

Single-Trip, Integrated Rathole Elimination BHA Drills Wells 7.5 Days Ahead of AFE, Offshore Sakhalin

World's first deployment of PowerDrive RSS with the Rhino XS2 reamer eliminates rathole cleanout run and optimizes openhole gravel-pack completions

CHALLENGE

Drill and complete two reservoir sections in a tight time frame due to seasonal constraints.

SOLUTION

Deploy Rhino RHE* dual-reamer rathole elimination system with PowerDrive X6* 675 rotary steerable system (RSS), high-speed MLWD tools, and a Smith Bits MDi616 PDC drill bit to perform multiple operational steps using a single BHA.

RESULTS

- Delivered two wells 7.5 days ahead of AFE.
- Expanded 8½-in × 10¼-in hole section in one run for two wells.
- Drilled and reamed 522-ft interval of Well 1 at an average ROP of 65.6 ft/h while maintaining a 45° inclination.
- Drilled and reamed the 469-ft interval of Well 2 at an average ROP of 60 ft/h.
- Reduced 138-ft rathole to just 23 ft, eliminating dedicated rathole cleanout run.
- Optimized openhole gravel-pack completions by minimizing solids generation from reamers during backreaming.
- Cut operational costs by USD 600,000 on two wells.



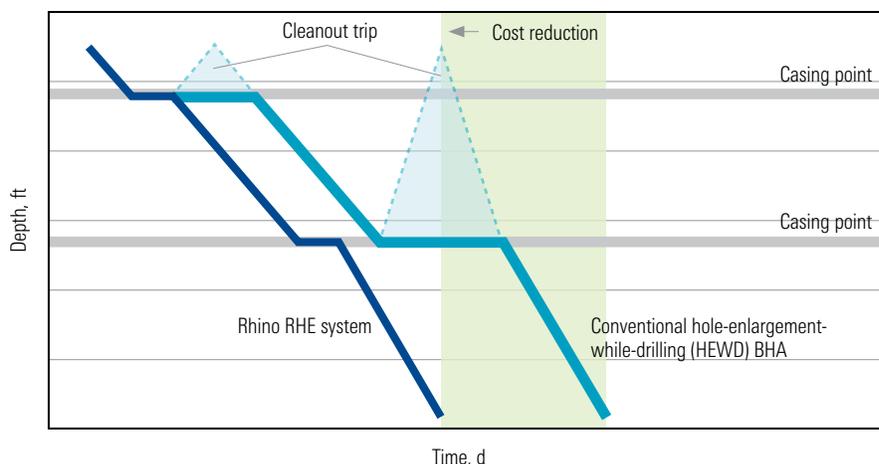
Optimize hole enlargement while drilling

Sakhalin Energy Investment Company Ltd. (SEIC) was planning its first openhole gravelpack completions program for sand control offshore Sakhalin. Because the sea often freezes during the winter, SEIC needed to drill and complete two reservoir sections during the short summer months—before supply vessels could no longer operate.

SEIC partnered with Schlumberger for a detailed drilling and contingency program. After saving more than 20 hours on the first well, SEIC wanted to reduce time and costs while drilling the 8½-in × 10¼-in section of the second well. In addition to greater operational efficiency, SEIC required a 45° inclination with minimal tortuosity, accurate LWD measurements not more than 49 ft behind the bit, and a solids-free environment for openhole gravel-pack operations.

Customize a first-of-its-kind BHA

Schlumberger and SEIC performed a joint peer review of the sequence of operations, including the fluids program, which revealed that to maintain a solids-free environment, both reamers had to be closed after underreaming. To address this, SEIC agreed to deploy Rhino XS2* full-cycle expandable reamer, a double-ball drop system, so a second ball could be dropped to close the reamer after underreaming-while-drilling operations. This would prevent any additional cuttings generation from an open reamer while backreaming the enlarged hole, for risk-free backreaming inside the 9⅝-in liner and 13⅜-in casing.



The Rhino RHE system is able to eliminate cleanout trips, drill faster, and reduce costs compared with wells drilled using conventional BHAs.

