

SEP 14, 2012

SCIENCE

# Everything You Need to Know About Shell Oil and Arctic Offshore Drilling in Alaska

After years of arguments over drilling in the Arctic National Wildlife Refuge (ANWR), the debate about Arctic oil exploration has moved offshore, into the waters of the Chukchi and Beaufort seas. Now Federal regulators appear close to granting the final permits that one company, Royal Dutch Shell, needs to commence drilling north of Alaska. If the operation goes forward this summer, it could mark the birth of an offshore oil industry in the Arctic Ocean. However, environmentalists and many of the Inupiat villagers who live in the region oppose drilling, fearing oil spills and other risks to wildlife. Here's everything you need to know about oil development in the Arctic Ocean.

 By Jerry Beilinson

**PM**



José Mandojana

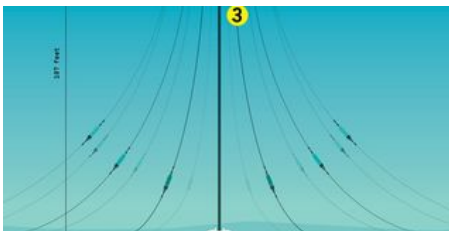
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*Editor's note: This story was originally published on July 17, 2012, and has been updated.*

### It's Exploratory Drilling

Royal Dutch Shell isn't really planning to drill for oil this year and in 2013. It wants to drill for data. The company will cap and permanently abandon any wells before the sea ice returns. The company had planned to drill as many as two wells in the Beaufort Sea and three wells in the Chukchi Sea in 2012. (The Beaufort stretches to the north and east of Point Barrow, which lies in the center of the north Alaska coast, while the Chukchi is to the northwest.) However, the *Arctic Challenger*, an oil-spill response vessel listed in the company's drilling plan, wasn't ready on time, and the company has been challenged by heavier-than-normal ice. For both reasons, drilling has been severely delayed. Limited work in the Chukchi Sea finally began on September 9 but was suspended a day later so that equipment could be moved away from ice that was moving toward the drill site. It seems increasingly likely that the company will do shallow, preparatory drilling this year without actually approaching the depths where oil and gas might be found. (The company's drill ship in the Chukchi, the *Noble Discoverer*, has been in the news repeatedly throughout 2012. Lucy Lawless, from TV's *Spartacus* and *Xena: Warrior Princess*, was arrested for occupying the ship as part of a Greenpeace protest in New Zealand this spring. Then the ship dragged anchor while in Dutch Harbor, Alaska, on July 14, fueling criticism among opponents of drilling.) A Shell video showing the first steps in drilling a well, including the excavation of a mud-line cellar to house the blow-out preventer (BOP), is [here](#).

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### Shell Received a Temporary Change to Its Air Permits

Offshore oil rigs are more like factories than conventional ships and must acquire emissions permits from the Environmental Protection Agency under the Clean Air Act before they can operate. Shell's permits have been a point of contention and the subject of lawsuits for years. On June 28, Shell asked the EPA to revise its permit for drilling in the Chukchi, saying in part that generators on the *Noble Discoverer* drillship could not meet emissions requirements for nitrogen oxides (NOx) and ammonia. The company also asked for several other changes to the original document, officially called a Prevention of Significant Deterioration (PSD) permit.

Essentially, Shell said that the technology cited in its original applications hadn't worked as planned under real-world testing. However, environmental groups have argued that the even the existing limits were too lenient. The permits allowed the *Discoverer* and its support vessels to emit 336 tons of NOx, 154 tons of carbon monoxide, and 43 tons of particulate matter, or soot, during the summer drilling season. Those are roughly the same emissions generated by a fleet of 300,000 cars operating for a full year. In a detailed letter sent to the EPA on July 19, environmental groups wrote, "Shell is unable to comply with its current

permit or the Act this drilling season and its permit application likewise offers no basis for lawful operations. EPA, therefore, must exercise its authority to prevent Shell from operating until a new or modified permit is issued."

The EPA granted the temporary revision, called an air permit compliance order <

[http://www.epa.gov/region10/pdf/permits/ocs/shell/discoverer\\_air\\_permit\\_compliance\\_order\\_9-7-2012.pdf](http://www.epa.gov/region10/pdf/permits/ocs/shell/discoverer_air_permit_compliance_order_9-7-2012.pdf)> on September 7. An EPA statement read, in part, "EPA expects the Discoverer's overall emissions for this drilling season to be lower under the compliance order than the original permit allowed. The Compliance Order expires in one year and does not waive any of Shell's permit requirements or any air quality standards."

