



Mining, Energy & Manufacturing

– FALL 2020 EDITION –

THE WORLD-
Spectator





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Interest in Lithium deposits

When the Government of Saskatchewan held its Subsurface Mineral Crown Disposition Public Offering on back in the spring, on April 20, it raised \$169,878 in revenue for the province.

Eighty-one subsurface mineral permit blocks totalling 141,640.79 hectares were posted. Out of the 81 blocks posted, 16 received bonus bids and consisted of 51,917.960 hectares. Sun Valley Land Ltd. picked up nine permit blocks totalling 36,769.377 hectares for \$101,300.00; Deep Earth Energy Production Corporation picked up three permit blocks totalling 3,462.289 hectares for \$55,000.00; and Prairie Lithium Corporation picked up four permit blocks totalling 11,686.294 hectares for \$13,578.00.

The highest bid received in this offering was \$30,000.00 from Sun Valley Land Ltd. This 1,656.78 hectare permit block is located 18 kilometres southwest of Estevan and is prospective for minerals, such as lithium.

The subsurface mineral public offering uses a transparent and competitive bidding system to issue subsurface mineral dispositions that grant the holder exploration and development rights for potash and natural mineral salts occurring more than 60 metres below the land surface. These include boron, calcium, lithium, magnesium, potassium, sodium, bromine, chlorine, fluorine, iodine, nitrogen, phosphorus and sulfur, and their compounds.

As the appeal for lithium is increasing in the global market, the province has seen a significant interest in Saskatchewan's lithium potential.

The next scheduled date for a subsurface mineral public offering in Saskatchewan is December 14, 2020.

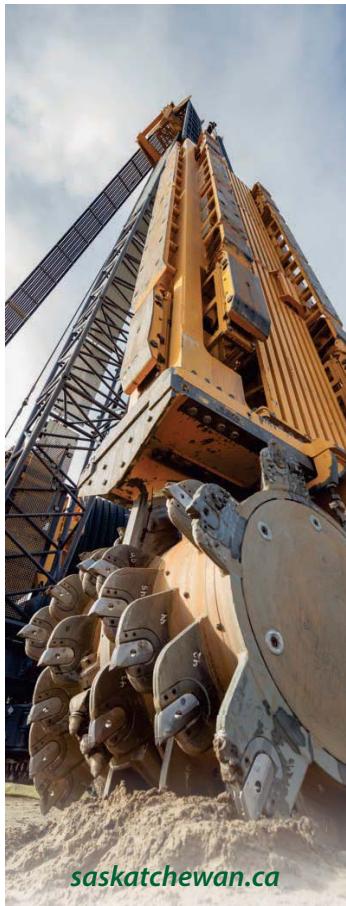
Steven Bonk, MLA
for Moosomin Constituency

The mining, energy and manufacturing industries are vital to our economy and the people of this province.

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A Strong Saskatchewan

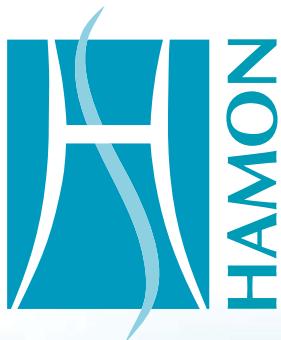
Saskatchewan's manufacturing, energy and mining sectors are important drivers in the province's economic growth, contributing **32.6% of GDP and thousands of jobs.**

Saskatchewan's Plan for Growth identifies aspiring goals for these dynamic sectors by 2030 including:

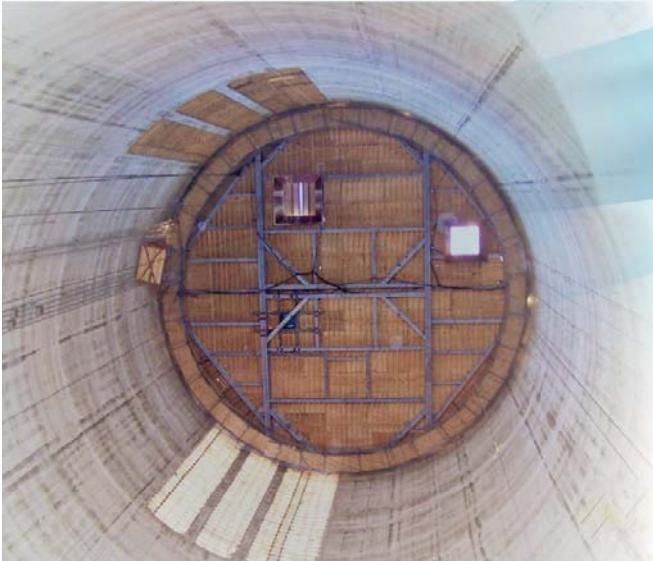
- Increasing the annual value of **uranium sales to \$2 billion.**
- Increasing the annual value of **potash sales to \$9 billion.**
- Increasing the value of Saskatchewan manufacturing exports by **50 per cent.**
- And by utilizing enhanced oil recovery and **SaskFirst New Growth Tax Incentives** to position Saskatchewan as the best place in North America to test, commercialize and scale new oil and gas technologies.

These goals will help build a strong economy and a strong Saskatchewan!

Saskatchewan 



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THE WORLD-SPECTATOR

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Moe sees strong future for Sask mining

World-Spectator editor Kevin Weedmark spoke to Saskatchewan Premier Scott Moe on Friday, November 20 about the future of Saskatchewan's resource industries:

How important are Saskatchewan's resource industries to the province?

Very important, not only in the employment they create locally and across the province—you can see that locally in your coverage area. Also important that the participants in this industry give back to our communities, and you also see that locally in your coverage area as well.

More broadly, the importance of the mining sector in particular, and the associated manufacturing sectors is huge.

The mining sector in particular in the province is responsible for 10% of our gross domestic product. The mining sector employs directly over 10,000 people across Saskatchewan and exports over seven and a half billion dollars worth of product—potash predominantly, but also uranium, gold, coal, sodium-chloride, sodium-sulfate. A number of items come out of this province, and in addition to those 10,000 direct jobs, each of those jobs create at least two additional jobs in supply, manufacturing, and supporting some of the expansions that we see happening in the mines in your coverage area, in Esterhazy and Rocanville for example. It is extremely important at the community level, but our mining sector is also extremely important at the provincial and national level as well.

How do you feel the resource industry, particularly mining, has adapted and responded to the Covid-19 pandemic?

Above and beyond! Our public health office was in touch with our mining sector very, very early in this pandemic. The mining sector deserves a great degree of appreciation from the broader community. The mining sector has put in place—not just in potash but in all our mining sector across the province—have put in protocols that have been above and beyond anything that Public Health has mandated or put into public health orders.

