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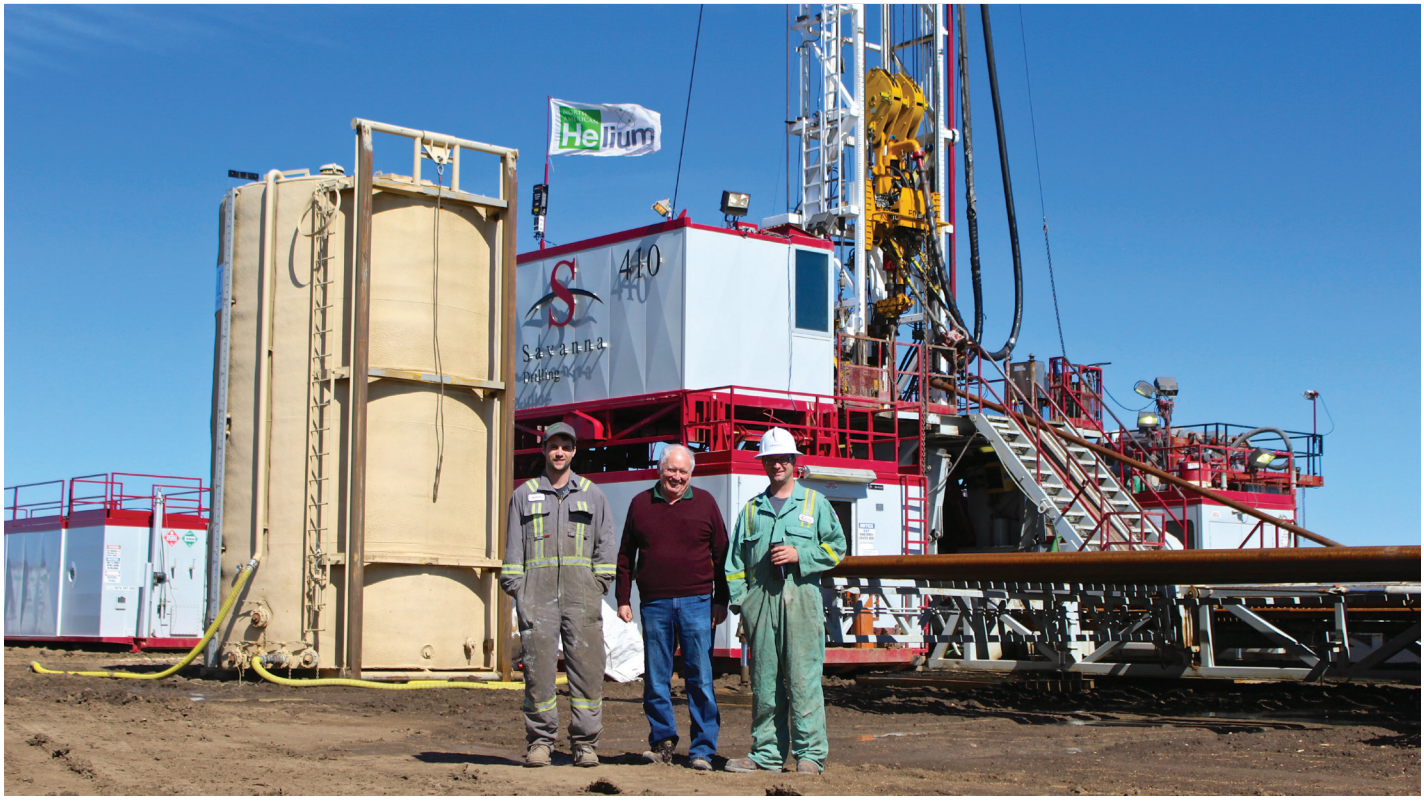
North American Helium sees opportunity in Saskatchewan

SHORTAGE | Junior plans to produce high-quality helium gas at Battle Creek project



At North American Helium's Battle Creek project in Saskatchewan, from left: Brendin Sand, wellsite geologist; Bill Young, president of North American Helium; and wellsite supervisor Kristian Link. NORTH AMERICAN HELIUM

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When people think of helium they often think of party balloons.

But the party favourites make up just a fraction of the global $2-billion helium industry.

The inert gas is the only safe way to pressurize liquid fuel in rockets and keep silicon chips cool while making semiconductors.

In 2017 the European Union added helium to its list of critical elements, and the U.S. Geological Survey followed suit in May this year.

Like cobalt, which is usually produced as a by-product of nickel and copper production, helium is usually produced as a by-product of oil and gas production.

