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Fulin Subsag Palaeogene Depth Layer Sedimentary System Research and Oil-Gas Exploration

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Fulin subsag in the south of Zhanhua sag in Jiyang Depression, east-west clamping between in Kendong arch and Chenjiazhuang arch, north to Kenley fault zone and Gunan sag. Fulin subsag deep Oil and gas resources is rich, has now proven Oil bearing area of 16 square kilometers, proven Oil geological reserves of 30 million tons, It is the Shengli Oil Field exploration favorable position. However, ten years from 1996 to 2006 Fulin subsag oil-gas exploration breakthrough, analysts say Mesozoic unconformity surface, deep strata layered unknown understanding unclear, favorable reservoir facies belt not sure, is the oil-gas without a major breakthrough in the exploration of the main factors.

Facing structural trap has been basically proved and Fulin subsag only Es~3 Lower sub-member of the actual situation of a set of effective hydrocarbon source rocks in Fulin subsag palaeogene the depth layer Es~3 Lower sub-member inside this birth, reservoir and caprock, find out the sequence framework in the space-time distribution of sedimentary system, determine the advantageous reservoir facies belt, combined with the analysis of hydrocarbon accumulation conditions, looking for Structure-lithology and lithologic reservoir, is a clear direction on exploration in the study area.

Recognition of Fulin subsag Mesozoic unconformity surface

Mesozoic unconformity surface sequence is important in the study area, the main purpose of a layer of bottom interface, it is important to petroleum oil and gas layer, the Fulin subsag Mesozoic unconformity surface understanding is of great significance.

Wells reveal that Fulin subsag T6 under deep reservoir sand body development is thinner, the most thick place Fu 112 Wells, FuXie 151 Wells only 50 meters of sand layer, and the occurrence of strata is very thin (60~190 m). Due to the thin stratum, the determination of stratigraphic system interface is very important. Purpose layer top interface Es - 3 Lower sub - member oil shale period of stability in the region. The bottom of Mesozoic unconformity surface sure become the important basis of the research.

Comprehensive study found Fulin subsag Mesozoic unconformity surface lithology layered characteristics significantly, andesite weathering, leaching shape feature, the sedimentary formation environment, lithology changes and unconformity surface weathering leaching erosion characteristic, the corresponding unconformity surface logging curve characteristics significantly, Mesozoic unconformity surface lithology layered characteristics and well logging curve characteristics become the unconformity in the study area the important means of surface recognition, the precision is greatly improved. Fu 9 Wells core observation to determine the Mesozoic unconformity surface, it is of great significance, makes the troubled oil - gas exploration of FuXie 151 Wells, Fu 17 Wells of reservoir sand body source supply problems resolved, southern Chenjiazhuang arch, Kendong arch junction source direction is clear.

Redrawing of the Deep formation

Through sequence framework division and stratigraphic correlation, sedimentary environment analysis and stratigraphic paleontology analysis appraisal, Fulin subsag T6 to deep Mesozoic unconformity surface between TR formation can be divided into Es - 3 Lower sub-member and Es - 4 member formation, rather than to simply the Es ~ 3 Lower sub - member stratum, exploratory well reveal Fu 9 Wells-FuXie 151 Wells - Fu 17 Wells line for Es - 4 member reservoir, Fu 112 Wells to Fu 112 Wells in a line for Es - 3 Lower sub - member reservoir.

Es - 3 Lower at the bottom of the sub - member formation characterized by obvious high resistivity formation, performance for oil shale depositional environment and logging curve characteristics, contrast good marks. Es - 4 member formation in Es 3 Lower sub - member oil shale section and high resistivity and Mesozoic strata unconformity surface between the TR, characterized by low resistivity formation, and Es - 3 Lower sub member and Mesozoic high resistivity

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formation characteristic of difference is obvious. Es - 3 Lower sub - member stratigraphic rich fossils, Fu112 Wells (2860.5 m), Fu115 Wells (3060.8 m), Fu19 Wells (3112.6 m) Es ~ 3 member stratum, Es - 3 member Ostracoda visible index fossil Huabeinia obscura Ostracoda, with Es - 3 the Lower sub member - typical of the sporopollen fossil assemblage. Es - 4 member fossil formation characteristics significantly, Fu15 Wells (3105.2 m) core member in see Es - 4 index fossil Houchangjinxing Ostracoda, member with Es - 4 sporopollen assemblage characteristics. Fu 19 Wells (3268 ~ 3270 m) see a full member Es - 4 core index fossil Guanghuananxin Ostracoda.

