Unique Yastreb rig drills Sakhalin-1 ERD wells

Parker Drilling Company designed and built the largest and most powerful land rig in the world – the one-of-a-kind Arctic-class Yastreb (Russian word for hawk) that has drilled near-record wells for the Sakhalin-1 project's extended-reach drilling (ERD) program. Parker Drilling constructed the rig for the Sakhalin-1 consortium and continues to operate it under a five-year operations-and-maintenance contract.

Additionally, the consortium awarded Parker Drilling a five-year contract to operate and maintain the Orlan drilling and production platform offshore Sakhalin Island. A fully automated, fifth-generation rig was built in South Korea and installed on the Orlan for drilling ERD wells. Parker Drilling supplied a significant number of personnel during construction and was also involved in the rig's commissioning and delivery in the summer of 2005.

These contracts and others are part of the company's global operations and maintenance (O&M) business, with O&M contracts in Kazakhstan, China (which also involves ERD wells) and New Guinea. In addition, the company is growing its ERD expertise and building on its strong reputation for drilling in harsh Arctic environments, including the northern Caspian Sea in Kazakhstan and Alaska as well as Russia's Sakhalin Island.

The Yastreb rig is shown in 2002 near the end of the construction phase in New Iberia, Louisiana. Parker Drilling designed, contracted construction and completed the rig in 18 months.

Near-record ERD wells

Parker Drilling not only overcame design and environmental challenges but also met the challenges of drilling ERD wells that exceeded total measured depth of 11,000 meters (36,000 feet). The Yastreb is earthquake-resistant and capable of operating in temperatures of -40 C (-40 F). The horizontal reach of the wells improves productivity of the Chayvo field's Miocene formations while avoiding disturbing Western gray whale migrations.

The Yastreb has drilled near-record total-measured-depth wells, including seven of the world's top 15. The longest drilled by the Yastreb is 11,134 meters (36,529 feet), with a horizontal section of 10,088 meters (33,098 feet). Total vertical depths are up to 2,600 meters (8,530 feet).

Fast-track construction

Parker Drilling designed, contracted construction and completed the Yastreb in 18 months. Final assembly and commissioning occurred in June 2002 in New Iberia, Louisiana. The rig was then disassembled, crated in cargo packages and shipped on three cargo vessels to the port of Korsakov on Sakhalin Island, arriving in early August. From Korsakov, the containers were transported via barge, rail and truck to the well site on Chayvo beach through the fall and winter. Rig up and commis-

The Yastreb's first extended-reach well was initiated on August 8, 2004, and drilled to a vertical depth of three kilometers and a horizontal reach-out of 10 kilometers.

Drillers use the Yastreb's cutting-edge technology to steer the bit and measure progress while drilling. The data are transmitted to the driller on the floor, rig offices and Parker Drilling's Houston office. Drilling engineers on site and remotely can view the data and analyze drilling performance in real time.

sioning began in the spring of 2003 followed by drilling start-up in June.

Russian nationals performed more than 80 percent of the rig-up work and commissioning. Parker Drilling's Russian-national employees also comprise more than 80 percent of the Yastreb's operations crew of 135.

Key components

The Yastreb's key design components include a fully enclosed drilling rig, automated pipe barn with guillotine door, and double-wall, 2-inch insulation. The enclosed rig and pipe barn allow the rig crew to perform drilling operations in temperatures of around 21 C (70 F) year around.

The rig's mast features a 1.5 million-pound hook-load capacity, 3,000-hp drawworks and a top-drive drilling system. To handle the extremely long wells, the Yastreb also features four 7,500-psi mud pumps, 9,000-barrel liquid-mud storage capacity and six generators.

The pipe barn, measuring 40 meters by 41 meters (130 feet by 134 feet), has a 7-meter (23-foot) internal height. Stands of drill pipe and casing up to 20-inches in diameter and 30 meters (98 feet) in length are made up and racked horizontally in the pipe barn instead of the derrick as a safety precaution against earthquakes.

The Chayvo field ERD wells are batch-drilled for efficiency. This drilling method requires moving the rig from well to well over a 100-meter (328-foot) track without being rigged down. Consequently, the rig was designed so that the rig and support equipment and facilities, including the utility modules, mud pits and pipe barn, could be moved hydraulically from one wellhead to the next.

After rig up of the Yastreb, a cuttings-injection well was drilled followed by batch-drilling of the 30-inch casing sections for the remaining wells. When the final 30-inch casing was set, the rig and drilling-support packages were repositioned over the field's first well to commence ERD operations.

Real-time data

Such long horizontal wells require as much information as possible to be transmitted to the driller in order to efficiently and safely drill the near-record-depth wells. During drilling, progress-measurement data are relayed simultaneously to the driller on the rig floor, to rig offices at the well site, and to Parker Drilling's Houston offices. Drilling engineers on site and remotely can view data and analyze drilling performance in real time, significantly increasing drilling efficiency and rig performance during each well.

Additionally, the top-drive drilling system, diesel engines and other equipment can transmit real-time data to external locations for evaluation of maintenance issues and recommendations for corrections or repairs.