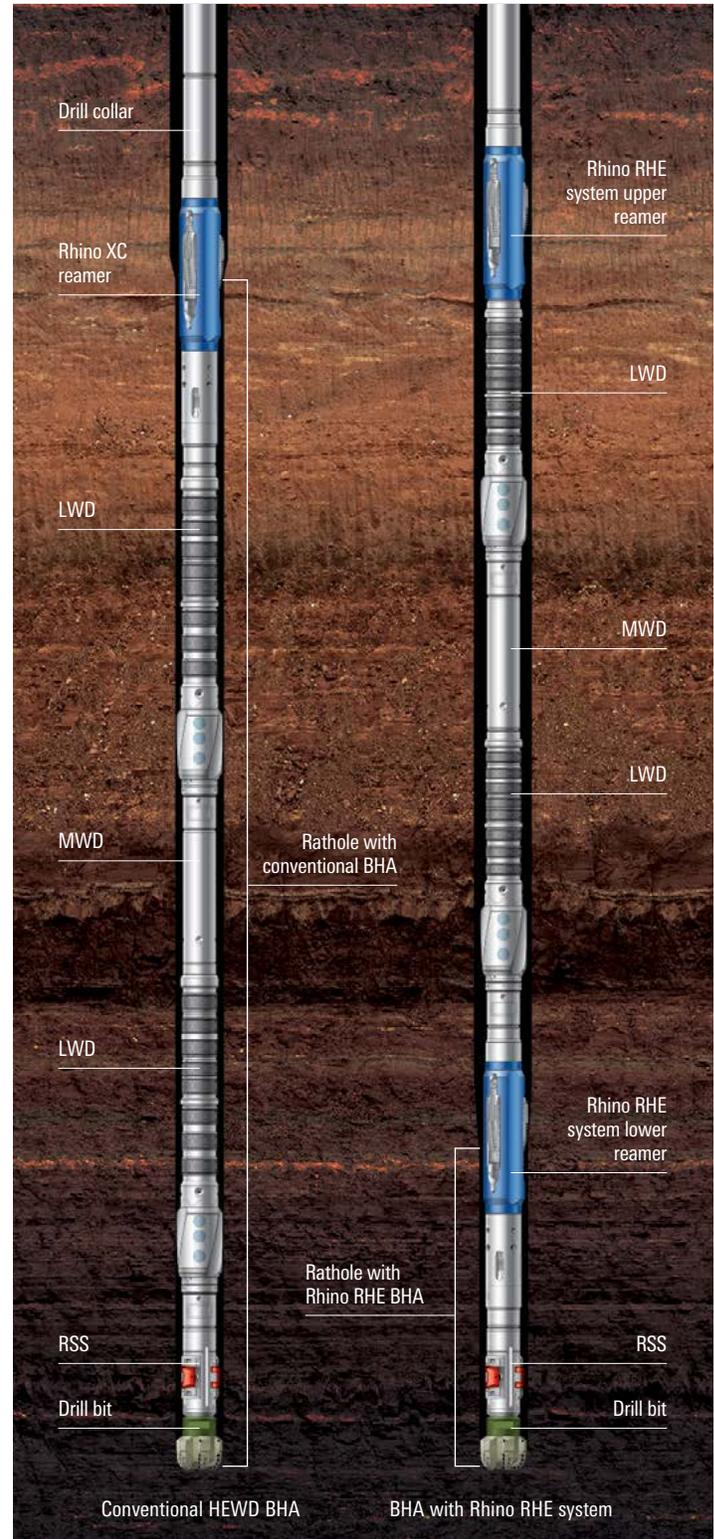
CASE STUDY: Integrated rathole elimination BHA drills well 7.5 days ahead of AFE, offshore Sakhalin

Using the IDEAS* integrated dynamic design and analysis platform, Schlumberger drilling experts compared more than 24 BHAs before customizing a design that would minimize shock, vibrations, and differential sticking while drilling through alternating lithology. The final BHA successfully addressed all the risks identified by the drilling, subsurface, and completions teams—enabling multiple operational steps to be performed with a single BHA. The engineered drillstring included a Rhino XS2 full-cycle expandable reamer run above the MLWD tools, PowerDrive X6 675 RSS, a near-bit Rhino XC* on-demand hydraulically actuated reamer, and a MDi616 PDC drill bit from Smith Bits, a Schlumberger company, to match the reamer cutters. This marked the world's first rathole elimination job to use PowerDrive RSS with the Rhino XS2 reamer.

The push-the-bit PowerDrive X6 675 RSS provided precise directional control through its closed-loop, inclination-hold feature, enabling SEIC to maintain a 45° inclination with no additional corrections. Once the BHA reached target depth, Schlumberger activated the lower Rhino XC reamer—reducing the rathole length from 138 ft to just 23 ft. Throughout drilling operations, EcoScope* multifunction logging-while-drilling service† and TeleScope* high-speed telemetry-while-drilling service provided accurate, real-time MLWD data. With a full suite of formation evaluation measurements in one collar, SEIC was able to characterize the formation, enhance directional control, verify underreaming, and assist completions by determining the volume of proppant required.

Eliminated cleanout run, delivered well 7.5 days ahead of AFE

Applying lessons learned from the first well, Schlumberger and SEIC successfully used the dual-reamer BHA configuration to drill and ream the challenging 469-ft interval of the second well at an average ROP of 60 ft/h. SEIC enlarged the hole from 8½ to 10¼ in one run—eliminating the need for a separate, time-consuming rathole cleanout run. The integrated drilling system saved SEIC a total of 60 hours, delivering the two wells 7.5 days ahead of the AFE. These drilling efficiencies reduced operational costs for both wells by more than USD 200,000 and USD 400,000, respectively.



The dual-reamer BHA enabled SEIC to drill and enlarge the wellbore while reducing rathole length by 83%—eliminating the need for a dedicated cleanout run.

*Mark of Schlumberger
Other company, product, and service names are the properties of their respective owners.
†Japan Oil, Gas and Metals National Corporation (JOGMEC), formerly Japan National Oil Corporation (JNOC), and Schlumberger collaborated on a research project to develop LWD technology that reduces the need for traditional chemical sources. Designed around the pulsed neutron generator (PNG), EcoScope service uses technology that resulted from this collaboration. The PNG and the comprehensive suite of measurements in a single collar are key components of the EcoScope service that deliver game-changing LWD technology.
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