

2017 Mining, Energy & Manufacturing



THE WORLD-
Spectator



Biggest potash mine in the world:

PotashCorp celebrates Rocanville expansion

BY KARA KINNA

PotashCorp celebrated the successful completion of its Rocanville mine expansion with an event at the Scissors Creek mine site near Rocanville Oct. 12.

The company's largest potash expansion—which took nine years from announcement to completion—has more than doubled the mine's capacity, from 3.0 million tonnes annually to 6.5 million tonnes.

According to PotashCorp, Rocanville is the company's lowest cost mine and a key part of the company's future.

The centerpiece of the \$3 billion expansion is the first new potash shaft built in Saskatchewan in nearly 40 years.

The new shaft, sunk 1,123 metres into the ground, is dedicated to moving people and materials into and out of the mine.

The old service shaft was converted to a second production shaft, allowing for expanded production.

The project also included construction of a new mill, a new 500,000 tonne storage facility (the size of several football fields), a new office building and a range of other infrastructure elements.

The footprint of the PotashCorp Rocanville mine, including the underground mining area, is now approximately the same size as the city of Saskatoon.

"We're now officially the largest potash mine in the world, with our official Canpotex number being 6.51 million tonnes," PotashCorp Rocanville General Manager Larry Long told a large crowd of people gathered at the Scissors Creek site to celebrate the completion of the expansion on Oct. 12.

"My career hasn't always been in the potash industry, I've also worked in the hard rock industry and I'm pretty sure we're not only one of the largest potash mines in the world, but I think we're probably one of the largest rock moving operations in the world, period. So it's something we all can be proud about, all the people involved in getting us to this point—our employees, everyone."

PotashCorp President and CEO Jochen Tilk spoke at the celebration. He said the PotashCorp expansion is an incredible accomplishment in more ways than one. "This is a significant achievement for our company. It's a significant achievement for all of us," said Tilk.

"I joined this company over three years ago . . . To be here today and celebrate with you all together the achievement of building a brand new mine, an expansion, the shaft with all the metrics that are so impressive, makes me very, very proud. I think it's an incredible accomplishment."

"Next month we will mark 10 years since the three billion dollar Rocanville expansion project was first announced. Ten years ago this, where we sit here today, was an open field. But we knew that below this ground there was a lot of potash that we could mine economically. So this decision was based on a tremendous vision."

"We began excavation in 2010 and we broke through the underground mine workings in 2015."

"That makes Scissors Creek the first new shaft that was sunk in the province of Saskatchewan for nearly 40 years. The last shaft that was sunk prior to that was 1979 and that was the Lanigan shaft."

"Imagine what that means for the expertise. People don't sit around for 40 years and say 'give me a call when you sink a shaft.' It is an expertise that is so challenging, so unique, and there were challenges along the way, quite a few. There were numerous water bearing formations that we had to get through that we knew about. It was a very complex project that required a lot of technical expertise."



The base of the shaft at Scissors Creek

So completing the new shaft was a great accomplishment for our employees and our contractors who helped us.

"The project also included a new storage building, with 500,000 tonnes of capacity, new rail infrastructure, and new loadout capacity, and a new underground conveyor system to move the potash from the ore body to a production facility."

"We installed enough conveyor belt underground to run from Rocanville to Yorkton. So when you make that drive, imagine that next to that road would be a conveyor belt all the way."

"We also completed a new headframe, the world's tallest steel headframe and one of the tallest structures in Saskatchewan. These are all impressive comparisons, but it's a reflection of all the work that you have done and that you have participated in."

"While that was underway we were also building a new mill to accommodate expanded production capacity. That new mill now has the capacity of 1,300 tonnes. And the old mill has the capacity of 1,100 tonnes per hour, which means together approximately 2,400 tonnes per hour. Put that in your mind, 2,400 tonnes of potash that comes out of those two mills, how many trucks that is, how many trainloads per hour. It's phenomenal."

"Our motto is that we help nature provide, we feed the world because we provide one of the most important nutrients, and if Rocanville is number one in the world as a potash producer, then by extension we are number one in feeding the world with this most important nutrient."

"So with the two mills now we have one great flexibility which means we can now perform maintenance on one of them while continuing to produce with the other one. And that ability to continue operating through shut-

downs is an added flexibility that Rocanville now has, which will make it even more productive."

"Given the sheer size and scope of the project, there were times when 1,800 contractors were on site. Not only were all of these structures built, but it was done safely. In spite of the large number of people and the wide range of construction activities that were underway at any given time, the expansion was done without incurring any serious injury or fatality. That to me is the major accomplishment of this, that we have done all of this without harming one person."

