

Unlocking the Arctic's best-kept secret



A sonic drill rig works around the clock on a frozen lake, drilling in the Canadian arctic to prove gas deposits.

Sonic drilling is helping to exploit natural gas reserves in the fragile Arctic.

DECADES ago, huge natural gas deposits were discovered in the Mackenzie Delta area, northwest of Inuvik, in Canada's beautiful frozen western Arctic. During the 1970s, with three large gas fields of interest identified, exploratory drilling commenced on the Taglu, Niglintgak and Parson's Lake deposits.

In those early days, many believed the area's deposits could supply a pipeline of natural gas to the south, with the prospect of more than 1 billion ft. 3/d fl. owing to thirsty Canadian and US markets. It turned out speculators were right but various concerns, including the project's impact on the environment, forced a 10-year moratorium on any further development.

Unfortunately, once the moratorium was lifted, low natural gas prices in the 1990s discouraged petroleum companies from developing these very fields of interest, including the Parson's Lake deposit with its estimated 1.8 trillion ft³ of recoverable natural gas.

Today, the 840-mile Mackenzie pipeline project is one step closer to reality, thanks to a new partnership between petroleum companies and aboriginal groups as well as C\$250 million spent on engineering and environmental studies.

This development comes against a backdrop of homeland anxiety as the price and demand for natural gas continues to rise, supported by the fear that traditional gas fields will not be able to meet future needs. As it turned out, proving out the reserves underneath Parson's Lake was no easy feat of logistics and endurance as temperatures dipped to -40°C and winds howled across the lake's frozen surface.

Ironically, although the arctic presents an often inhospitable environment, it was Parson's Lake and its abundant aquatic life that needed as much protection from the men working on it as the men needed protection from the unforgiving climate around them.

To accomplish that, ConocoPhillips, the company tasked with the difficult job of proving the reserve, chose a sonic drill.

In Canada, proving out a gas reserve usually comes with a blast – created by explosives, lowered down a drill hole – and geophones to listen and record the percussion wave created by the blast as it travels through the rock below.

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SONIC DRILLING

With a lake above, the concerns over creating turbidity during the drilling process as well as delivering a blast deep enough to prevent a possible fish kill led to the only option available.

Using a sonic drill, ConocoPhillips was able to bore fast through wet clay, without using drilling mud and with no disruption to the surrounding sensitive lake environment.

Positioned on ice 2 m thick and huddled inside a protective rig cover, the crews of Sonic Drilling Ltd. worked 24 hours a day, carefully drilling through ice, water, lake bottom and then on through a mixture of sand, wet clay, silt and gravel to depths of 50-80 m.

With the sonic drill's ability to drill and case in one step, explosive charges could then be easily inserted, with each charge's depth and location verified. The results were explosively successful – gathering important data, core samples and proof of the gas reserves below.

Just as importantly, all environmental regulations were met and the unique arctic aquatic world around the drillers was spared from any human-caused damage.