### One Oil Spill Response Vessel Isn't Ready

Shell's *Arctic Challenger* barge is an important part of the oil spill response plan for both the Chukchi and Beaufort sea operations, but a retrofitting project isn't yet complete. Until modifications are finished and sea trials held, the barge cannot be certified by the Coast Guard, and federal regulators have said they will not issue final drilling permits. The barge carries important oil-spill response equipment. This is in addition to a capping stack similar to the one eventually used to stop the Deepwater Horizon spill in 2010 (see more below), and to blow-out preventers that each have a pair of blind shear rams. Shell had already overcome one major challenge regarding the *Arctic Challenger* when the Coast Guard agreed to classify the barge as a mobile offshore drilling vessel, rather than a floating production installation as originally planned. (Stationary platforms must be able to withstand heavier weather.) However, the company did receive permission to begin drilling operations thousands of feet above potential hydrocarbon deposits.

### Oil Companies Drilled Here in the 1980s and '90s

This isn't the first drilling in America's corner of the Arctic Ocean. Around 30 offshore wells were drilled in the U.S. portion of the Beaufort Sea in the 1980s and early '90s, and five in the Chukchi. (Details can be found [here](#).) Some oil production already takes place on artificial islands in the Beaufort Sea. For instance, BP has operated the Endicott site in 14 feet of water, and the Northstar operation in 39 feet of water, for decades. (An overview of BP's operations in the area is [here](#).) None of the wells previously drilled farther from the coast resulted in oil or gas production, mainly because the price of oil dropped roughly in half from the early 1980s to the early 1990s. Drilling in the Arctic is economical only when the price of oil is high.

### Local People Depend on Subsistence Whaling

The 7500 Inupiat and others who live along the northern coast are heavily dependent on marine mammals, including whales, for food. A polluted Chukchi or Beaufort sea could destroy the backbone of their culture and devastate family budgets. Fresh food hunted at sea in an age-old tradition is a lot more palatable to locals than exorbitantly priced, shrink-wrapped food brought in by plane.

On the other hand, oil revenue from Prudhoe Bay helps to fund plumbing, electricity, medical services, and schools in the North Slope Borough. Prudhoe Bay's oil output was only 205 million barrels last year, down by more than two-thirds from its peak of 722 million in 1988. Just like the Alaska state government, local government bodies need oil money. But most Inupiat would be far less worried about drilling in ANWR or the National Petroleum Reserve than in the ocean. (Gwich'in Athabascans, who rely more on caribou for subsistence, may feel differently.)

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### Oil Spills Aren't the Only Risk

An oil spill is the greatest danger, but the Inupiat hunters also worry about noise pollution. Bowhead whales, in particular, are highly vocal creatures with astounding hearing, according to Craig George, a biologist who has spent 30-plus years living in Barrow and studying whales. "Bowheads live in an acoustic world far more than in a visual world," he says. The whales can communicate across 20 miles of ocean and have been shown to avoid industrial noises at nearly that distance. Inupiat will venture a few dozen miles offshore in open boats to hunt the whales; if the animals moved farther offshore to avoid noise, the hunts would become even more dangerous and perhaps impossible.

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Setting aside oil development entirely, the greatest danger of an Arctic oil spill in the near future comes from maritime traffic: A ship runs aground and spill its fuel into the sea. At least that's what Rear Adm. Thomas Ostebo, who commands the Coast Guard in Alaska, recently told me. "Everyone's concerned about oil drilling, but I think that's the least of our problems up there," he said. The waters of the Arctic are essentially unregulated, the weather is unpredictable, and most of the Arctic seafloor is uncharted. An area of particular concern for both the Coast Guard and marine biologists is Unimak Pass, to the south of the Arctic Ocean in the Aleutian Chain. It has one of the richest collections of marine life anywhere in the world, and it is an increasingly busy shipping corridor..

### The Wells Will be in Shallow Water

The proposed wells are all in 150 feet of water or less, and according to Shell geologist Steve Phelps, any oil would likely be found 7000 to 10,000 feet below the seafloor. The figures vary with location. (In comparison, the Gulf of Mexico's *Deepwater Horizon* accident in 2010 took place in 5000 feet of water, in a well that stretched about 13,000 feet below the seafloor.) Commercial production of oil would lie a decade in the future.

### This is Just the Start of Offshore Development

While only Shell would potentially drill this summer, ConocoPhillips is gearing up for the 2014 drilling season. Statoil, the Norwegian oil giant that offshore leases in the region, announced in September that it would delay any of its own drilling until at least 2015. The federal government plans to hold lease sales for additional sites in the Beaufort and Chukchi seas, probably starting in 2016.

### Oil-Spill Response Would be Difficult

Neither the Coast Guard nor the offshore oil industry has permanent infrastructure in the Arctic Ocean to respond to emergencies. The Coast Guard's big C-130 Hercules planes take off from Air Station Kodiak, about 820 nautical miles to the south. The closest deepwater port is in Unalaska, or Dutch Harbor, the Aleutian Islands community made famous by the Discovery Channel show *Deadliest Catch*. The distance from there to Point Barrow is 1280 nautical miles. These distances worry opponents of drilling, especially given the slow response to the Deepwater Horizon disaster in the Gulf of Mexico. They reason that if corporations couldn't get drilling right in the heart of the offshore oil industry, they don't stand a chance in the remote and forbidding Arctic.