"Arriving at where we are today, it's not just a huge milestone but it's an incredible milestone for PotashCorp and all of our partners. We remain globally competitive. We are more efficient because now overall our costs are lower and we have been able to optimize our outputs with high quality, easy to access ore."

Continued on page C3



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Biggest potash mine in the world:

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Continued from C2

"Results speak for themselves. We have reduced our cash costs, from \$136 per tonne in 2013 to \$86 a tonne in the first half of this year. That is unbelievable if you think about it, not quite half but close.

"That helps us to position ourselves very successfully in difficult market conditions. And even though market conditions have improved, we have improved our position in a very competitive market.

"We also have the flexibility to meet the increasing needs of our customers. This year we realized that momentum was there in the market, we noticed that demand was increasing.

"For the reasons we see demand picking up, we have every reason to be optimistic about the future. Global demand is growing at about 2.5 to 3 per cent a year and we estimate that demand will be 62 to 65 million tonnes, reaching an all time high.

"Think about that—2.5 per cent of 65 million is about 1.5 million tonnes a year. That's a lot of volume. And people tend to forget that.

"And you of anyone know how hard it is to just produce another million tonnes a year. If it were easy everyone would do it. However we are set up for that, we can meet that demand and I think that's planning for the future and that's where the potential is here.

"We're grateful for the men women who have worked so hard on the expansion.

"I want to finish by saying what a bright future we have. This has been a good year for us. This is a great moment to celebrate it and I think next year will be an even better year."

PCS Potash President Mark Fracchia also spoke at the celebration.

"It has been a ten-year journey, and every journey has to start with the first step, and for us that first step was the announcement of the expansion pretty much ten years ago. And ten years goes by very, very quickly when you have as much activity on a site as we have here. So this has been a long journey, and I'm sure I share this feeling with everybody involved that it has gone by extremely fast.

"I think most of us ten years ago would have looked at this day thinking it may never come, and it came much sooner than anybody felt it would.

"We are glad to be here, we are glad to get to that part of that journey and go on with optimizing this operation. That single event, that announcement of the expansion, set in motion a number of events that have had an extremely positive impact not only for Rocanville but for the communities.

"When you think about the infusion of people, the jobs, the economic activity in the area, especially around that period of 2008, 2009, 2010 where things slowed down because of an economic downturn, the activity never slowed down here, it just kept on going. That is something we are feeling today, all of the result from that additional economic activity."

Fracchia said there were 1,800 contractors working on site at any given time.

"The project took about 4.5 million person



The Scissors Creek headframe at PotashCorp Rocanville

hours to complete and during that period we had a lost time frequency over the entire project of .17 for 200,000 hours worked, which is really class leading for any construction project let alone a project this size," he said. "And the best part of that, we had no life threatening or life altering injuries during that period which is really something, that is a testament to the effort that everybody put in each and every day. So for us that is really what made the project a success. That was the icing on the cake, and if it weren't for that I don't think we would be talking about the project in the same way."

Fracchia said he is also proud of the expertise that went into the project.

"The fact that we hadn't sunk a shaft in Saskatchewan since 1979 meant that the expertise was essentially gone. Most of the people who were involved in sinking mine shafts for potash were either retired or deceased unfortunately, so that expertise had left," he said. "To a large extent our teams had to relearn that expertise, relearn that knowledge along the way as we were sinking the Scissors Creek shaft. And the shaft itself of course is sunk to the depth of 1,100 metres, which to put in perspective is not only over a kilometer in depth—most have you have seen the CN Tower, it is about 1,800 ft in height—and it is about twice that distance, but into the ground. So you can appreciate that it takes quite a bit of effort it. Is a complex task to make that happen."

Fracchia said the other challenge was tunnelling over to the shaft from the Rocanville site.

"We decided to tunnel from the west end of our mine. We had a distance of about 13 km, tunnelling two parallel rooms toward that mine shaft. The first challenge is to make sure we are going in the right direction. And when we got there the next challenge was to line across to connect these two parallel rooms,

and to do so right underneath where the shaft was being sunk.

"In a mining environment we don't have the benefit of GPS, we can't look on Google maps and get us to the right place. Our technical teams used a seismic method developed by the University of Saskatchewan to essentially triangulate that distance, that location by listening to the blasts from the shaft sinking operation and pinpointing where that signal was coming from so that we could mine right underneath the shaft.

"Believe me it's a very complicated process and we were so relieved when we hit the bulls-eye, we essentially mined right up to that point and our accuracy was 1.8 feet away from where we predicted.

"While all of this underground work was occurring there was a lot of work going on above ground. We converted our old service headframe to a production headframe, but the key thing is that we did so over and around and above the existing headframe. We installed a new hoist and then when it was all sent during the shutdown period. We moved the old headframe from underneath and just connected the shaft to the new headframe. And that was something that hadn't been done before. It's unique, it's a first in the mining industry and we did it right here."

