

The Man Who Bought North Dakota

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How wildcatter Harold Hamm became the biggest winner in the biggest American oil find since Prudhoe Bay

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Harold G. Hamm is lost. The 66-year-old founder, chairman, and chief executive of Continental Resources is steering a Chevy Tahoe past sunflower fields and grazing cows in western North Dakota. He's found millions of barrels of oil in these low prairie hills, but on this bright fall day, he's having trouble locating one of his own drilling rigs.

In the back seat, Hamm's public-relations handler uses her smartphone to get their bearings. "So, we go three miles east, five north," Hamm says in his Oklahoma drawl. "Got it." Meandering past an idle John Deere combine and clutches of mobile homes where oil workers live, he points out wells his company has already drilled as if showing a guest around his home. He misses a turn, shrugs, stops, doubles back. "It's a great day in North Dakota," he says. "We'll find it."

Finally, he pulls into a dusty yard surrounding a 140-foot-tall rig. Workers hustle around in hard hats and black fire-retardant coveralls. From this single location, Hamm explains, four drills will corkscrew down nearly two miles, then turn and pierce the rock horizontally, two wells to the north, two to the south. He pulls on his own hard hat and coveralls, jams his hands in his pockets, and beams at the rig. Shouting over the whine of a drill bit, he says, "Without a doubt, this is going to be like the one up the road. It came in close to 2,000 barrels a day." That translates into about \$150,000 in revenue per day to Continental Resources.

Hamm is the man who bought the Bakken, the shale formation that's the biggest U.S. oil find since Alaska's Prudhoe Bay in 1968. The Bakken stretches from central North Dakota into the northeastern corner of Montana and up into southern Saskatchewan and Manitoba. He leased his first acres and drilled his first wells in North Dakota nearly 20 years ago, and stayed with it when others gave up. Today, Continental, with a stock market value of \$13.5 billion, vies with oil giants such as Hess for the most Bakken acres under lease (more than 900,000), the most drilling rigs (24), and the most wells (more than 350). Continental's revenue has nearly tripled from two years ago to an expected \$1.76 billion in 2011, while profits have grown sevenfold to an estimated \$538 million, according to data compiled by Bloomberg. Hamm and his family control 78 percent of the company's shares, a stake valued at more than \$10 billion.

Hamm, a stocky man of medium height with a leprechaun's playful grin and a diamond-studded Continental ring on his right hand, has revived a character who had faded from the American oil patch. He's a wildcatter, the sort of oil hunter unafraid to lease land and put a drill bit in the

ground where there might or might not be crude. “I find oil,” he says as he drives to the company jet that will take him back to Continental headquarters in his native Oklahoma. “In America, people lost the will to drill for oil. But I’m a little more hardheaded than other people.”

Thanks in part to the success of companies like Continental, the search for crude is making a quiet comeback in the U.S. Lots of attention has been paid to the surge in natural gas exploration, but more rigs are currently drilling for oil than gas: 1,191, up 402 from a year ago and quadruple the number of rigs in 2007, according to the oil services company Baker Hughes. It’s happening in Texas, Wyoming, Oklahoma, and Ohio. Hamm is in the middle of it in North Dakota. The state produced 510,000 barrels of oil a day in November, surpassing the output of OPEC member Ecuador. North Dakota’s unemployment rate is 3.4 percent, lowest in the nation. Hiring is so frantic, the McDonald’s in Dickinson is offering \$300 signing bonuses.

This economic anomaly owes to the fact that North Dakota, along with parts of Montana and Canada, sits on a vast basin of previously elusive crude. On a whiteboard at a Continental office in North Dakota, Hamm draws red squiggles with a marking pen and says, “That’s the Nesson Anticline.” His blue eyes light up. “You know what an anticline is?” In this case, it’s a subterranean ridge that stretches south-to-north for 150 miles. Over millions of years, oil seeped along the crest in what is now called the Bakken, with layers of oil-rich dolomite sandwiched between dense shales. After its discovery in the 1950s, the formation produced some boomlets, but it resisted development because the rock is so compressed and its oiliest slices are as thin as 10 to 15 feet. Crude was so difficult to extract that oil prices had to be at least \$50 to \$60 a barrel to make it worthwhile.