Lisa Speer, international oceans program director at the National Resources Defense Council, has likened an oil-spill in the Gulf of Mexico to a heart attack in a big New York City teaching hospital: The emergency resources are at hand. "In contrast," she says, "there's very little capability for offshore spill response" in the Arctic.

However, Shell would be bringing oil-spill response vessels to the drilling sites. The company argues that it could therefore respond to an accident faster than companies working in other parts of the globe.

In reality, it's hard to clean up an oil spill anywhere, and the Arctic is no exception. A study of Arctic oil-spill clean-up techniques was published by SINTEF, a Norwegian research organization, in 2010. Researchers found it most effective to burn the oil as it floated on the surface of the water. Mechanical recovery of oil was difficult; ice coverage of 10 to 20 percent interfered with the use of booms. The research was funded by Shell and other oil companies; the results are [here](#).



Luciana Whitaker/Getty Images

### Shell will have a Capping Stack on Hand

In addition to several other oil-spill response vessels, Shell has capping stack in the Arctic, which could be fit over a failed blowout preventer if necessary. (Shell's oil-spill prevention and response plan for the Chukchi is [here](#); the Beaufort plan is [here](#).) The structure is similar to the one that eventually stopped the flow of oil after the Deepwater Horizon explosion. Inspections and testing of the capping stack were prerequisites set by the Bureau of Safety and Environmental Enforcement for approval of the drilling permits. (BSEE is one of several agencies that needed to sign off on various aspects of Shell's plans.)

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At a conference held this spring at the Coast Guard Academy in New London, Conn., BSEE director James Watson said that the Shell drilling operation was the subject of unprecedented regulatory oversight: "I really have a lot of confidence in the hole in the ground." But in an interview afterward, he also said, "I can't guarantee there won't be a spill. We're erring on the side of extreme caution, but with every war plan there's a lot that you don't know ahead of time."

### Shell Is Not Drilling During the Fall Whale Hunt

Royal Dutch Shell purchased its current oil leases for the Beaufort Sea in 2005 and for the Chukchi in 2007, spending more than \$2.1 billion. The company planned to drill in the Beaufort starting in 2007 but was blocked by legal action under the leadership of Edward Itta, an Inupiat whaling captain who at the time was the mayor of the North Slope Borough. Since then, Shell and Inupiat leaders have negotiated a number of agreements to minimize the risk to wildlife. The company has independent wildlife observers and federal regulators at its drilling sites, and agreed to stop Beaufort operations on August 25 to avoid interfering with whale-hunting crews from the villages of Kaktovik and Nuiqsut. As it happened, drilling hadn't even begun by that date, and as of mid-September, the Beaufort operation was on hold.

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### Alaska's Offshore Reserves are Huge...

Alaskan waters probably hold the biggest oil fields in the Arctic. In 2008, the United States Geological Survey estimated that the entire Arctic has about 90 billion barrels of recoverable oil, 1.669 trillion cubic feet of natural gas, and 44 billion barrels of natural gas liquids. (Numbers from the study, the [Circum-Arctic Resource Appraisal](#), or CARA, are repeated in virtually every mainstream media article on the topic. According to Donald Gautier, the lead researcher on the project, CARA remains the best source for such information.) The study stated that about 84 percent of these hydrocarbons are expected to lie offshore.

Alaska's continental shelf is thought to have the biggest oil reserves, possibly 25 billion barrels' worth. However, the really monstrous hydrocarbon deposits

consist of natural gas and lie largely in Russian waters.

### But Russia's are Bigger

The United States may have more oil, but Russia is the undisputed king of Arctic hydrocarbons. The Shtokman natural-gas field, located in the Barents Sea, is one of the biggest in the world, and the country's Gazprom has partnered with Norway's Statoil and France's Total Sa to develop it. The field may not be developed aggressively in the near future: Gas prices are low at the moment because of the boom in U.S. natural-gas production, and Russia has immense onshore gas reserves to exploit. However, Norway's Snøhvit natural gas complex in the Barents Sea is in operation. It consists of a network of undersea pipes that are unaffected by ice on the surface.

### This is the Arctic's only Healthy Population of Bowhead Whale

Bowhead whales are amazing creatures. (This information isn't strictly need-to-know; skip it if you like.) According to biologist Craig George, bowheads have been reported to break through as much as 3 feet of ice to surface, helping them to winter in the Arctic Ocean. They are the only baleen whales to do that; the other species head for warmer waters. Additionally, bowheads have some as-yet-unknown method of navigating shifting leads in the ice, which can close quickly and doom some marine mammals to death by drowning. Bowheads were decimated by industrial whaling in the 19th century. While other populations of bowheads remain fragile, the whales north of Alaska have rebounded, and their numbers have been growing at a rate of 3 to 3.5 percent each year. Since the whales can live for 150 years or more, some of the current population presumably lived through that bloodier era.



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