Fracchia said the effects of the expansion will be long-term.

"With the expansion completed our workforce here in Rocanville has grown. In fact it's doubled. It's up to over 750 people and that's about the level we expected to be at going forward.

"Looking ahead we know the effects go beyond our minesite. This workforce means more people in the community, more jobs, more young families moving into our towns. It means continued enrollment in our schools and more money spent locally which is good for everybody in the area.

"At PotashCorp we are very grateful for the strong partnerships we have with our employees, our contractors and with our communities and we certainly don't ever want to take that for granted and we certainly don't. We know it's important to be a good neighbor, we know we can make a difference and we strive to make that difference, whether it's just creating in good stable jobs or investing in projects that enrich our communities and making them better places to live and we think we are doing that in Rocanville and surrounding areas.

"Today we recognize the hard work and skill that everyone has put in in getting us to this point, and it couldn't happen without all of you so a big thanks to all of you."

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Saskatchewan oil facts

Saskatchewan is number two in the amount of oil produced among Canadian provinces, accounting for 13 per cent of Canada's oil production. Saskatchewan's oil and natural gas development can be traced back to the 1880s with natural gas drilling near Regina. The first commercial oil well was discovered in Lloydminster in 1943. Saskatchewan has about seven billion barrels of crude oil and about 9.5 trillion cubic feet of natural gas. Follow-

ing are a few figures on Saskatchewan oil production

486,000 barrels per day - Saskatchewan oil production in 2015.

\$750 million - payments industry made for the use of Saskatchewan's oil and natural gas resources in fiscal 2015/16

\$4.4 billion - industry spending on exploration and development in 2015

33,000 - person years of direct and indirect employment by the industry in 2015

1.8 Trillion cubic feet - remaining marketable natural gas reserves at 2014

1.0 billion - barrels of remaining crude oil reserves at 2014

29,200 - number of producing oil wells in 2015

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Sask. rated high for mining investment

According to the Fraser Institute's 2017 Survey of Mining Companies, which evaluates 109 jurisdictions, Saskatchewan's mining investment attractiveness ranks first worldwide

Saskatchewan is singled out for several advantages including:

High standards for environment, sustainable development and safety

World-class research and development, led by the universities of Saskatchewan and Regina, the Saskatchewan Research Council, the International Minerals Innovation Institute and the Canadian Light Source synchrotron

One of the world's largest exploration sample processing labs, with expertise in uranium and diamonds

Central location with excellent transportation services to North American and offshore markets

A list of companies with exploration and development projects that would consider investment proposals can be found at http://economy.gov.sk.ca/investment_opportunities

Firm commitment to enhance and sustain industry competitiveness

High-quality, extensive and easily accessible geoscience information, including online mineral deposit models can be found at <http://economy.gov.sk.ca/geopub>

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No payroll tax

No health insurance premiums

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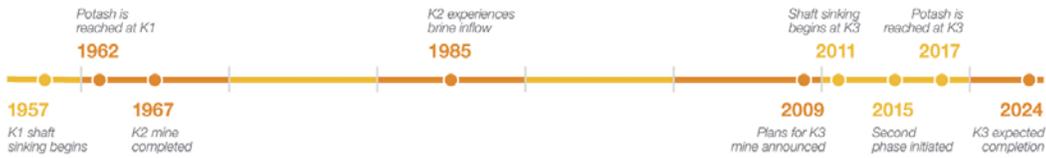
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Mosaic K3 Timeline and facts

Before we went down, we had to go up

The North K3 headframe towers more than 380 feet above the prairies. This structure houses two massive hoists — the Koepe and Blair. The Koepe has skips that bring potash to the surface from nearly a kilometer underground. The Koepe hoist will move 60-ton skips, capable of lifting 10 million short tons of potash per year.

The Blair hoist will carry a cage for people and equipment.

Shaft sinking: a descent through time

Mosaic used state-of-the-art technology like 3D seismic and exploration drilling to study the geology of the K3 mine for years.

To reach potash, two 20-foot diameter shafts were built.

To sink the shaft, freezing technology is used to control water inflow. A cycle of drilling, blasting and mucking are used to break up each layer.

An excavator suspended from a platform, known as Galloway, removes blasted muck with a large bucket and carries it to the surface.

