

Report > Frank Baker

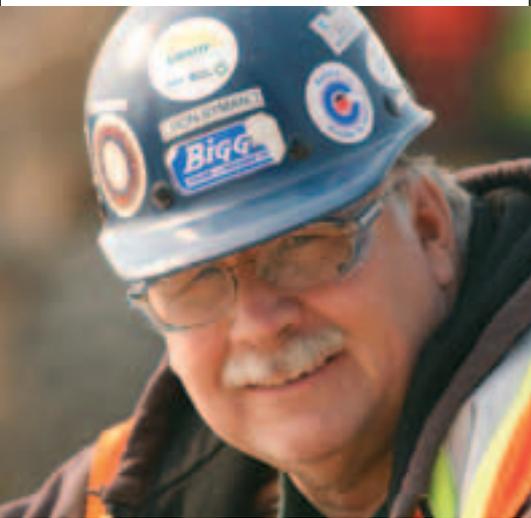
Photography > Judy Patrick

LIBERATING A TECHNICAL CHALLENGE

While BP has pushed technical boundaries in Alaska for more than 40 years, construction on one of the world's largest, most powerful land-based drilling rigs at its new Liberty development marks a major milestone in one of its biggest challenges to date.



Expansion plans: Liberty's drilling site is the manmade satellite drilling island – part of BP Alaska's Endicott development. More than 100 workers are involved in constructing the drilling rig.

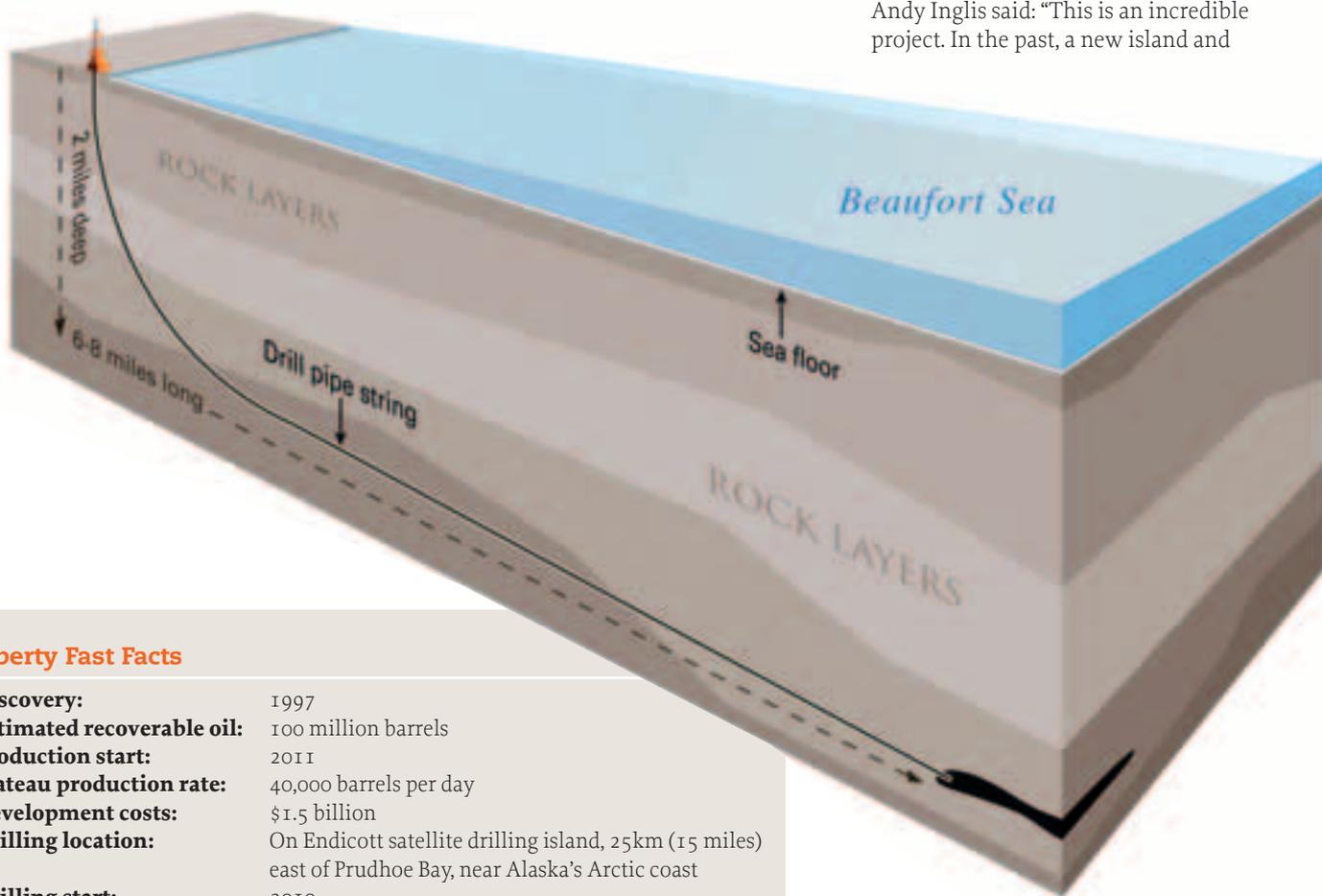


Off Alaska's northern coast, on the edge of the Arctic Ocean, more than 100 workers swarm around an assemblage of blue-coloured modules, various sized pipes and other equipment – pieces of what will eventually become the world's largest and most powerful land-based drilling rig – a rig that next year will embark on one of BP's most technically challenging developments – Liberty.