In 2008, the U.S. Geological Survey (USGS) estimated that the Bakken Formation in North Dakota and Montana contained up to 4.3 billion barrels of recoverable oil. Two years later, with more wells drilled, Continental Resources released its own estimate: 24 billion barrels. By comparison, Prudhoe had 13.6 billion barrels of recoverable crude when discovered, according to the Energy Dept., and the Ghawar field in Saudi Arabia has 70 billion barrels of remaining reserves.

Other companies aren’t as optimistic as Hamm, but analysts are growing more confident that the government estimate is low. The state-of-the-art drilling technologies used by Continental and others have produced a boom that “proves the old adage that people tend to find oil and gas in places where they’ve already found oil and gas,” says Andrew Coleman, an analyst with Raymond James. The USGS is redoing its assessment.

Hamm is convinced that the Bakken—and another formation right under it called Three Forks—can help North America take a big step toward energy independence. He gets downright angry talking about federal legislation that he says threatens tax benefits for oil exploration. Over a plate of chicken-fried steak at the Buckskin Bar & Grill in Killdeer, he sets his fork down and scowls, recalling a chat he had with President Barack Obama in July at a White House event for Hamm and others who’ve pledged most of their wealth to charity. Hamm says he told Obama there’s plenty of oil to be found in the U.S. He felt the President blew him off. “It was like, if you’re in the oil-and-gas industry, you don’t matter,” he says.

Hamm grew up in rural Lexington, Okla. Farming was a natural career option, but Hamm wasn't interested. By age 17 he had married and relocated to Enid for a job that would earn high school credit, making \$1 an hour pumping gas and washing trucks. An oil boom was spreading through northern Oklahoma. The trucks made billows of dust, men came seeking work, and after sunset, derricks glowed on the horizon. Hamm liked listening to the men gab about their quarry and where they might find it.

Two years after high school, Hamm hired on with Champlin Oil, making union wages of about \$500 a month. "It was one of those jobs everyone wanted," he says. But he yearned to look for oil on his own, and in 1967 he started his own oil services company out of a Ford pickup. During the day he hauled water and mucked crud out of oil tanks. Early mornings and late evenings, he sat with seasoned oil-and-gas men and learned to read well logs showing where crude might lurk. Logs of old wells indicated that mud was caked inside the bores, a sign of rock containing moisture and, possibly, oil. Hamm drilled his first well in the early 1970s; his second was a gusher.

The money allowed him to take college classes in geology, chemistry, and mineralogy. While he never earned a degree, Hamm calls himself a geologist and gets excited talking about things like breccia, a kind of sedimentary rock, and 3D seismic mapping. He takes pains to explain the properties of porosity—the ability of rock to hold oil like a sponge—and permeability, referring to how easily crude might flow through rock.

Hamm eventually built a full-service exploration company, with most of his holdings in Oklahoma. In the mid-1980s, he drilled 16 horizontal wells—not a brand-new technique, but hardly conventional—beneath the city of Enid. He drilled multiple wells from a single site, a cost-saving method now widely used in North Dakota. "He embraces all the new technology," says Jack H. Stark, Continental's exploration chief. Equally important, "he will lease and put the bit in the ground to test the idea. So many others are reluctant."

They're reluctant because it's expensive. Conventional wells can cost \$1 million. The horizontal wells being drilled by Continental and others in North Dakota can cost eight times that much, because they're often deeper and set in less porous, permeable rock. Also, the technology to steer drill bits sideways through shelves of rock is complex and costly. Companies' aversion to the risk tends to ease, though, as oil prices rise.

Driving through corn and wheat fields near Ames, Okla., Hamm tells the story of one of his favorite finds. In a vast pasture there in 1988, his geologists gathered public drilling data and fed it into a computer to map where oil or gas might be. The results were perplexing. One technician said a circular depression on the map seemed to indicate cow tracks. Another correctly surmised Hamm & Co. stumbled onto an astrobleme—a subsurface crater left by an asteroid hundreds of millions of years ago. The crater, eight miles in diameter, was brimming with crude. Back in his modest office in Enid, Hamm takes a softball-size rock off a shelf and cradles it. It came from the astrobleme, now known as Ames Hole. "This got blown into the sky and came back in rubble-ized form," he says. He points at perforations mottling the stone's surface, some nearly big enough to fit a pencil—evidence of extraordinary porosity. "That's why that oil would just flow." Ames Hole has yielded more than 18 million barrels of oil, according to Hamm.