3,350 feet below

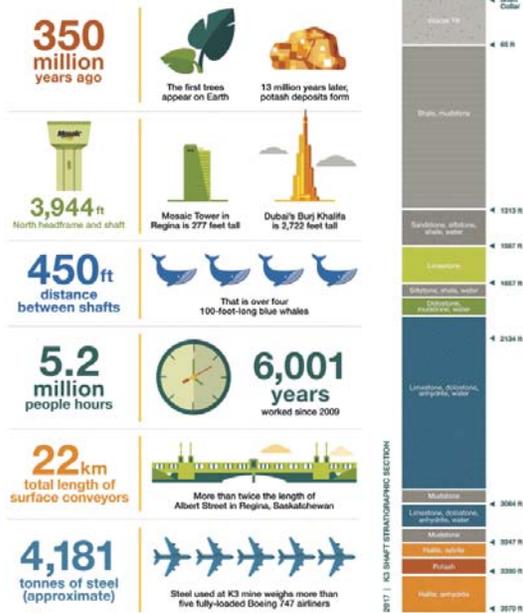
On Friday, February 16 at 3,350 feet, the potash zone was reached at K3. This marked a significant milestone for the project and for shaft sinking in Saskatchewan.

From vertical to horizontal

Once shaft sinking is complete, mine development begins by first cutting a horizontal pass between the two shafts. Much of the required infrastructure will be added underground, including equipment that will be lowered and reassembled for mine development and future production. Moving along

On the surface, a conveyor system to transport ore from the new mine to the existing mills at K1 and K2 is under construction. Upon completion of K3, Mosaic's Esterhazy operation is expected to be the largest, most competitive underground potash mine in the world.

K3 demonstrates Mosaic's commitment to the long-term sustainability of our operations and the vision we have for the future. Mosaic has a long and proud legacy in Esterhazy.



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At Mosaic, we believe our success is rooted in our people. Generation after generation, we've built a company and community where they can grow. Through innovation, sustainability and strength – our commitment reflects their efforts to create a legacy we can all share. Together, we can see tomorrow from here.

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Amanda Ruller showing George Kaczmar the interactive Mosaic display.



People viewing some of the displays at the open house in Esterhazy on Wednesday.

Mosaic hosts K3 to K1 conveyor open house

BY KARA KINNA
Mosaic held an open house in Esterhazy on Sept. 27 to share their plans for a conveyance system that will transport potash ore from the new K3 mine to the existing K1 mill.

For the past five years Mosaic has worked to complete two production shafts at K3. Work on the K3 project is expected to continue into 2024.

As part of the K3 project, two conveyor systems are being built to carry potash ore from K3 to the existing mills at K1 and K2. The conveyor to K2 is already under construction. At their open house Wednesday, Mosaic invited the general public to find out more about the conveyor that would be built from K3 to K1.

"We're holding this open house because we are doing engineering for a similar conveyor going to the K1 site," said Bernie Boutin, Senior Manager of Engineering at K3, during the open house.

"We have the north headframe that's been constructed and they have been sinking a shaft. They've reached shaft bottom and now they are developing the shops and the shaft bottoms in preparation for shaft bottom steel. What they are working on is starting to develop the underground workings and they start at the bottom of the shaft.

"On surface we're constructing the K3 to K2 overland conveyor, and it will convey ore from the K3 to the K2 mill, and it is an 11 km long conveyor.

"Back in the spring of 2015 that's when we had the open house for the K3 to K2 overland conveyor. Similarly this is the open house for the K3 to K1 overland conveyor.

"The K2 overland conveyor will be complete and in operation by October of next year and we plan to be hoisting ore from K3 site by mid next year. The underground development continues. As we hoist ore up to surface, we will dump it on the K3 to K2 overland conveyor and then it goes over to the K2 site.

"The K1 conveyor is the next phase of the K3 expansion. Our plan is to start construction in 2019 and then have it operational by 2022. It's approximately 11 km long as well."

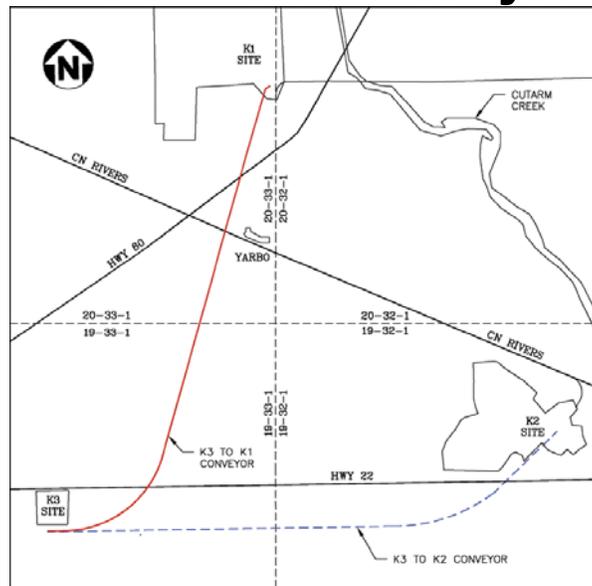
K3 will be an entirely separate mine from K1 and K2, but using the conveyor system will allow Mosaic to use the existing mills at K1 and K2.

