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Specialized AC Drilling Rig for Arctic Offshore Drilling Applications

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Abstract

An 18-month modification was recently completed on Nabors Alaska Rig 19E in preparation for drilling operations on the Oooguruk Island development. The rig was converted from a conventional DC electric SCR power system to an AC electric VFD (variable frequency drive) system with enclosed driller's cabin and PLC (programmable logic controller) control system leading to redesignation of the rig as 19AC. The rig moving system was also converted from a conventional arctic wheeled truck-pulled system to a hydraulically-operated walking beam system. This revolutionary yet proven rig mobility system is ideally suited to small footprint and space-limited development programs.

Rigs of the 19AC variety can be utilized wherever pad size limitations demand a drilling rig with a small footprint that can cantilever over and drill wells on very close (7 foot) well centers. Fiberglass insulated windwall panels and fully enclosed working spaces with steam and forced air heat make this rig uniquely suited for operation in arctic environments.

The conversion of Nabors Alaska Rig 19E to Rig 19AC has produced a drilling rig of greater flexibility and potential. The AC powered drilling rig operates on supplied utility power generated by shore-based gas turbine engines which provides a source of reliable power and serves to reduce diesel emissions. The rigs versatile moving system has a proven record of reliability in arctic environments and locations where subsidence of the drilling surface may require the rig to self-level.

As the technology of drilling progresses to keep pace with the need for oil and gas production in increasingly environmentally sensitive areas, drilling rigs with the ability to drill on very close well spacings over fully enclosed well bay modules will be required. Small footprint, high mobility, and the efficiency of AC power systems will be the hallmark of these drilling rigs.

Introduction

In late 2005, Pioneer Natural Resources Alaska contracted Nabors Alaska Drilling Rig 19E to perform drilling and completion services on their Oooguruk Island prospect in the Beaufort Sea. Fulfillment of these services in a challenging offshore, arctic environment would require a drilling rig with special characteristics and capabilities. The very nature of drilling wells in a somewhat remote island setting with indeterminate periods of limited logistical access requires a drilling rig that provides improved occupational safety and reduced risk to the environment coupled with enhanced rig operational efficiency. Hookload and setback requirements have to be met as well as pumping and solids control specifications. The rig power system must be able to operate in conjunction with the islands utility power. As with any island drilling operation, space is at a premium and the rig would be required to perform the work while configured in the smallest possible footprint. The limited island size also dictates close well spacings which the rig will be required to accommodate. The unique rig moving system is required to safely and efficiently move the rig from well to well and from one side of the well bay modules to the other. The moving system accomplishes these moves while supporting the rig with full pits, setback and pipe shed load over gravel terrain that may be uneven or experiencing extreme subsidence. Nabors Alaska Drilling was required to modify the rig in order to meet all these specialized requirements, transforming Rig 19E to Rig 19AC.