We have heard of cases of Covid-19 in our people that work in the mining sector but we have not heard of wide scale outbreaks in the mining sector. I have talked to all those involved, their health and safety teams, keeping their employees safe but also from a community level they have been a big part of ensuring that our infection rates have not been higher and our mining sector has not been a conduit for infections in our broader community, so thank you to all involved.

Here in our area we had 400 people working on the Enbridge Line 3 surface remediation through the summer, then in the fall we had a large number of workers in the area for a project at Nutrien Rocanville this fall, yet we have been able to maintain one of the lowest rates of infection in the province. In our sub-region, Southeast 2, there are four cases of Covid-19 as of Friday morning, so having all those people in this area didn't impact those numbers.

That's a great point that it isn't just the mining sector that has gone above and beyond to keep these individuals safe and by extension keeping our community safer. All those people are staying somewhere, quite often in and around those communities, they're eating somewhere in and around the community, and we are extremely appreciative to have that economic bump, in particular at this time. But we are also thankful for everything that our hospitality industry has done to ensure that everyone is safe who are in our communities that are doing this type of work. It's a Herculean effort and my hats off to everyone that's been involved, and nowhere is that more evident (than in and around the Moosomin area, the mining, the energy and the manufacturing sectors).

Some industries have had to slow down or close temporarily because of Covid-19 restrictions. How important is it to the provincial economy that the resource industry continues to operate through the pandemic?

It has been of vital importance, you are exactly right, many in our hospitality sector and our retail sector have had a tough road to travel in the course of the last six to eight months managing their way through Covid-19. The fact that the resource sector has stepped up and ensured they have safe workplaces, that has been huge from an economic perspective, and continuing to provide an opportunity for jobs for so many Saskatchewan people.

From a community morale and a mental health perspective, continuing to have a broad sector of people in our community and across the province that are still able to carry on life—although different to some degree—much more normal than they are able to in other sectors is huge. It is huge that they have been able to operate in our mining sector throughout this pandemic and in many cases I think this probably prepares us for a great opportunity when the world finds itself in a post-covid situation.

Saskatchewan, I've always said, does have the food, fuel and fertilizer to provide for a recovering global economy and at no time is that going to be more important than as the world starts to recover from Covid-19, hopefully sometime in 2021. We are well placed to do that, we have proven that our mining sector in particular can operate safely throughout.

I think there are some recent numbers out that potash



SASKATCHEWAN PREMIER SCOTT MOE

mining in particular is up 35% this year. Not only have they been operating, they have been operating at an enhanced production level, and I think that's something that everybody that is involved in that industry can be very proud of.

We've had some major investments in potash mining in our area. There was a multi-billion dollar expansion at the Nutrien Rocanville mine and the ongoing multi-billion dollar K-3 expansion at Mosaic Esterhazy. What does the province need to do to ensure those kind of investments continue to be made in Saskatchewan?

We need to ensure that the operating environment that we have here in Saskatchewan continues to be stable, and ensure the certainty of regulation that the industry is operating in. All industries look for certainty and stability, even more so in the last eight months when we have all been dealing in a very uncertain environment, with Covid-19 being in our communities, in our workplaces, affecting everything we do in our daily lives. That certainty is even more sought after today than it has ever been.

Also it's important to work with these industries and the mining sector to ensure that we are advocating for a similar type of certainty in other levels of government and around the world—certainty of market access for example.

What we are doing is working closely with our mining sector, our agricultural sector, our energy sector on maintaining market access and expanding that market access. We are opening up three Saskatchewan operated trade offices in countries in other areas of the world. When those come up to speed and are operating we are going to look to expand that, as well.

Certainty of operating environment, of regulatory environment that they're operating with here in Saskatchewan and Canada are important. We most certainly advocate for our federal government to provide that kind of environment.

We should never forget that this small province in the prairies of Saskatchewan sells products to 150 countries all around the world. And one of the largest exporters that we have is the potash industry, so we work very closely with them on providing them with certainty in every way we can.

What do you see as the greatest challenges that are facing the energy producers and miners in the province right now?

That very certainty, first with the global prices, and they have fluctuated a bit, but I think in the short-term to medium-term looks reasonable in the potash industry. Our volumes are up, which is a positive sign.

The uranium industry, the medium-term outlook is looking relatively stronger than it has over the course of the last few years. And we have some opportunities on the rare earths side. I think Saskatchewan will be the center of attention not only in Canada but across North America.

Certainty in that global price and that market access, but also certainty on the regulatory side, we have worked very closely with the potash industry in particular, but also our other mining industries on doing what we can to provide as much regulatory harmony and alignment as we can and doing some advocating with those industries, with our federal government on some changes that have been coming and continue to come from our federal government that do have an impact on the mining industry.

I don't need to rehash Saskatchewan's position on bills like C69 and the federal carbon tax. Just this week now we have bill C12 that has been introduced which is a target of going to net zero carbon emissions by 2050 in the nation of Canada. We are working with the industry and with other industries to ascertain what impact that may have on our mining industry.

On Bill C-12 specifically the province received little to

no consultation on that particular bill, and to my understanding I don't know if the industry received a whole lot of additional consultation. And that's somewhat problematic, when you see a level of government that isn't working with industry to at least understand what the impacts of a specific piece of legislation will be.

That is an example of where there may be some uncertainty that arises, and we need to work closely with the industry and advocate with the federal government and ensure we can continue to have a strong mining sector here in Saskatchewan, in particular in Rocanville and Esterhazy with the world's largest potash mines.

Because if we aren't able to continue with that sector and those jobs right here in Saskatchewan, that potash will be supplied to the world from other parts of the world with far lower environmental standards, far lower labour standards, and that isn't beneficial for the global environment. We feel as the world looks to securing a positive supply chain from friendly nations, Saskatchewan can certainly be that supplier. We see a great opportunity post-Covid-19 for our mining sector and for all the sectors in the province.

Does the government have any plans at this point to review the royalty or tax structures for the miners in the province or do you believe they are competitive as they stand?

No, there are no plans to review the structure we have in place. Aside from always working with the industry to align the regulations, we have to provide equalized outcomes with less stringent procedures and ultimately lower cost, and sometimes even lower costs and higher outcomes for the mining sector. We are always looking to streamline things for the benefit of all.

What do you see as the future of the mining industry in the province? Do you think there is potential for a lot of growth in the minerals that are currently mined or a lot of potential for the development of new minerals that Saskatchewan is not producing right now?

I'm going to break this into three parts—the potash producers, the uranium industry, and some of the other industries we have opportunities in.