"K1 and K2 are managing some water inflow underground and that's the main driver for this," said Boutin.

"We don't have water in the underground workings in the K3. That's why these mines won't be connected."

The plan is to have the new K3 mine fully operational by 2024.

"Underground development takes a lot of time and a lot of effort because



This diagram shows the conveyors running from the K3 site to the mills at the K1 and K2 sites.



From left to right: Lawrence Berthelet (Director, Capital Expansion), Theresa Mann (Senior Engineer), and Bernie Boutin (Senior Manager, Engineering- K3) at the open house Wednesday.

you're actually mining out rooms and putting in infrastructure," says Boutin. "That's a very long process."

Building K3 and the conveyors is a big investment for Mosaic.

"The K3 expansion is a total investment of about \$3.2 billion. And then these conveyor systems are approximately \$200 million each," said Boutin.

Boutin said peak construction for the conveyor projects would see approximately 200 people employed.

Once K3 is open, a shift in manpower will take place from the K1 and K2 sites to K3.

"K3 will be supplying ore to the existing mills and eventually the underground operations move over to K3. It's a neutral shift in manpower. The majority of the increase in manpower occurs during construction activities," said Boutin.

The two conveyors being built will be above ground and will carry ore overland to the mills at K1 and K2.

"They are an enclosed structure and they have a roof, they are enclosed on the top half and they have guarding on the bottom half on both sides," said Boutin.

He said environmental concerns were taken into consideration.

"There's a lot of considerations you take to minimize impact on the environment. You have to build a conveyor roadway and we minimized that impact to adjacent water lands and stakeholders and neighbors, etc.

"Prior to construction you have to do environmental studies, biological studies, you look for various endangered species or plants or animals, you do a cultural survey—there's a lot of preparation work prior. There's noise and dust sampling. And then the same type of survey work has to occur when the conveyor is in operation."

Boutin said the conveyors will have minimal impact to the environment.

While Mosaic is the first potash mine to use a conveyor system, the conveyors are not unique to the mining industry and other industries.

"These conveyors have been used in the oil sands, they've been used in the coal industry in the southern U.S., in South America—they've been used across the world," said Boutin.

What is the benefit of using a conveyor as opposed to building a new mill at K3?

"It's more efficient, it's not as costly and you can use the existing infrastructure at the existing sites," said Boutin.

Boutin says the conveyor projects seem to be moving along smoothly.

"We've worked through most of our challenges and engaged the right stakeholders and ensured the work is being done safely. That's a priority," he said.



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Line 3 replacement project underway

BY KEVIN WEEDMARK

Construction started this year on Enbridge's 1,700-kilometre Line 3 replacement pipeline, the largest project the company has ever undertaken.

Construction began on the Alberta and western Saskatchewan segments of the line in August

Several pipeline projects have been proposed to pass through the Prairies, though this will be the first to proceed. The \$7.5-billion Line 3 replacement from Hardisty, Alta., to Superior, Wis., was approved last fall, at the same time as the Trans Mountain expansion.

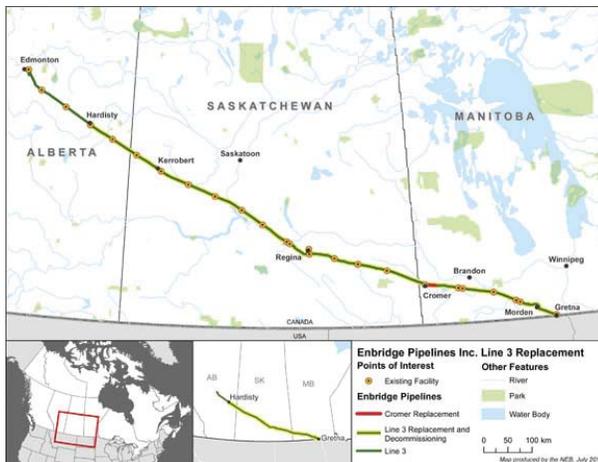
Construction on the Canadian portion of the Line 3 Replacement started this summer in three areas (called spreads) of Alberta and Saskatchewan (Hardisty to Luseland and Rosetown to West of Regina).

Approximately 400 kilometers of pipe will be laid during the first phase of construction. Enbridge noted in an October progress report to the National Energy Board that this month saw construction crews actively pipe stringing, bending, coating, and welding—all the steps that go into building a pipeline—in the first two spreads while surveying and staking activities were taking place along with grading and topsoil removal in the third spread, further east in Saskatchewan.

Suzanne Wilton of Enbridge says the project is going well so far.

"Construction is progressing well and our crews are ahead of schedule, which means weather permitting, we may also get a head start on a fourth construction spread (known as Spread 2)," she said.

