OTC 18975

RSS Application From Onshore Extended-Reach-Development Wells Shows Higher Offshore Potential

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This paper was prepared for presentation at the 2007 Offshore Technology Conference held in Houston, Texas, U.S.A., 30 April–3 May 2007.

Abstract

During drilling of more than 600,000 feet of hole in some 100 horizontal wells in the Alpine Field of Alaska's North Slope, a "matched" rotary steerable system (RSS) delivered performance increases in intermediate 8-1/2" hole, with additional technological advances leading to introduction of 8-3/4" RSS drilling. Initial success in the intermediate section led to application of 4-3/4" RSS tools and 6-1/8" extended-gauge box-up bits in horizontal sections of these wells, continuing what has been "step change performance" since introduction of RSS to the Alpine Field, and demonstrating significant potential for offshore application.

Introduction

With nearly one million feet of hole drilled in North Slope wells using matched point-the-bit RSS/extended gauge drilling technology, application of rotary steerable drilling techniques in remote Alpine Field development wells provides the means to successfully achieve extended reach profiles, including several record slimhole horizontal lengths. Extended lateral lengths increase reservoir exposure and in this case, have proven up additional reserves in an Alpine Field satellite drill site currently being developed.

In addition to enhancing development of new reserves with fewer wells and smaller footprints, utilizing RSS to drill extended reach lengths can improve production, increase reserves of existing fields, and enable development of marginal fields made economically feasible with current higher commodity prices. In this respect, the technique offers significant advantages for offshore application.

In addition, this remote location required extreme environmental sensitivity as well as presenting unique logistical challenges analogous to offshore drilling, where existing platforms may dictate hole size and equipment limits as well.

For example, there are 16 existing platforms in the Cook Inlet, Alaska where this technology may find application. The RSS work being completed at Alpine currently uses smaller hole sizes than some deep water applications. These smaller RSS tool sizes have applications and limitations in offshore environments.

Background

Declared commercial in 1996, the Alpine discovery was the largest onshore oil field discovered in the United States in more than a decade. The western-most producing oil field on Alaska's North Slope, Alpine Field is located in the Colville River area, 34 miles west of the Kuparuk River field near the border of the National Petroleum Reserve-Alaska.

The discovery well was drilled in 1994 and production is from the upper Jurrasic Alpine sands **(Fig. 1)**. The source rock for the recoverable is believed to be the Kingak Shale.

The remote location required development of the 40,000-acre Alpine oil accumulation to meet strict environmental challenges, including keeping surface facilities to just 97 acres, or two-tenths of one percent of the field area. In addition, the small "footprint" of the site limits the area available for stockpiling materials.

With no permanent roads to the site, transportation of equipment and drilling supplies requires ice roads to be constructed during the winter and allowed to melt in the spring. In addition, because the site is a near zero-discharge facility, all generated waste must be reused, recycled or disposed of properly.