First of all the potash, we have seen large expansions to the mines, for example Rocanville and Esterhazy, that have created the opportunity for us to meet the demand as the world continues to use more potash.

The future looks very bright for the potash industry and I firmly believe that as the world moves to a post-Covid-19 environment and starts to ramp up production around the globe that they are going to need fertilizer, specifically potash fertilizer, and I think the future looks very bright for us not only to be able to supply that through the capacity that we have through the expansions that have occurred—and you have seen that at a local level in your area—but to be able to actually look beyond the current capacity we have in the years ahead, so the future looking very bright for potash.

Uranium has had some challenging years price-wise. As the world looks to re-arrange their power sources, nuclear is very much a part of that conversation, not only in Saskatchewan, Canada, and North America but around the world. And I think the medium-term outlook for uranium, as we see some of these nuclear power plants come back online or new plants coming online, looks very bright. I think we'll have the opportunity to see some of the latent capacity that we have in the uranium industry really start to ramp up and be a major global supplier of uranium.

In terms of future opportunities, we have provided funding for the Saskatchewan Research Council to build a research facility for rare earth elements right here in Saskatchewan.

Rare earth elements have been looked at across Canada and across North America. Most of the processing has been controlled out of mainland China. What's happening with the Saskatchewan Research Council out of Saskatoon is it's on the very cuff of one of the very first processing facilities that is being built and brought online outside of China.

It will really help us centralize the rare earth elements mining industry right here in the province of Saskatchewan.

This is a model that we have followed with the potash industry many decades ago and have since really centralized Canada's potash production and potash research right here in Saskatchewan.

It's a model that we followed with the uranium industry a few decades ago in Saskatchewan and it's really centralized Canada's production, research capacity and jobs ultimately right here in Saskatchewan for the uranium industry.

So we're mirroring some of what we've done in those two industries with the rare earth elements industry. So as we look ahead at the next 5 to 10 to 20 years here in Saskatchewan, as the globe recovers from Covid-19, I think we have some opportunities to capitalize on in the mining industry and to boost our volumes.

And as we look more strategically out over the next few years, I think the mining industry more broadly—uranium, potash and rare earth elements—we have some great opportunities to really be in the situation where Saskatchewan is—to borrow a term from the great one, Wayne Gretzky—"we have an opportunity to be where the puck is going to be."



Town of Moosomin

R.M. of Moosomin

R.M. of Martin

Town of Esterhazy

Town of Rocanville

R.M. of Rocanville

Town of Wapella

R.M. of Spy Hill

The communities of the area thank **Nutrien** and **Mosaic** for their contributions to our communities.

Nutrien and **Mosaic** have been good corporate citizens and have contributed greatly to all of our communities.

We're proud to see the major investments that **Nutrien** and **Mosaic** have made in our area, and we look forward to working with you in the future!



It's time to invest in Canada's energy sector

Imagine a global \$800-billion natural gas and oil investment market and the opportunity that represents for Canada.

Canadians should be very interested in what it would mean for our country's economic recovery if we market the strengths of our vast natural gas and oil industry, and capture an increasing share of those billions of investment dollars annually.

Recent projections for future global energy demand include the International Energy Agency's World Energy Outlook 2020. In its commonly cited Stated Policies Scenario, the IEA projects oil demand will increase by five per cent by 2030 and six per cent by 2040 (from 2019 levels).

Most forecasts, including IEA's, anticipate a rebound in global oil demand post-Covid-19. That will lead to a plateau in the next decade where oil demand remains at or near historical levels—around 100 million barrels per day through 2040.

And who better than Canada—a leader in environment, social and governance performance—to provide stable and affordable oil supply?

A stable supply of oil shouldn't be taken for granted. Even under scenarios where demand plateaus, investment in the order of US \$390 billion every year will be required to ensure upstream oil production from worldwide sources can meet demand. This investment is needed to sustain production from existing fields and to develop new fields necessary to offset declines from current sources of production.

The latest World Energy Outlook expects Canada will be a key supplier, with oil sands production projected to



Tim McMillan

increase 13 per cent by 2030 and 11 per cent by 2040. This is largely in line with the Canadian Association of Petroleum Producers' (CAPP) analysis of forecasted Canadian crude oil production.

Canada can supply oil to world markets for decades, while continuing to drive down emissions intensity and bolster this country's economic recovery.

It's important to remember that oil is not Canada's only major energy export. Global demand for natural gas is projected to continue to hit historic records. IEA projects demand for natural gas will grow 15 per cent by 2030 and 30 per cent by 2040.

Natural gas production in Canada is projected to grow by 11 per cent by 2030 and 21 per cent by 2040. This sustained growth is driven by growing demand for liquefied natural gas (LNG), especially in India, China and Southeast Asia. Canada has an enormous opportunity to help meet this demand by developing our extensive natural gas resources and exporting LNG to growing markets.

IEA projects that meeting the world's need for oil and natural gas to 2040 will require an investment of \$750 billion to \$800 billion each year for the next two decades.

If Canada can capture just five per cent of that market, some \$40 billion annually would flow into our country. That will facilitate growth in the industry, which in turn generates jobs and government revenues, and supports advanced technologies that improve environmental performance.

A growing industry also sparks opportunities for Indigenous communities that can further economic reconciliation with Indigenous peoples.

Achieving the growth projected by the IEA for Canadian oil and natural gas would result in 120,000 additional permanent jobs, a \$45-billion increase in gross domestic product, and a \$7.5-billion-a-year increase in government revenues. This is according to modelling completed in 2018 by a joint working group involving industry and the federal government.

The \$800-billion investment opportunity is massive. By comparison, it's expected the worldwide capital investment needed to develop renewable energy sources, while still impressive, is less than half that at about \$366 billion.

In the near term, capital investment enabling industry growth will help drive Canada's post-pandemic economic recovery.

Canada's track record on environment, social and governance, and emissions reduction performance can, and should, be our competitive advantage.

Our natural gas and oil producers need government action and clear support—a signal to the international community that Canada is worthy of investment.

Tim McMillan is president and CEO of the Canadian Association of Petroleum Producers (CAPP).

Hatch launches design software to take the guessing game out of pneumatic conveying systems

Hatch has just launched an all-in-one software called PneuCalc 7.0.0 that will enable engineers and practitioners who work with pneumatic conveying systems to design and troubleshoot both pressure and vacuum systems in the most efficient way.

Industrial process plants and designers of pneumatic conveying systems have always faced challenges with blockages in production lines, irregular feed rates, and understanding why equipment wears prematurely.