"As reported to the NEB, the additional work this year could include top soil stripping and grading of an additional 60 km from Luseland through the Kerrobert area, as far west as Dodsland, Sask."



\$600,000 already funded in areas where construction has begun. In areas where Line 3 construction has not yet commenced, supplementary community investments will be timed to coincide with construction startup, which has not yet been finalized.

As the project moves into future phases of construction, community investment and economic benefits will follow.

"Replacing the existing Line 3 with the newest and most advanced pipeline technology will provide much needed incremental capacity to support Canadian crude oil production growth and U.S. and Canadian refinery demand," said Wilton. "This pipeline is critical energy infrastructure that supports our economy and assures a reliable and cost effective supply of energy."

The existing Line 3 pipeline will continue to operate until the replacement is completed, then will be decommissioned.

The project involves replacing existing 34-inch-diameter pipe with 36-inch-diameter pipe from Hardisty to Gretna, MB, and Neche, ND, to Superior.

Segments of Line 3 from the U.S.-Canada international border to Neche, and near the Minnesota-Wisconsin border to Enbridge's Superior Terminal, will be replaced with 34-inch-diameter pipeline, and are under separate segment replacement projects.

In general terms, the process of decommissioning a pipeline involves: removing the oil from the pipeline; cleaning the pipeline; physically disconnecting the pipeline; segmenting the pipeline and continuing to monitor it.

Over the past decade, Enbridge has transported more than 15 billion barrels of crude oil with a safe delivery record that's better than 99.999 per cent, according to the company.

O.J. Pipelines and SA Energy Group are contracted for the first phase of construction work.

One of the largest private infrastructure projects that Canada has seen, the L3RP—with a cost of \$5.3 billion north of the border—will replace about 1,660 kilometers of existing pipe, from Hardisty, Alberta to Superior, Wisconsin, with modern pipe materials using modern construction methods.

"The project will deliver on jobs and economic benefits to the Prairie Provinces and Canada as a whole," said Wil-

son. "Local communities benefit through employment and economic stimulus—purchase of goods and services locally, accommodation and food. More than \$50 million in community benefits will also flow to Indigenous communities."

The project is expected to generate \$514.3 million in tax revenue to Canadian federal and provincial governments with 24,493 temporary full-time equivalent jobs created in Canada.

As well, Enbridge has pledged \$3 million toward community investment initiatives as part of this project, with nearly

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2017 Mining, Energy & Manufacturing

Canadians have a duty to truly understand energy issues

This nation needs a thoughtful dialogue on energy civics, because Canadians must become far more involved in the way energy policy is shaped and grounded in everyday life.

Wikipedia says: "Civics is the study of the theoretical and practical aspects of citizenship, its rights and duties; the duties of citizens to each other as members of a political body and to the government."

That would ring true for those Canadians who take more than a passing interest in the affairs of government and politics, and what it means to their lives. They take it as their civic duty.

Two words stand out: rights and duties.

But too many Canadians are prone to squawk loudly about the first and remain curiously silent about the second.

Yet rights and duties are inextricably bound together. In many respects, one requires the other to function.

Take this puzzling energy paradox as an example: Canadians will argue that they have a right to clean, abundant and low-cost energy. But rarely will they be curious about the duties required to support that right. Put bluntly, Canadians tend to be energy entitled. They often have no clue about the real costs—social, political, economic and even moral—of a sustainable energy economy.

It's downright confounding.

And it's landed Canada in what is a decidedly uncivil energy discourse.

In a civil society, citizens are bound together—and function together—based on common interests.

Energy should be one of those collective interests. But it's not.

Canadians generally don't understand they have a duty to be informed about energy dynamics. Politicians, media, industry, non-government organizations—all the actors in our energy drama—have failed abysmally in making Canadians more energy literate and therefore



Bill Whitelaw

more legitimately involved in the process.

The consequence of that ignorance? A polarization in important discussions that should bind Canadians together but in fact are tearing the nation apart.

Take the carbon dynamic. If there ever was a conversation Canadians should have based on knowledge and rational thought, it is about how best to work through the challenges (and opportunities) of creating a sustainable low-carbon economic model.

Canadians clearly think we have a right to a healthy environment. But turn to talk about the duties required to make that happen and things become a little murkier. The dynamics of duty are complex, to be sure, and there is no one-size-fits-all model for Canadians.

But there is one common foundational plank. At its most basic level, the baseline duty is to be informed, certainly above what most Canadians could now legitimately claim to be in regard to energy.

But here we are, embroiled in carbon conflicts, and a great portion of the population appears functionally illiterate on the topic. The result is political polarization and an under-informed populace whose views ought to be shaping the discussions.