Once commissioned and operational in 2010, the rig will make history by drilling the longest extended-reach wells ever attempted.

Specially fabricated for BP Alaska by Parker Drilling, the unassembled rig arrived at its northern destination via two barges in July, following a three-week, 5,300km (3,300-mile) sea journey from its manufacturing site in Washington state on the US west coast. Liberty's drilling site is the manmade satellite drilling island (SDI) of BP Alaska's Endicott development, located in the Beaufort Sea around 25km (15 miles) east of Prudhoe Bay. The island was expanded this past summer to accommodate the large rig, camp, wells, manifolds and ancillary facilities.

Visiting the site in late August, BP's Exploration & Production chief executive Andy Inglis said: "This is an incredible project. In the past, a new island and



Liberty Fast Facts

Discovery:	1997
Estimated recoverable oil:	100 million barrels
Production start:	2011
Plateau production rate:	40,000 barrels per day
Development costs:	\$1.5 billion
Drilling location:	On Endicott satellite drilling island, 25km (15 miles) east of Prudhoe Bay, near Alaska's Arctic coast
Drilling start:	2010
Wells required:	up to six
Length of wells:	nine to 13km (six to eight miles) – world record

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Tapping into the offshore Liberty field from the near-shore SDI will require wells with a horizontal ‘departure’ of nine to 13 km (six to eight miles). To handle the exceptional demands of rotating and moving a drill string in a well bore this long, the rig has to be able to apply an exceptionally high turning force to the drill pipe. Consequently, a key component in the new rig will be the massive top drive, the device slung in the rig derrick to grip and rotate the drill pipe.

“The drive can apply 105,000 foot-lbs of torque to the drill pipe, while rotating the pipe at 130 revolutions per minute,” says Darryl Luoma, BP Alaska’s Liberty project general manager. “In a typical North Slope

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rig, the top drive will provide torque in the range of 30,000-45,000 foot-lbs. In fact, the power of the drive is the highest rated on any drill rig worldwide. This piece of equipment delivers more than twice as much power requirement to turn the drill pipe as any other piece of equipment used on the North Slope.”

BP Alaska is developing a specially designed drill pipe that is relatively lightweight, but that can withstand the high torques that the top drive will be able to deliver.

Because a single well might require 27,500-30,500 metres (90,000-100,000 feet) of drill pipe and casing, the new rig layout will include a pipe barn with more than 2,322 square metres (25,000 square feet) of area. Equipment to automatically handle the assembly and positioning of the drill pipe will enhance rig safety, Luoma adds. “People won’t have to physically screw the pipe lengths together. There is equipment »

Ocean voyage: the unassembled Liberty rig travelled 5,300km (3,300 miles) to its northern destination on two barges.





that picks it up, puts it together, and then lifts it onto the drilling rig floor.”

The long wells will also require fluid pressures of up to 7,500 pounds per square inch, compared with the 3,500 to 4,500 pounds per square inch of a typical Prudhoe Bay drilling operation. And the volumes of fluid involved require an especially large drilling service module for fluid handling.

Advances in measurement while drilling technology will allow drillers to reach their distant targets with almost pinpoint accuracy.

Powered by natural gas, the rig will be outfitted for Arctic conditions, including low-temperature-tolerant steel and thermal sound dampening insulation. It will be equipped with an integrated control system that provides centralised monitoring, command and management systems. The rig will operate with a crew of 84 people (42 days/42 nights). Operation centres, which will provide real-time drilling status monitoring, will be located on the North Slope and in Anchorage.

Collaborative effort

Shepherding Liberty from concept and planning to the execute phase has been a multi-year effort on the part of BP Alaska’s technical, commercial, supply chain management and other support teams.

“Liberty has been a multidisciplinary effort spanning more than four years,” says Max Easley, business unit leader for the Alaska Consolidated Team (ACT). “It has taken a phenomenal amount of both surface and subsurface effort to get the rig built and delivered to the North Slope, and more work remains to make it ready to drill. A key part of this was securing numerous permits from state and federal agencies, and working closely with North Slope community leaders to assure them we are developing the field responsibly,

with minimal environmental impact. Despite all these challenges, the project has moved steadily along, safely, on schedule and within budget.”

Freezing temperatures

Winter comes quickly in Alaska: in September, cool breezes sweep across the Endicott gravel causeway and its drilling islands. In only a matter of weeks, winter arrives to freeze the ocean fast to shore. And with the first snowfall, the islands and causeway are reduced to grey outlines against a world of white. By October, temperatures fall below zero Fahrenheit and winds scour freeze-dried snow off the island where the Parker drilling rig will stand tall – reaching 70 metres (240 feet) above the pancake-flat terrain – the highest point for miles.

Winter in this remote, northern outpost will quickly usher in some of the harshest weather on Earth. But the workers will be there, methodically putting the drilling rig together, piece by piece, and testing its components.

They and others involved with Liberty will be so immersed in their work they probably won’t have time to reflect on something they have in common with their parents, grandparents and friends, some of whom worked decades earlier on the Trans-Alaska pipeline and at Prudhoe Bay.

They will be making history. ■

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Incredible project Exploration & Production chief executive Andy Inglis (far left) visited the Liberty development in August, describing it as an example of BP at its best.