PneuCalc 7.0.0 determines how the system parameters influence the behavior of powders and bulk materials during pneumatic conveying in industrial process plants thereby eliminating any guess work.

PneuCalc 7.0.0 is the only comprehensive software in the market that can design and troubleshoot both pressure and vacuum



An effective solution to design and optimize pneumatic conveying systems.

systems, and comes complete with comprehensive features that enable smart design choices through:

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- material saltation ve-

locity calculator tools

- automatic Geldart display material group classification
- detailed pipe segment display
- automatic parameter verification for sloping

convey lines, acceleration zone length, min./max. speed, refluxing in vertical sections, and maximum pressures

This time-saving software allows the user to customize, reuse, and

- engineers who design pneumatic conveying systems

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- organizations that validate supplier equipment

• component suppliers for pneumatic systems

Companies are able to download and install the software for a free trial period.

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Why oil and gas are fundamental to Canada

Humans are wired to respond to stories that paint a relatable picture of an issue at hand. And those stories are easier to remember.

If we repeat a Rex Murphy story about how out-of-work cod fishery workers from Newfoundland saved their homes and marriages by moving to Alberta's oil sands, you may remember it years from now.

Murphy told a crowd last year how, after the 1992 moratorium on the cod fishery was imposed, 30,000 Newfoundlanders went West to work in the oil patch. Those are a lot of marriages and families.

Between 2000 and 2018 (adjusted for inflation to 2020 dollars), Canada's energy sector paid \$672 billion to federal, provincial and municipal governments in taxes. The oil and gas sector (a subset of the energy sector) was responsible for nearly three-quarters of that, over \$493 billion in taxes and royalties paid to Canada's governments.

That \$493 billion includes \$14 billion in indirect taxes (sales taxes like the GST); \$45 billion in lease payments for the use of Crown land; \$60 billion in corporate income taxes; \$68 billion in personal income taxes; and a whopping \$306 billion in rents and royalties.

That \$493 billion from the oil and gas sector is \$18 billion more than the \$475 billion the federal government spent on family allowance and other children's benefits between 1970 and 2019.

What did other sectors pay to governments between 2000 and 2018?

Real estate: just over \$193 billion.

Construction: about \$276 billion.

The real estate and construction sectors' combined \$469 billion in revenues is still \$24 billion less than the \$493 billion paid to governments by the oil and gas sector.



**Mark Milke
&
Lennie Kaplan**



We're often asked how the revenue from the oil and gas industry compares to an industry like manufacturing. But it can't be compared because the Statistics Canada data for manufacturing includes oil and gas manufacturing. Construction and real estate are completely separate revenue streams. That's why we can compare their taxes paid with the oil and gas industry.

Download Graph Gross revenues by sector

Some will argue that the \$493 billion from oil and natural gas reflects the past and not the future, that they're 'sunset' industries.

But energy transitions are notoriously difficult to predict.

University of Manitoba professor of energy and environment (emeritus) Vaclav Smil—who likes the idea of less carbon emissions but is also a world expert in energy transitions—pointed out the following in his recent paper for the University of Saskatchewan's Johnson Shoyama Graduate School of Public Policy (note to U.S. president-elect Joe Biden): "Designing hypothetical roadmaps outlining complete elimination of fossil carbon from the global energy supply by 2050 is nothing but an exercise in wishful thinking that ignores fundamental physical realities."

The Organization of Petroleum Exporting Countries (OPEC) forecasts that the world will consume 109 million barrels daily in 2045. That's up from 91.7 million barrels daily now forecast for 2020 by the International Energy Agency.

And expect natural gas demand to rise in the short- and long-term (30 per cent higher by 2040). That's in part because of population and economic growth in Asia, and because of power plants that switch from coal-fired electricity to natural gas. (The latter is cleaner on particulate emissions and emits less carbon relative to coal.)

If Smil is correct that energy transitions can't ignore "fundamental physical realities" and oil and natural gas will be with us for some time—decades at least—then the only question is if the public and politicians think they can do without nearly half a trillion dollars in future oil and gas revenue, any more than they could have sacrificed nearly \$500 billion in the last two decades.

That \$493 billion in oil and gas taxes paid for a lot of school lunches, kids' clothes, runners, after-school lessons and much else.

But as big as such numbers are, they represent something beyond even children's lunches. To quote Murphy, "Employment is not just a damn paycheque. It is the spine of most people's existence."

That spine of existence is what \$493 billion in taxes from oil and gas directly represents.

Mark Milke and Lennie Kaplan are with the Canadian Energy Centre, an Alberta government corporation funded in part by taxes paid by industry on carbon emissions. They are authors of \$672 billion: The Energy Sector's Revenues to Canadian Governments 2000-2018.

\$760,849.23 in revenue generated in October oil and gas public offering

The Government of Saskatchewan held October's Crown petroleum and natural gas public offering on October 27, which generated \$760,849.23 in revenue for the province. This is the fourth of six oil and gas public offerings and brings the cumulative 2020-21 fiscal year total to \$5,317,642.56.

The Estevan and Swift Current areas brought in the majority of the bid activity. The Estevan area received \$362,966.60 in bids for 39 parcels totalling 2,573.818 hectares, while the Swift Current area received \$209,793.58 in bids for 15 leases totalling 2,201.504 hectares.

The highest bonus bid received in the Octo-

ber public offering was \$84,921.58 for a lease in the Lloydminster area. This lease was awarded to Lacadena Land Company Inc. and is prospective for heavy oil in the Mannville Group.

The highest dollars per hectare received was \$772.18 for a 32.376-hectare

lease in the Estevan area. Villanova Energy Inc. bid a total of \$25,000.00 on this parcel, which is prospective for oil in the Midale Beds and Frobisher Beds of the Madison Group.

The scheduled date for the next public offering is December 1, 2020.

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Mining, Energy & Manufacturing

- FALL 2020 EDITION -



Mahindra Roxors are modified for use underground in Saskatchewan mines at Universe Satellite Sales in Rocanville.

Universe providing Roxors for mining industry

BY KEVIN WEEDMARK

Rocanville's Universe Satellite Sales is filling a need for Saskatchewan potash mines—the company is providing vehicles to transport people underground at the massive potash mines at Rocanville and Esterhazy.

Owner Stan Langley says that as soon as he saw his first Roxor he knew the vehicle would work for the mines, and the vehicles are being modified in Rocanville to meet the precise needs of the mining industry.

"We have supplied other vehicles to work underground like the Kioti's, and I had been after the manufacturers to build a vehicle specifically for the mines, but they didn't because it costs a lot of money to design something for the mines," he says.