So politicians move forward on assumptions of what voters ought to want, rather than knowing. Activists do the same thing, based on what they think folks ought to want.

It all flows from a general failure of Canadians to do

their duty: to be informed and participate in civil society. That failure creates a civics vacuum. And we all know politicians and activists abhor such vacuums.

At the same time, the energy industry rarely recognizes such vacuums proactively. It typically shows up late to the party. The result is an industry proclivity to lecture Canadians on how a robust energy sector facilitates and enables high-quality standards of living.

And that hardly constitutes the kind of thoughtful dialogue on energy civics that is so badly needed in this country.

Bill Whitelaw is president and CEO at JuneWarren-Nickle's Energy Group.

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Line 3 construction

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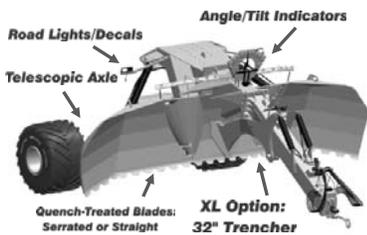
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Saskatchewan mining facts

In 2015, Saskatchewan produced 11.1 million tonnes of potash with a sales value of \$6.1 billion. In 2014, potash production and value of sales were 10.3 million tonnes and \$5.7 billion, compared to 9.7 million tonnes and \$5.6 billion in 2013, and 8.8 million tonnes and \$6 billion in 2012.

Since 2005, the industry has committed over \$20 billion for the development of expansions and new potash mines in Saskatchewan. The expansions will nearly double the province's potash production capacity.

Potash production in Saskatchewan has been continuous since 1962 when Mosaic completed its K-1 mine at Esterhazy.

The potash reserves in Saskatchewan are massive. By conservative estimates, Saskatchewan could supply world demand at current levels for several hundred years.

The Saskatchewan potash industry typically accounts for approximately 30 per cent of world production, and directly employs over 5,100 people, while contributing to the livelihood of thousands more.

All of Saskatchewan's current potash producers make sales destined for all markets outside North America through Canpotex, a Saskatoon-based marketing company owned by its member companies.

The United States typically accounts for ap-

proximately 45 per cent of Saskatchewan's potash exports. Latin America and the large Asian offshore markets of China, India, Japan, Malaysia, Korea, and Indonesia make up most of the remainder of Saskatchewan's potash exports. High-quality, economically mineable deposits of both potash and uranium are currently produced in relatively few jurisdictions in the world. Canada, Russia and Belarus together account for just over two-thirds of global potash production, and Kazakhstan, Canada and Australia produce two-thirds of the world's uranium.

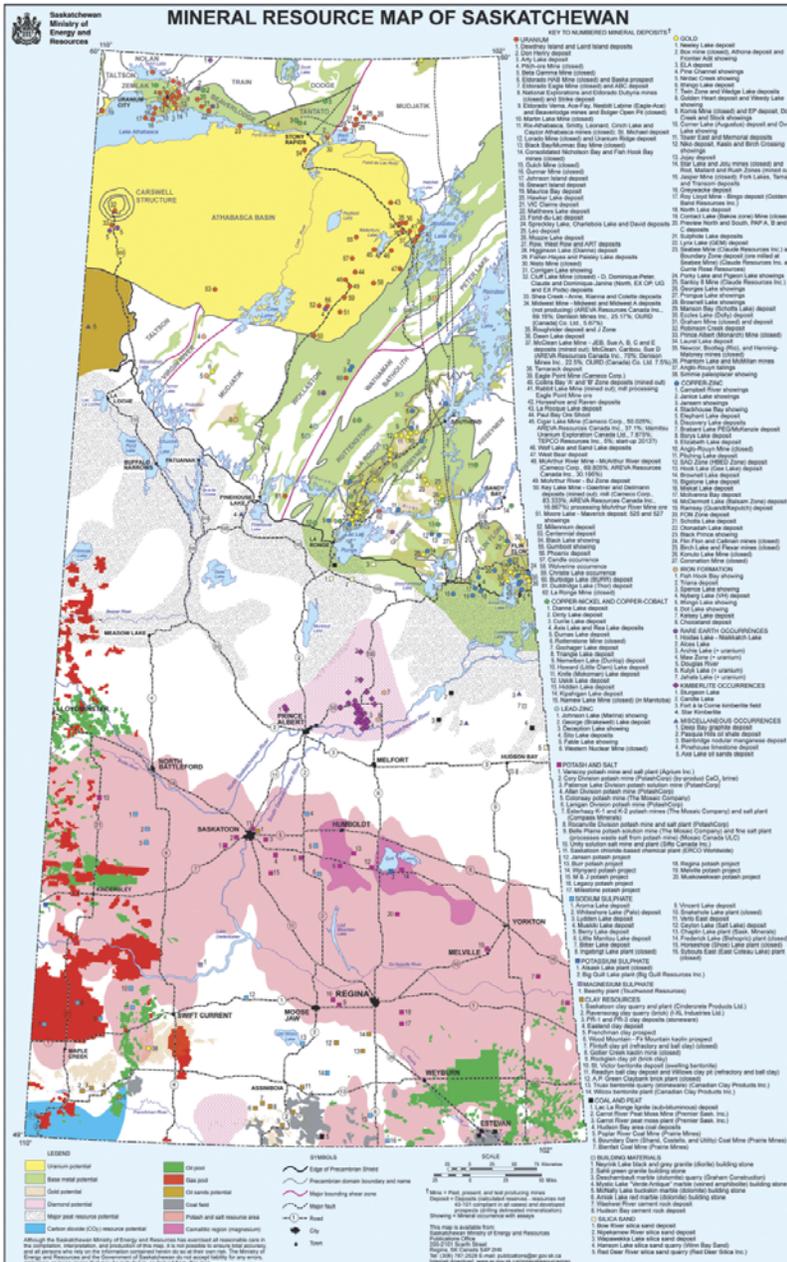
Saskatchewan has the largest high-grade reserves in the world for potash and uranium.