"To get more cobalt you have to mine more nickel and copper, and to get more helium, you need more big, conventional oil and gas projects that happen to have a helium component. But frankly, most of those mega oil and gas projects aren't economic anymore because of the advent of shale gas," says Nicholas Snyder, chairman, CEO and founder of privately held **North American Helium**.

The shortage has accelerated with the U.S. government's decision in the mid-1990s to sell off its helium stockpile.

In the 1960s, the U.S. government — driven to beat the Soviet Union in both the arms and space race — subsidized the search for helium in North America.

Nicholas Snyder (left), North American Helium chairman and CEO, and Kristian Link, wellsite supervisor, examine directional drilling tools at the Battle Creek helium project in southwest Saskatchewan. NORTH AMERICAN HELIUM

The U.S. government mandated testing every gas field to see if it contained helium, and loaned hundreds of millions of dollars to the Bureau of Land Management to buy and stockpile the element.

At one time, the stockpile — stored in a depleted natural gas field in Amarillo, Texas — supplied one-third of the world's demand for the commodity.

Today, 95% of the original stockpile is gone and there is no other store of helium in the world, Snyder says, noting that the last U.S. federal auction will take place in July.

For much of the last decade, the sell-off artificially depressed prices.

"The physics community and other groups that take a longer-term view — including people in the military — have been periodically raising the alarm about sales of this supply, albeit to no avail," Snyder says, adding that helium is the one commodity that you can never get back once it has been used and released into the atmosphere.

"Basically, the world's supply-demand balance for helium has moved into a shortage, and as of the spring of this year, some of the major gas companies that distribute helium have already put their customers on allocation — delivering less helium than was contractually promised — and this is only going to get worse for the foreseeable future."

The oldest and most rapidly declining supply comes from conventional natural gas fields, like the enormous Panhandle Field in Texas, which produced most of the helium that found its way into the government's stockpile.

More recently there have been carbon dioxide-related helium projects, from the time that CO_2 was produced for enhanced oil-recovery efforts before the shale revolution. There is a huge legacy project of this type at Shute Creek, Wyo., where Exxon produces CO_2 and methane, and some helium.

But, by and large, Snyder says, neither the old conventional natural gas fields nor the more recent CO_2 fields are economic, as a way of adding new helium production.

"Exxon's project might run for a long time, but no one thinks they would want to expand it or do more projects like that in this environment."

The newest source of helium in the last 20 years (other than the U.S. government's stockpile), has come from liquefied natural gas (LNG) projects, but only a small percent of these happen to have a helium component. Because the LNG plants are already condensing off the methane at low temperatures, they can concentrate and extract helium from fields with a much lower helium content.

The next major LNG project in the pipeline that has some helium is already delayed, Snyder says. The US$10.4-billion Barzan gas plant project in Qatar was expected to start supplying the helium market last year, but now it isn't expected to come online until mid-2020.

The gas plant is being developed by a joint venture of Qatargas and ExxonMobil, and will provide natural gas to complement the Gulf state's infrastructure developments, such as power and desalination plants, among others, ahead of the FIFA World Cup in 2022.

The plant will serve as a cryogenic facility to separate the hydrocarbon liquids and concentrate helium in the original gas stream for recapturing. The facility should collect 425 million cubic feet of helium, Snyder says.

One of the delays in the project involved compromised pipelines. "Unfortunately, this project is fed by an offshore field, and the original subsea pipeline ruptured as a result of sulphur embrittlement from this high-sulphur gas, similar to what happened to the Kashagan megaproject in Kazakhstan," Snyder says. (In October 2013, the launch of first oil from the massive Kashagan oil field in the Caspian Sea was aborted after gas leaked from one of two 90 km pipelines that linked the platform to processing facilities onshore.)

Meanwhile, a US$30-billion, gas-treatment facility in the works by Russia's Gazprom in Amur, Siberia — along with a huge gas pipeline from Siberia to China — won't run until 2021, and could take until 2025 or 2026 to reach full capacity.

Even then, the timing of first production is uncertain.

"Complex, industrial plants that cost US$30 billion and are being constructed somewhere like East Siberia usually don't come online on time, and 2022 is just the first phase of the project," Snyder says, adding that stage one involved building the pipeline, and "that was the easy part."

Russia is good at producing pipelines and can use rubles to buy the pipes and pay for the labour, he says. But the track record of completing the more technically challenging aspects of the project, like the Amur gas plant, usually has delays, as do most megaprojects around the world that involve a number of international firms.

"It is also unclear how Gazprom will fund

this project and if sanctions could come into play," he adds. "The original expectation was that the Chinese — who are the project's customers — were going to loan them the money, but so far they have refused."