"A friend of mine wanted us to get into selling Roxors because he wanted to buy one, but we didn't really want to take on another line, and when he went and bought one in Alberta he came home and he says 'you got to come out and have a look at this.' We drove down there and had a look at it. As soon as I walked in the door I said 'holy, that is exactly what the mine needs.'

"So we went after the dealership, got it right away, and the first thing we did is we got a couple guys from the mine to come in and said 'if you could build a perfect mine vehicle, what would you do to this vehicle?'

"The first thing they said was it was a little too high so you would need to get it lowered, which we did by changing out to smaller wheels. You would need all the lights for underground, and need the scrubbers for the exhaust. They said you need different bumpers because everyone is going to bump into the wall—they are going to bust the taillights and everything on it."

"So we just took all the notes, and then I got Scott Norton down who was involved in building some of the first mine vehicles when Sylvite was first doing it when he worked for Goodman's. (Sylvite of Canada first developed the Rocanville potash mine.)

"He designed the front and rear bumpers for us and he started making them for us and we got the first one down underground at Rocanville, and they like it. It hasn't been underground for a year yet and I think it has around 36,000 km on it."

Universe's modified Roxors are now underground at both Nutrien Rocanville and Mosaic Esterhazy mines.

"We've got five at Nutrien and one at Mosaic, and I'm sure we'll have more—it's just a matter of time," said Langley. "They are quite a bit less money than some of the other vehicles they are using. They've been really dependable. We've changed a

couple light bulbs and a speedometer and other than that they've been working really good."

How much customization goes into the vehicles?

"We put on the heavy duty front and rear bumpers, we change the batteries in them, and the ignition comes out of them. We put in a push button start and do away with the key on them," explains Langley.

"We put light bars on them. We put a scrubber system on the exhaust. We put on the tow hitch and now they can actually tow with them now, so we're actually putting electric brakes on them as well now. Plus they have all the warning lights on them, and we put the reflective tape on them. We do a fair bit of work to them to make them mine ready."

The bumpers come off to get the vehi-

cles down into the mine.

"The bumpers have to be off them when they put them down in Rocanville," said Langley. "They are exactly 144 inches if we take the bumpers and taillights off, which makes it really nice for them—they fit right in the man cage and down they go."

Langley said Roxor is 100 per cent behind his efforts to get the vehicles into the mines.

"Roxor is right behind us," he said. "They've actually had one of their guys from California, one guy from Edmonton and another guy from Ontario come out and they actually toured both Mosaic Esterhazy and Nutrien Rocanville underground and talked to the people that were running them and they just said 'Okay, what would you change if you could do anything to them?' and they had a couple ideas. We were actually supposed to meet a couple other guys. We are going to be going down to Detroit to meet with them and sit with the engineers and spend a couple days right at Roxor where they are building these things and talk to all their engineers, but Covid-19 came along, so that got put on hold."

Langley said he believes the potential for the vehicles is huge in the mining industry and other industries.

"The potential is huge," he said. "CP Rail is actually starting to use them in their yards. They are putting cabs and air conditioning in and they outlast the half tons because half tons are not meant for that type of terrain. There are some mines in B.C. that have taken them underground. We've had a lot of dealers from the U.S. call and say 'what are you doing to these things to make them mine ready?' So I think the potential is really big because of the simple fact that we can probably do them for a third of the price of some of the bigger man carriers."

Langley said he sees lots of potential for more businesses in the region to develop products for the mining industry.

"There is probably lots of economic development potential around the mines. You just need to find out what they need. They are buying product from all over the world. This is the niche that I found, but I'm sure there are other things that businesses could provide locally for the mines. It's no different than agriculture. Everybody grows wheat and there is no reason why they couldn't be milling wheat around here and making flour, but we send it all away."

"I think there is lots of potential for different things around the mine. This is our niche and we're filling a need for the mining industry, and I think there's also potential for the farming industry because the ranchers are buying these things up like crazy."

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This photo shows the continuous pour on the south headframe at Mosaic K3 taking place, part of the \$3 billion expansion of Mosaic Esterhazy's K3. The pour was completed on September 4.

Daryl Harrison

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Massive contribution from Saskatchewan resource industries

Saskatchewan's resource industries, from potash to petroleum, are an important driver of the province's economy.

The potash mining industry alone directly creates 5,100 jobs and pays more than \$1 billion in wages, and indirectly supports many more jobs.

Saskatchewan's potash industry is number one in the world with \$4.4 billion worth of sales and 30 per cent of world production.

Saskatchewan's potash mining industry invests more than \$15 million a year in various community and indigenous partnerships.

The potash mining industry contributes \$5.52 billion to the province's GDP and contributes more than \$500 million in taxes.

Potash mining has a strong future in the province, as Saskatchewan has half of the world's potash reserves and demand for potash continues to grow as the world's population grows.

Potash is a major source of export earnings for Saskatchewan and Canada, as 95 per cent of the province's potash is exported to markets including the United States, China, Brazil and India.

Wide range of energy production

Saskatchewan is one of the few places in the world that produces all of these types of energy:

- crude oil;
- natural gas;
- coal;
- uranium;
- biofuels;
- geothermal power;
- wind power; and
- hydro power.

In 2019, the combined estimated value of oil and gas production was over \$10.5 billion.

With its research facilities and network of suppliers, there are opportunities in Saskatchewan's oil and gas industry.

Thanks to a supportive government and stable, transparent regulatory environment, energy companies find the province one of the best jurisdictions in the world to pilot and commercialize new energy-related technologies.

Oil

Saskatchewan is the second-largest oil producer in Canada and the sixth largest onshore producer in Canada and the United States. In 2019, the province produced 177.9 million barrels of oil.

The province has estimated oil reserves of almost 1.2 billion barrels, refining and upgrading capacity, and an extensive network of pipelines.

Saskatchewan is home to a significant portion of the Bakken Formation, one of the largest conventional oil plays in North America.

Clean Coal

Saskatchewan's expertise in clean coal technologies is a good example of how the province is committed to "greening up" its conventional energy resources.

Natural Gas

Saskatchewan is the third-largest natural gas producer in Canada. In 2019, the province produced 179.3 billion cubic feet. Estimated recoverable gas reserves are 1.8 trillion cubic feet.

Opportunities exist in shale gas in central and east-central Saskatchewan.

Nuclear Energy and Electricity

Saskatchewan is the world's leading supplier of uranium—90 per cent is exported, with the remaining 10 per cent fuelling nuclear reactors in Canada.

The province's uranium is responsible for powering approximately 1 in 20 homes in the United States.

