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Petroleum Geology of the Western Ust-Yurt Basin, Republic of Kazakhstan

Introduction

The Ust-Yurt basin occupies a triangular shaped block tucked against the southeastern margin of the large Pre-Caspian basin in Western Kazakhstan. Several giant fields are currently producing in the basin but it remains relatively unexplored despite developed pipeline infrastructure and active foreign ventures.

The western Ust-Yurt basin lies adjacent to and partially within the North Caspian Sea. The North Caspian is currently one of the world's most exciting new oil provinces, where billions of barrels have apparently been discovered at Kashagan East.

Infrastructure

Existing pipeline infrastructure was built in the 1970s to transport crude from giant fields on the Buzachi arch and South Mangyshlak. This existing pipeline system is insufficient to handle the production of Tengiz field and anticipated discoveries in the Caspian. The Caspian Pipeline Consortium (CPC) is building a pipeline that will move Western Kazakhstan oil to export on the Black Sea.

Structural Setting

The Ust-Yurt block is adjacent to the larger Pre-Caspian basin. It has been subjected to numerous collisions and stresses throughout the late Paleozoic, Mesozoic and Tertiary as continental blocks accreted to form modern Asia. The Buzachi arch, a broad uplift in the western Ust-Yurt basin, contains the bulk of the basin's known petroleum reserves. The Ust-Yurt basin deepens to the east and is largely unexplored.

Stratigraphy

The known stratigraphic section consists of Triassic clastics which lie unconformably below a transgressive Jurassic section. Jurassic fluvial, deltaic and marginal marine deposits are the important reservoirs throughout the area. The Uppermost Jurassic/Lower Cretaceous carbonates and evaporites form a regional seal for petroleum accumulations. The Cretaceous is predominantly marine and marginal marine sandstones, shales, and chalks.

Source Rocks

Little is known of source rocks in the Ust-Yurt basin. Geochemically, several important oil families are recognized including a carbonate source rock kitchen within the Pre-Caspian basin and a clastic source rock kitchen in the North Ust Yurt trough.

Trap Styles

Fields on the Buzachi arch and the North Caspian fold and thrust belt are typically structural with multiple sandstone pays within the Jurassic. Some fields exhibit a high-degree of faulting, while low relief drape structures are typically unfaulted or have minimal faulting. Kerr-McGee's Arman field is an example of a wrench fault updip seal for multiple Jurassic pays.

Prospectivity

The North Caspian and shallow waters in Mertvyi Kultuk are poorly explored due to the high cost of access and stringent environmental regulations. The first well drilled in the North Caspian Sea was Ostrovnaya #1, drilled in August 1998 by Oryx Energy. This well was drilled on an artificial island, constructed at high cost and resulted in a subcommercial (30-50MMBO) accumulation. Even more expensive is Kashagan East where drilling costs are expected to exceed several hundred million dollars.

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The largest prospective feature we have mapped is a large, low relief structure in the North Ust-Yurt trough named Salkenskaya, which covers more than 30,000 acres and has more than 100 meters of vertical closure. Drilling is anticipated in 2001.

Biographical Sketch

Kurt Reisser is an exploration geologist in the International Exploration Department of Kerr-McGee Oil and Gas Corporation in Houston, Texas. He has worked for Kerr-McGee since 1999 when it merged with Oryx Energy Company.

Kurt began his career with Exxon Company USA in New Orleans in 1976 as a production geologist. He joined Getty Oil Company in 1979 in Denver, Colorado as an exploration geologist working Wyoming and Colorado. In 1981 he joined Sun Exploration Company in Denver and concentrated on western Wyoming. He is credited with the discovery of Lucky Ditch field in 1985 on the South Moxa arch for which the Rocky Mountain Association of Geologists awarded him their Explorer of the Year award in 1988. In 1986 he was transferred to Dallas as geological manager for various western U.S. districts.

In 1989 Sun Exploration became Oryx Energy Company. He joined their New Ventures group in 1991 and began actively working on Kazakhstan and former Soviet Union projects. He moved to Houston last year after the merger with Kerr-McGee and now works Yemen and China in addition to Kazakhstan.

He has a B.A. degree in geology from the University of Colorado, Boulder and an M.S. degree in geology from the University of Nebraska, Lincoln. He is an AAPG Certified Petroleum Geologist and a member of the Houston Geological Society. □