Snyder says it's time to develop new helium sources in North America, and, since the founding of North American Helium in 2013, the company has acquired a large land position in Saskatchewan.

The Calgary-based company has amassed rights to 1.2 million acres (4,856 sq. km) in southwestern Saskatchewan, where its Battle Creek project is located, and is the most active driller of helium wells in the province.

"The most economic source of new helium supply is in southwestern Saskatchewan, where you have it in deep, large, high-pressure fields that have helium in a nitrogen carrier gas," he says. "Frankly, in this price environment any CO_2 or natural gas component to a project is likely to have negative value, and without them, there's a smaller environmental footprint, and you don't have to build pipelines. You can build a plant to separate out the helium and vent the nitrogen, which is already the largest part of the atmosphere and has no negative environmental effects."

Battle Creek was one of the three or four places helium found 60 years ago, but it was never put into production, he says.

In the last six months the company has drilled the first successful helium exploration well in an untapped structure, where no one has ever found it before, versus expanding a known discovery, which hasn't been done since the 1960s, he says. "We drilled a well into a brand-new field and it's been successful, and we then immediately moved to another structure eight miles [13 km] away, and drilled a well there, and that was successful, too, and proved our theory was right," he says. "Now we're getting ready to drill more structures, and we think it's going to kick off a really significant industry in Western Canada."

Battle Creek makes up just 12.1 sq. km of the company's 4,856 sq. km, and there have been 36,000 shallow oil and gas wells drilled in the area by previous operators.

There are other companies looking for helium in Alberta and Montana, but Snyder thinks Saskatchewan is unique because of its favourable business climate and regulatory regime, as well as its infrastructure and human capital.

The province also benefits by not having a lot of CO_2, or other contaminants in its gas.

"As you move westward into Alberta, there have also been historical helium discoveries, but they have a significant CO_2 component, so we think we're in a sweet spot, geologically," he says. "And we're extremely lucky that it falls under a pro-development regulatory regime, and with the Trans-Canada highway running right through the middle of our operating area."

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While exploration for helium looks like oil and gas exploration, producing it looks a lot more like the mining business, he says, where the barriers to entry are high. With helium, companies need to reach a pretty significant scale to justify building a helium-purification plant with specialized infrastructure.

Another hurdle is that the pricing of helium is opaque. Almost all helium contracts have a confidentiality clause, he says, and most people are reluctant to invest in a commodity if they don't know what it costs.

"The helium market itself is almost completely opaque for a number of reasons, not least of which is that no one wants to get on the wrong side of the competition laws, so the industrial gas oligopoly doesn't really talk to each other and share information," he explains. "You can google the price of helium and you won't be able to find it, so there's not a lot of information. This wouldn't be strange if it were a $50-million annual market for some minor rare earth metal, but it's actually a $2-billion global market that major industries are absolutely dependent on, from medical imaging to semiconductor manufacture to space exploration."

North American Helium bought helium in a federal helium sale last year and is selling it as liquid helium to one of the industrial gas companies for between US$180 and US$200 per thousand cubic feet (mcf) at the factory gate. But due to declining supply, and demand that he estimates grows 2–3% a year, Snyder says the market price is higher than that. Ten years ago, by contrast, helium was US$50 per mcf.

In addition, financing a helium-purification plant isn't as easy as financing a mining project, he says, where companies can resort to stream financing or off-take agreements to get started. "Helium is a unique situation because an industrial gas company that controls the helium industry will not invest in the upstream," Snyder says.

He notes that every other gas the industrial gas company distributes they get themselves from air-separation units. "These companies don't drill for other gases and don't have geologists working for them. They're not interested in taking that kind of risk. So without that financing infrastructure in place to support exploration, it's a tremendous hurdle to say: 'Hey, let's get some risk capital and drill some risky exploration wells without a plan to get into production.'"

So far North American Helium has raised $35 million and plans to build a production plant in the fourth quarter of this year. The plant will produce high-quality helium gas, which will be shipped in tube trailers. The plant will produce at least 50 million cubic feet of helium a year after coming online in the first quarter of 2020.

Beyond that, the company's exploration program recently found multiple fields, and it plans to move towards production by drilling more development wells in the fields next year.

The goal in 2019, Snyder says, is to prove up enough reserves to justify construction of a larger helium purifier and a helium liquefier, so that it can convert all of its production to liquid helium, which has lower shipping costs.

For now, the company has no plans to go public, but isn't ruling it out entirely.

"We have ample funding from institutional investors for our current needs, and we do not have any immediate plans for a public offering, but this is an issue that is periodically considered by our board of directors, and we may choose to take this path in the future," Snyder says. TNM