The province boasts almost half of world potash reserves and eight per cent of known recoverable uranium reserves.

Canada's mineral production was valued at \$44 billion in 2013. Potash, coal and iron ore were the leading commodities by value of production.

In 2013, 15.8 million tonnes of potash was produced from 10 potash mines in Saskatchewan, including eight conventional underground mines and two solution mines. PotashCorp owns and operates five mines (Rocanville, Allan, Lanigan, Cory and Patience Lake). The Mosaic Company owns and operates four mines (Esterhazy K1 and K2, Colonsay and Belle Plaine) and Agrium owns and operates one mine (Vanscoy).

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2017 Mining, Energy & Manufacturing

A spiral of failure when the drill bit doesn't turn

An old proverb makes connections where they seemingly don't exist to show that all actions have consequences, often unintended.

It starts with the loss of a single nail that affixed an iron shoe to a horse's hoof. The linking narrative builds from there.

Most often attributed to Benjamin Franklin, the proverb offers simple homespun logic, building to a powerful conclusion.

For want of a nail the shoe was lost
 For want of a shoe the horse was lost
 For want of a horse the rider was lost
 For want of a rider the message was lost
 For want of a message the battle was lost
 For want of a battle the kingdom was lost
 And all for the want of a horseshoe nail.

The proverb has morphed over the years to adapt to changing contexts and circumstances. But its underlying essence remains unchanged: little things can have big consequences and sometimes you have to work hard to connect the dots.

Just ask the thousands of Canadians and their families who are the human dots—and have been profoundly disconnected from the normalcy of being employed as Canada's oil and gas sector crashes and burns.

What's most frustrating for them is that Canadian politicians, while generally sympathetic, seem only vaguely aware of the consequences when drill bits don't turn. They don't connect the human dots to the real consequences of an energy sector on its knees and the implications for the Canadian economy—and, therefore, ordinary Canadians.

The tough reality is that the men and women who run for public office, regardless of party affiliation, are generally well-intentioned but in matters of energy, frequently poorly informed. More often than not, they know little more than those who voted them into office.

And if Canada has a problem bigger than politicians without the credentials or experience to shape meaningful policy, it's a body politic that is woefully and shamefully ignorant of the complex energy dynamics that shape and define their world.

The catastrophic state of the nation's petroleum sector



Bill Whitelaw

barely registers on most Canadians. They have no sense of the longer-term impacts it will have on their lives. Perhaps a requirement for citizenships should be a basic course in energy civics.

Our energy future is being shaped by individuals who came to office with good intentions but bad energy backgrounds. For the most part, their source of energy intelligence and insights comes from bureaucracies too often suffering from their own energy myopia.

It opens up the very real possibility that political action and policy creation will produce consequences diametrically opposite of the intended objectives. (Current debates over carbon pricing and carbon taxes are perhaps

the most useful example at the moment.)

In the spirit of the proverb's flexibility over time, here's a contemporary variant that remains true to the original theme. It will certainly resonate for the thousands of Canadians who today bear the consequences of the profound collapse of Canada's oil and gas sector—those who know well what happens when the drill bit doesn't turn.

For the want of a bit the well was lost
 For the want of a well the job was lost
 For the want of a job the career was lost
 For the want of a career the family was lost
 For the want of a family a sector was lost
 For the want of a sector an economy was lost
 And all for the want of a drill bit.

Many Canadians would be happy if at least one politician understood the simple, undeniable logic of this updated version.

Bill Whitelaw is president and CEO at JuneWarren-Nickle's Energy Group.

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