By the late 1980s, Hamm had survived two oil busts, a big lawsuit with Occidental Petroleum, and the drilling of 17 straight dry holes that cost him more than \$10 million. Chastened by the busts, other companies were shifting to natural gas. Hamm stubbornly dispatched his geologists to find fresh crude. They researched well logs, production records, and geologic studies in Wyoming and North Dakota. The question wasn't whether these regions held oil, but whether it could be extracted at a reasonable profit. "We were looking for higher-risk, higher-potential plays that hadn't had every rock turned over," Hamm recalls.

Hamm thought North Dakota held the most promise. Soon he was making five-hour flights there in his single-engine Piper Cub. His geologists had mapped a field, outside the Bakken formation, in the state's southwestern corner called Cedar Hills. They suggested leasing 10,000 to 20,000 acres to test it. Not enough, Hamm said. By 1995, he'd assembled 300,000 acres on three-year leases at \$15 to \$50 per acre. Today, where leases are available, they run about \$1,500 an acre, and some have gone for more than \$5,000.

Because the rock in Cedar Hills holds oil in thin slices, it requires horizontal drilling. Properly aimed, a sideways bore penetrates more oil-bearing rock than it does punching vertically through shelves only 10 or 20 feet thick. The right equipment wasn't readily available, so Hamm asked a supplier for help. "They told me horizontal drilling was a novelty," he says, chuckling. By 1998, Continental was producing 7,000 barrels a day out of Cedar Hills. Hamm turned to the Bakken. Rig counts in North Dakota were declining as companies decided to try elsewhere. Behind Hamm's back, some of his own employees spoke of "Hamm's Folly," says Katy O'Brien, his executive assistant.

The Bakken, which has denser rock than Cedar Hills, required another technological leap: hydraulic fracturing, the controversial extraction method better known as fracking. The sideways bores are fed with water, sand, and chemicals that are pumped at high pressure into the rock, freeing the crude. Hamm's company and others have had increasing success using "long-lateral" fracks in which they blast the rock from as many as 42 points. It's a lot of work, and worth it at \$100 a barrel.

Continental wasn't the first to frack in the Bakken. In 2000 two other companies tried it. By then, Hamm's geologists had mapped out swaths of the Bakken where they thought oil could be plumbed. "We said, 'Well, we've got a map, y'all show us what to do,'" Hamm recalls. When the other companies' wells worked, he grabbed more Bakken leases. In March 2004, Continental tried its first horizontal frack in North Dakota under an assumed name, Jolette Oil, so as not to attract rivals' attention. The day was cold and clear, and "you couldn't see the tops of the fence posts" for the snow, Hamm says. The well was soon producing 120 barrels a day, and "we were off to the races." Continental's stock price has increased 78 percent in the past two years, and the investment bank UBS recently listed the company as a potential takeover target. Would Hamm sell? "Everything's always on the table," he says.

One morning in November, Hamm pins a "Harold" tag to his shirt pocket and sits with 12 staffers around a conference table covered with color-splashed maps, smartphones, and foam cups. It's the weekly exploration meeting at Continental headquarters. The room is so cramped people lean on windowsills. Facing Hamm across the table is Tony Moss, a 27-year-old with a

geology degree from Oklahoma State University. Hamm asks him for an update on Three Forks, the formation beneath the Bakken. Some healthy wells have been drilled in its uppermost layers, but some of the staff think more oil could reside in deeper levels, or “benches.” The question is how much. And there’s only one way to find out. Last year, Continental drilled a test well into the second Three Forks bench in a hilly field northwest of Watford City, N.D. The well yielded a profitable 1,140 barrels a day.

Moss reports that the well continues to produce nicely, but there’s more. He unfurls a long sheet of paper and sticks it to the wall with magnets. It shows photographs of core samples dug from the lower Three Forks benches (imagine cross-sections of apple cores illuminated by black light). Moss points to yellowish blotches within the black cylindrical shapes. Those blotches suggest the presence of oil in the second, third, and fourth benches. Hamm strokes his chin, transfixed. Moss, pointing to a few spots on a North Dakota map, suggests that Continental dig more samples. “Go ahead,” Hamm says. “Good work.”

As others report on lease prices and projects in Oklahoma and Wyoming, Hamm occasionally wonders aloud where the next big find will be. “The San Joaquin basin,” he muses, referring to central California. “Huge, huge amount of oil there.”

He wraps it up after signing off on a winter drilling budget in the Bakken. He sets his pen down and says, “I know y’all are turning over every leaf, but oil’s up over a hundred.” He grins. “What can I say?”

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