Enhanced Oil Recovery

Saskatchewan is a leader in petroleum research, especially in the areas of en-

hanced oil recovery (EOR) and horizontal well drilling, which allow increased production from individual wells.

Two commercial EOR projects are currently underway in southeast Saskatchewan using carbon dioxide capture and storage (CCS) technologies.

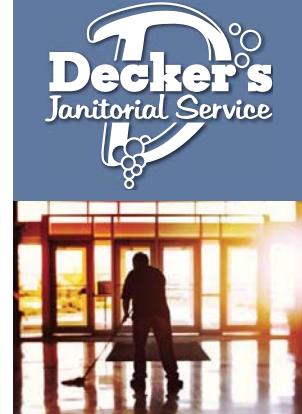


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Mosaic K3 project on track for 2022 completion

Bernie Boutin, Director, Capital Projects, K3, answered our questions about the status of Mosaic's K3 expansion, one of the largest projects in the company's history.

What have been the main milestones in the K3 expansion project to date?

We first announced our intentions to build the first new underground potash mine in Saskatchewan in over 50 years in 2009. One of the early milestones was sinking both the North and South shafts and building a 375-foot North headframe required for the massive hoists needed to move ore to surface.

Next, above ground, we started engineering and construction on an overland conveyance system to transport K3 ore to the existing K2 and K1 mills. After reaching the potash level in 2017, work continued to complete all the required underground infrastructure, including maintenance shops and the assembly of mining machines, bin construction, and belt conveyors. In 2019, K3 ore was moving by conveyor to the K2 mill and this year, over to K1. Production grows as we progressively build more 4-rotor miners. (currently five 4-rotor miners are in operation.)

This summer, we completed the continuous concrete pour to form the south headframe, and now teams are installing the internal infrastructure. Work continues underground to complete everything we need like bins, belts and 4-rotor miners, to run what will be the world's largest and most competitive potash mine. Once the second headframe is complete at the start of 2022, we will more than double our current hoisting capacity. K3 is expected to be fully operational in the first quarter of 2022.

What are the main technical challenges in a project of this scale?

The first challenge was the shaft sinking. We used state-of-the-art technology to first study the geology of the area and later used freezing technology to deal with the water bearing formations that were encountered when sinking the shaft down to the potash level.

A comprehensive plan was then established and executed to develop the shaft pillar area, using high reach drum miners. This included the boring and cutting of bins with track excavators.

Then an accelerated miner assembly plan was developed to incorporate modular component assembly techniques and detailed installation plans, that were prepared with the combined efforts of our own Mosaic assembly crew members and Prairie Machine and Parts personnel.

Modular construction is used extensively on the K3 project, both underground and on surface. It is common to see large structural components and assemblies being transported to the site on our Saskatchewan highways.

The use of an overland conveyance system to transport potash is also an interesting technical challenge. These conveyors are over 11 kms long and are really the first of their kind to be used in this way in the cold winters of Saskatchewan.

With any project of this magnitude and duration, safety



Work is underway on the superstructure at the top of the south headframe at the K3 expansion.

is always top of mind. We have had thousands of contractors contribute to different aspects of the work being done here. At Mosaic, the safety of all people at our facilities means everything. The training needed to ensure everyone across the project goes home safe at the end of the day is a challenge that we have embraced and consistently improve upon. To date, over 10 million-person hours have been contributed to the K3 project.

How does this expansion compare with other Mosaic projects over the years in terms of total cost?

This is by far one of Mosaic's most significant capital investments. It is a multi-billion-dollar project that is really the first of its kind for our company as it lives today. Our predecessors built the original facilities in the 60s when the province had its first ramp up of projects – one being our K1 facility which was the first successful underground potash mine in Saskatchewan at the time and later K2.

With the completion of the concrete pour on the south headframe, what are the next steps in this project?

We're now focused on outfitting the headframe with all the infrastructure needed to hoist ore from deep underground. It takes impressive amounts of steel (2000 tons)

and concrete (4350 m³) to build the massive support needed for the Koepf hoist that moves 60-ton skips capable of hoisting millions of tons of potash a year.

The South production shaft will solely move ore, while its sister north service/production shaft also transports people and materials; bringing it online will in fact double our production capacity and allow for no interruptions to move anything but ore.

Is the project on schedule at this point?

Yes, in fact, we have accelerated our original timeframe twice since we started the project and remain on-track. With a project of this size, sometimes we shift our approach or plan, constantly finding ways to adjust the work being done to meet our targets – sometimes that could come from things like the weather which can be unforgiving on the prairies or most recently, a global pandemic.

Our contract partners like Hatch and so many others, are all part of the process and we have to constantly work together to stay on-track.

What is the target date for completion of the K3 expansion project?

We expect K3 to be fully operational in April of 2022.

Once K3 is completed, will it be a fairly simple process to move production to the K3 facility, or what will be the process of shifting production.

We like to think of the transition process as a bit of a carefully orchestrated dance. Everything has to be co-ordinated so we're all heading in the right direction while keeping everything moving – in this case ore to our global customers. We are balancing our production needs between three sites right now. As we close out the year, we will be winding down K1 production, relying on K2 and K3 to meet our needs in 2021. By the end of next year, we will complete inflow operations and in mid-2022, transition our ore supply fully over to K3. The process will take the hard work of our talented team to make this happen and we're ready for the challenge.

What will be the impact on the workforce at Mosaic Esterhazy once K3 is up and running?

Our workforce plan has remained fluid throughout the transition process. We are evaluating our people-power needs very closely and are moving people into new roles in the mills, over to K3 or into other areas of the business in a very systematic and thoughtful way.

We are monitoring natural attrition and carefully managing vacancies to make the people move as seamless as possible. We have an extensive change management process in place aimed at helping our people feel comfortable and ready for what the future holds in Esterhazy.

We currently have over 120 Mosaic operations personnel already transitioning over to K3 from the K1 and K2 sites.

We thank all Mosaic and contract personnel who contributed to the current success and progress of the K3 project, and we'll continue to focus on safety being the most important goal for the project.

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Nutrien Rocanville mine has massive footprint

Above is the original site of the Nutrien Rocanville mine northeast of Rocanville, and below is the Scissors Creek site west of Highway 8. The two sites are miles apart, but are connected underground.





