shielding effect of the advantages of the flow passage, the boundary of the advantage seepage channel becomes the boundary of fluid flow. The remaining oil is formed in the side of the advantage of the seepage channel, which is caused by the injection of non mining or non injection.

X12-2-B3422, X12-2-E3433 and X12-2-B343 wells are not flooded,mainly because the three wells where the sand body is not very developed, In addition to the surrounding sand body is the sand body development,sand body development permeability is relatively high,migration channels have an advantage over the area where the sand bodies are not developed.

Control factors: permeability difference control remaining oil,the distribution of residual oil in the reservoir is controlled by the difference of permeability in the sedimentary units. This result in uneven distribution of remaining oil; plane permeability difference, the formation of high permeability channel, relatively low permeability area is easy to form the remaining oil.

**Distribution of remaining oil**

Six sedimentary time units in the study area, because there are five times of the well net water injection, the study area sand body and more development, so the water flooded degree is very high. Most areas are flooded, so the distribution of remaining oil is small. The remaining oil is mainly distributed in three parts. 1.Both sides of the river channel and abandoned channel are the remaining oil distribution and enrichment area (without pressure relief channel and occlusion).2. Interior of point bar: middle and upper enrichment.3.The relative enrichment of remaining oil in the sand part of the river overflow.

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