GEOLOGICAL RESERVOIR CHARACTERIZATION OF KOSHILSKOYE OIL FIELD (WESTERN SIBERIA, RUSSIA)

by

Anna A. Fursova

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 – 1346

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Signed: _____
Anna A. Fursova

Approved: _____
Dr. Roger M. Slatt
Thesis Advisor

Golden, Colorado

Date 9/3/97

_____
Dr. Roger M. Slatt
Professor and Head,
Department of Geology and
Geological Engineering

ABSTRACT

The initial geological model of the Koshilskoye Oil field in 1995 described the reservoir units of the Koshilskoye field as uniform, laterally continuous strata, which are homogeneous in terms of reservoir properties distribution. However, production of this field appeared to be too low for the established geological characteristics, even after waterflooding had begun.

This study was designed to analyze the reasons for this low production and to help optimize the recovery efficiency through improved reservoir characterization. To accomplish this, a detailed stratigraphic framework was developed by means of analysis of 10 stratigraphic cross-sections and 6 isopach maps constructed for the individual and composite units. This allowed the identification of facies deposited during Late Jurassic transgressive events, represented by meandering fluvial sandstone (Yellow-Blue horizon - base of the section), coastal plain distributary channel sandstones (Bazhenov-Pink Horizon), and marine shale (Bazhenov Formation - top of the section).

The structure was determined through analysis of 23 structural cross-sections, a structural map and available production data (DST, oil/water production, and mercury injection tests). As a result, Koshilskoye field is considered to be structurally

compartmentalized. Structural compartmentalization is controlled by the regional tectonic trend (north-south rifting) and lithological differentiation influenced by deposition.

Structural and stratigraphic compartmentalization controls the reservoir geometry as well as reservoir volume and reservoir fluid distribution. Faults make the reservoir unit of Koshilskoye Field heterogeneous with regard to fluid flow as evidenced by: (a) different positions of the oil-water contact (OWC) in individual fault blocks and (b) poor response of production wells to injection, especially in the directions perpendicular to the structural trend.

Analysis of facies and reservoir properties distribution, structural compartmentalization, aspects of the water drive mechanism, the positions of the OWC, and dimensions of a transition zone all helped to estimate the realistic production potential of this field and to develop criteria for optimizing the existing development pattern. Water injection wells should be placed to maximize the south/southeast-north/northwest optimal fluid flow pathway identified from this study.

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