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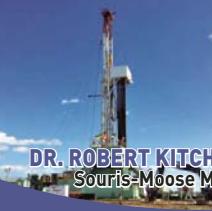
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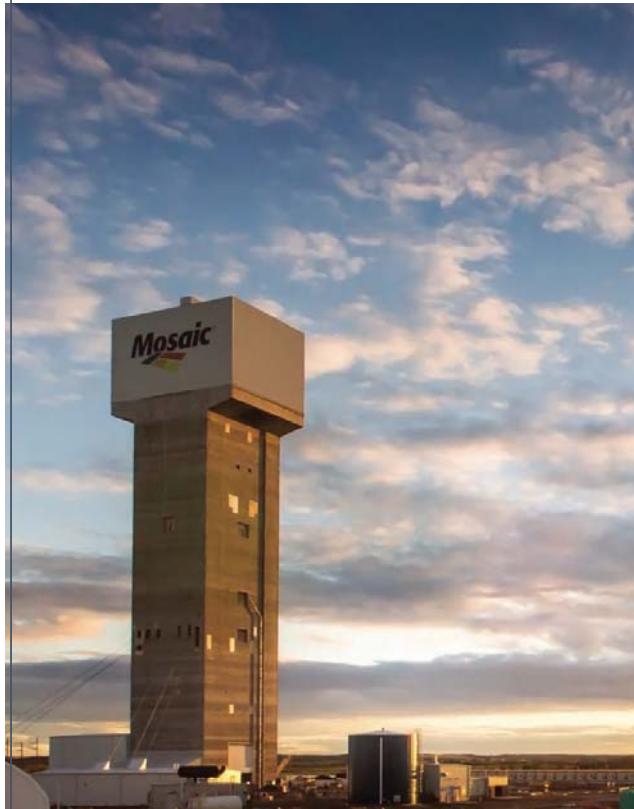
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The WORLD-Spectator Mining, Energy & Manufacturing

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'We are feeding the world through potash and agriculture'

Kevin Weedmark of the World-Spectator spoke with Saskatchewan Chamber of Commerce CEO Steve McLellan about the 50th anniversary of the Nutrien Rocanville mine. Following is the full interview:

It was 50 years ago when the first rail car of potash left from the Rocanville mine. How important was that first moment, the start of that mine?

That is an interesting question. Obviously a lot of work went into getting the mine built and getting to that point.

But now we look at the legacy of that moment and all the good that 50-year-old mine has done. It's amazing. There are people whose livelihoods have been made by that mine, and we see second and third generations working there. We see the taxes that have been generated by the employees and the company itself, the people in different parts of the world who have eaten better because of the contents of those rail cars.

Everything about it is simply outstanding and we can sometimes be a bit complacent about potash as we can be around our ag sector—but we are feeding the world through potash and agriculture and we can't take that for granted nor should we. This is a good time to stop and reflect it and celebrate it a little bit because that was a big day 50 years ago. Without that first car of potash, nothing else would have come after.

How important is the potash industry to Saskatchewan?

I think it is absolutely fundamental. As a matter of fact there is an argument that we should be taking it more seriously. A couple years ago in the provincial budget there were some surprises for the sector without sufficient consultation in terms of their tax and royalty structure, and I think it was unfair.

I think we should be looking at that as an opportunity to build more jobs, to build more communities around those mines, and of course for every mine worker there is a contractor that is doing work on those places too—it's not just the direct mine jobs that are critical. We should be sitting down and saying 'listen what can we possibly do as the people in this province to help you ship more potash because we've got lots more than we will ever use.'



First potash produced at Rocanville

It was September 25, 1970 when the first railcar load of potash was produced at Rocanville.

Decades, and hundreds of years of supplies—what could we possibly do to get more out there, to take advantage of the fact we have it?

How much of a contribution do you think the potash industry has made to Saskatchewan over the last half century? How different of a province would this be if we didn't have that entire industry?

That's interesting to think about. It's hard to imagine the scale of the contribution to this province. The full direct contribution to tax alone, the number of jobs, the number of high schools that have been built with those tax dollars, the number of college educations that have been paid for, the number of universities that have been paid for with the tax revenue that goes through the province to the universities. We would be a whole different province without potash. We would not be as

strong. We would not be as well trained. The contributions of Nutrien to the communities that they're in and the province generally is amazing. We see their logo everywhere and it's because they're committed to the province—and that is the visible dollars. The invisible dollars are the tax revenues that have paid for hospital wings without putting a logo in front. We would be a whole different place without them.

What do you see as the future of the potash industry in Saskatchewan?

I think it is very bright if we do it right. If we take it seriously. The companies are exceptional. The people that work in and run those companies are the best in the world and the product that we have is the best in the world, and our capacity to get it to where it needs to go is the best in the world. The problem we have and the only

stumbling block I would argue in keeping us from getting more volume out of the province is the fact that our regulatory environment—federal and provincial—is not working as hand-in-hand with the sector as we would like to.

We've added new environmental requirements that make no sense for the potash sector. We've charged royalty rates that may not make sense when we have an excess of supplies as we do underground. So we're taking the industry for granted and charging them things that make no sense when we could make more money as a province by simply saying 'hire more people, keep all the mines open' and those taxes will generate much more collective benefit. We've got the wrong attitude toward that sector.

The federal and provincial governments look at potash and say 'well they can't move because this is where the potash is,' whereas those companies indeed have reduced some of their investment because it is more expensive to do business here and there are more jurisdictions in the world starting to get their potash out of the ground without the environmental, labor, and human rights requirements that we have here. The potash companies in Saskatchewan perform at the highest level. We're taking them for granted and we shouldn't be.

What does the province need to do to ensure a strong future for the potash industry?

They need to go to the table with the companies with a blank sheet and say 'what can we do to get you twice as busy as you are now?'

That means more people working in the mines. It means more products being shipped and more people in the world eating better because of it.

With that sort of a clean slate attitude they can start to invest in the future of this province. It's not like the companies don't want to pay any taxes or don't want to play by any environmental or human rights rules—that's not the case, but they need an open book and that's the opportunity we haven't taken, haven't give them.

Instead of that, what do we do? We surprise them the day before the provincial budget with some new costs, which is again taking them for granted.

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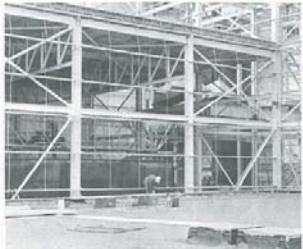
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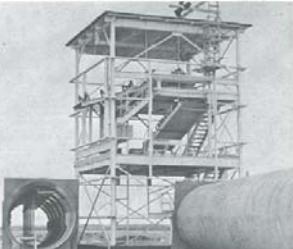
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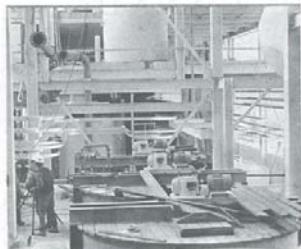
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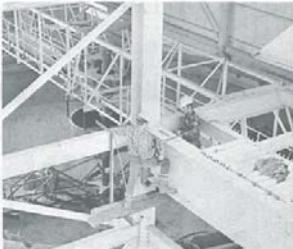
This photo was taken from the machine shop roof, and looks into the refinery. A few feet of the hot thickener can be seen at left.