Lithology characteristics, the logging curve characteristics of stratification and the seismic reflection characteristics together, combining with the depositional environment analysis and stratigraphic paleontology analysis appraisal, makes the sequence framework in the study area stratigraphic correlation and sedimentary system accuracy is greatly increased, for oil - gas exploration work provides a powerful guarantee.

Sedimentary system research of Deep formation in Fulin subsag

Fulin subsag is located in the eastern Zhanhua sag, belongs to the Jiyang 'Zhanhua sag of a secondary sub-sag. North near Kenley fault zone, the east in Kendong fault and Qingtuozi arch is bounded, southwest of Chenjiazhuang arch. Of the Fulin subsag deposits, especially in early deposition obviously controlled in Kenli and Kendong two directions syngenetic fault activity and the impact of the existence of Chenjiazhuang palaeohigh.

Based on multi-port core observation of Wells in the study area, cooperate with logging curve characteristics, sand body morphology distribution and thickness variation, comprehensive analysis and research of seismic reflection characteristics, correct the past think Fulin subsag mainly development subaqueous fan and turbidite fan in the error view, think in the palaeogene in the depth layerEs - 4 member the main development of the 3 types of sedimentary facies, braided river delta, shallow lake and shallow lake sedimentary facies types, littoral and shallow lake dam; Es - 3 Lower sub - member mainly developed the 2 types of sedimentary facies, fan delta, semi deep lake - deep lake sedimentary facies types, etc.

Es - 4 member fault activity is weak, the lake basin sedimentary period, mainly shallow lakes sedimentary environment: Fu9 - and Fu151-Fu17-Fu19 Wells area in south slope, southwest Eastern - subsag margin - braided river delta and shallow lake sedimentary combination, early development type water, underwater braided river delta plain river coarse clastic sediments, late show is poor provenance closed shallow lake sedimentary characteristics.

Es - 3 Lower sub - strong fault activities member sedimentary period, the lake basin is deeper, give priority to with deep-water lakes sedimentary environment: Es - 3 the Lower sub member sedimentary early fu111 - fu112 - Fu115 Wells area Kenli buried hill, medi - subsag area developed fan delta, half deep-water sedimentary assemblage, bottom-up general performance of fan delta plain, fan delta front of retrogradation type combination; Es - 3 Lower sub - member late sedimentary deep-water sedimentary combination, oil shale development.

Oil - gas exploration practice

Based on research results, from 2007 to 2011, successively obtains the Fu112 Wells Old well test is successful, Fu115 Wells Es ~ 3 Lower sub - member target oil reservoir, Fu112 block rolling exploration gradually expand, Fu25 Wells Es ~ 3 Lower sub - member reservoir sand body test success, and a series of good application effect, direct economic benefits of more than 300 million. Research findings and the formation of the technical means of Fulin subsag deep oil - gas exploration has important practical significance, the research achievements in the study area for the exploration and the rolling exploration and application in production and development in good condition, for the oil - gas exploration breakthrough to lay the solid foundation of the Zhanhua sag and Jiyang 'in other parts of the oil - gas exploration and production and development also has guidance and reference significance.

Conclusion and understanding

(1) The re-determination of Mesozoic unconformity surface is of great significance, not only clear the supply deeper source direction, and unconformity surface recognition accuracy is greatly improved;

(2) Depositional environment analysis of paleontology analysis appraisal corrected before deep strata layered recognition, clear Wells reveal reservoir of Es ~ 3 respectively Lower sub - member reservoir and Es - 4 member reservoir, including Es - 4 member along Fulin subsag southern slope developed braided river delta sedimentary system, Es - 3 Lower sub - member Kenley fault zone Kenli buried hill thick fan delta deposition of peripheral development, has been clear about the study area is the most favorable reservoir facies belt;

(3) Based on research results, nearly four years has made the rich wealthy 112 piece, and $112, 25 pieces and a series of good application effect of exploration and development, for the whole of Jiyang 'exploration area of oil - gas exploration and production and development also has important guiding significance.

Key words: Jiyang Depression, fulin subsag, lower third sub-member of the Shahejie Formation, palaeogene depth layer, sedimentary system, oil-gas exploration