It is at the transfer house (above) that the ore comes up from the headframe and changes direction to the raw ore bin at the refinery.



A portion of the re-agent mixing area at the refinery. At the extreme upper right can be seen a part of the dryer.



Workmen preparing for the pouring of the concrete floor above the hot thickener.



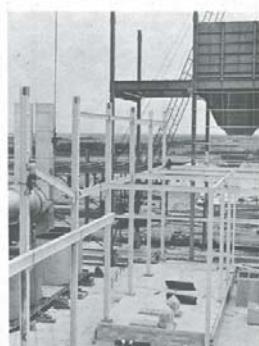
A welder is seen here at work on the interior of the hot thickener in the refinery.



Steel columns for the refinery. A section of the product dryer at left resembles a gun barrel.

Highlights

The photos on these two pages were taken at various stages of construction at the Sylvite of Canada potash mine and refinery complex. Construction started July 23, 1968.



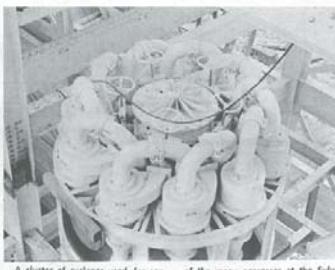
Some of the refinery steelwork. Upper right shows the load-out, and the area at the bottom center is for re-agent storage.



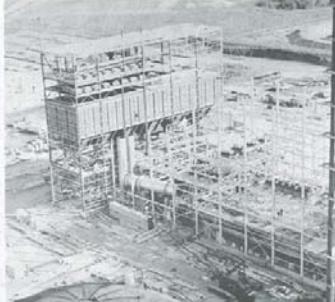
Workmen are seen here closing in the huge main building for the refinery and load-out facilities.



A mining tradition was observed as this evergreen was planted on the highest place piece of steel at the top of the soaring headframe.



A cluster of cyclone used for separating solids from liquids, just one of the many processes at the Sylvite refinery.



Some of the hundreds of steel columns and girders for the giant refinery and load-out. At right, a section of one of the headframes.

Massive project

Photos of construction of the Rocanville potash mine from the centrespread of the first special section the World-Spectator dedicated to the Rocanville potash mine. The mine was built by Sylvite of Canada, became part of the Potash Corporation of Saskatchewan, which was originally a Crown Corporation, became part of PotashCorp, and became a Nutrien mine with the merger of PotashCorp and Agrium to become Nutrien.

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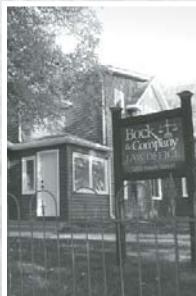
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- FALL 2020 EDITION -



The continuous pour on the south headframe at K3, part of the \$3 billion expansion of Mosaic Esterhazy's K3, was completed on September 4—three days ahead of schedule. At 380 feet, the north headframe, at right in the top photo, is the tallest structure in Saskatchewan. Crushrite Concrete provided the concrete for the pour.

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CRUSHRITE

Proud to have supplied the concrete for the Mosaic Esterhazy K3 south headframe during its continuous pour this fall!

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Strategic acquisition could add 30 years to life of Nutrien Rocanville mine

Nutrien acquired more than 253 square kilometres of mineral rights earlier this year in what the company describes as an investment for the very long term.

"That acquisition is

looking decades into the future," a Nutrien spokesperson said.

"In May, we completed

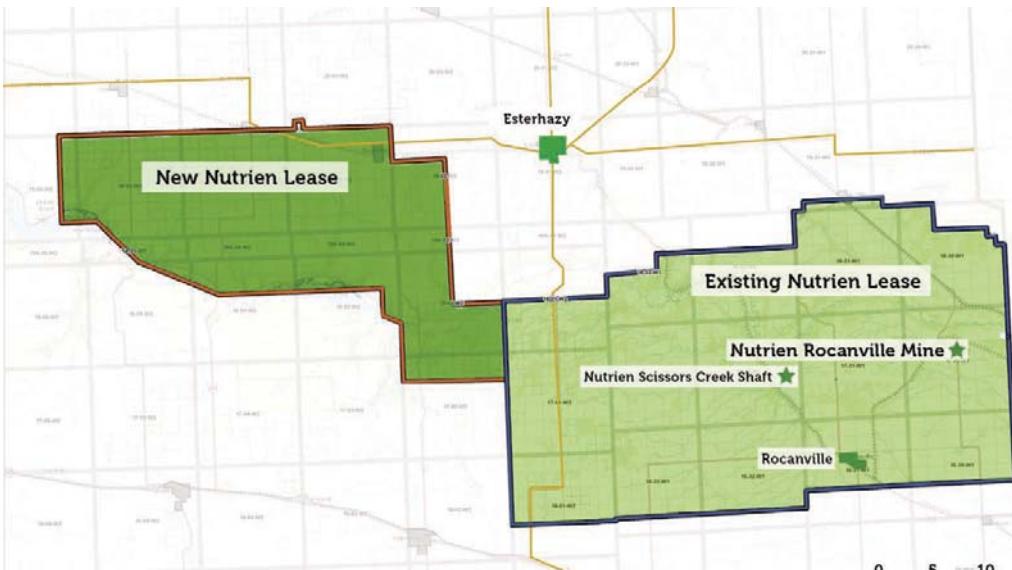
a Crown lease purchase agreement with North Atlantic Potash that provides Nutrien with another

263.5 square kilometers of subsurface mineral rights north-west of our Rocanville potash mine," a Nu-

trien spokesperson said.

"The lease area, known as KL-279, is rich in potassium chloride and holds the potential to add 30 years of mining to Rocanville. This was a strategic long-term investment to support future expansions of Rocanville and ensure that our potash network remains strong and competitive. Adding decades of potash production at Rocanville is also good news for our employees, customers and communities who rely on our operations to grow and thrive."

"That acquisition is looking decades into the future. It's not medium term or long term, it's the very long term. That's not on the horizon at the moment, it was a strategic acquisition. It has the potential to add to the life of the mine, which is always good when you have any big resource asset. It's always good to look decades ahead and ensure you've got ongoing potential for development. It's a really key investment for Nutrien in that part of the world."



In May, Nutrien acquired a new lease of more than 243 square kilometers for the very long term expansion of Nutrien Rocanville.

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