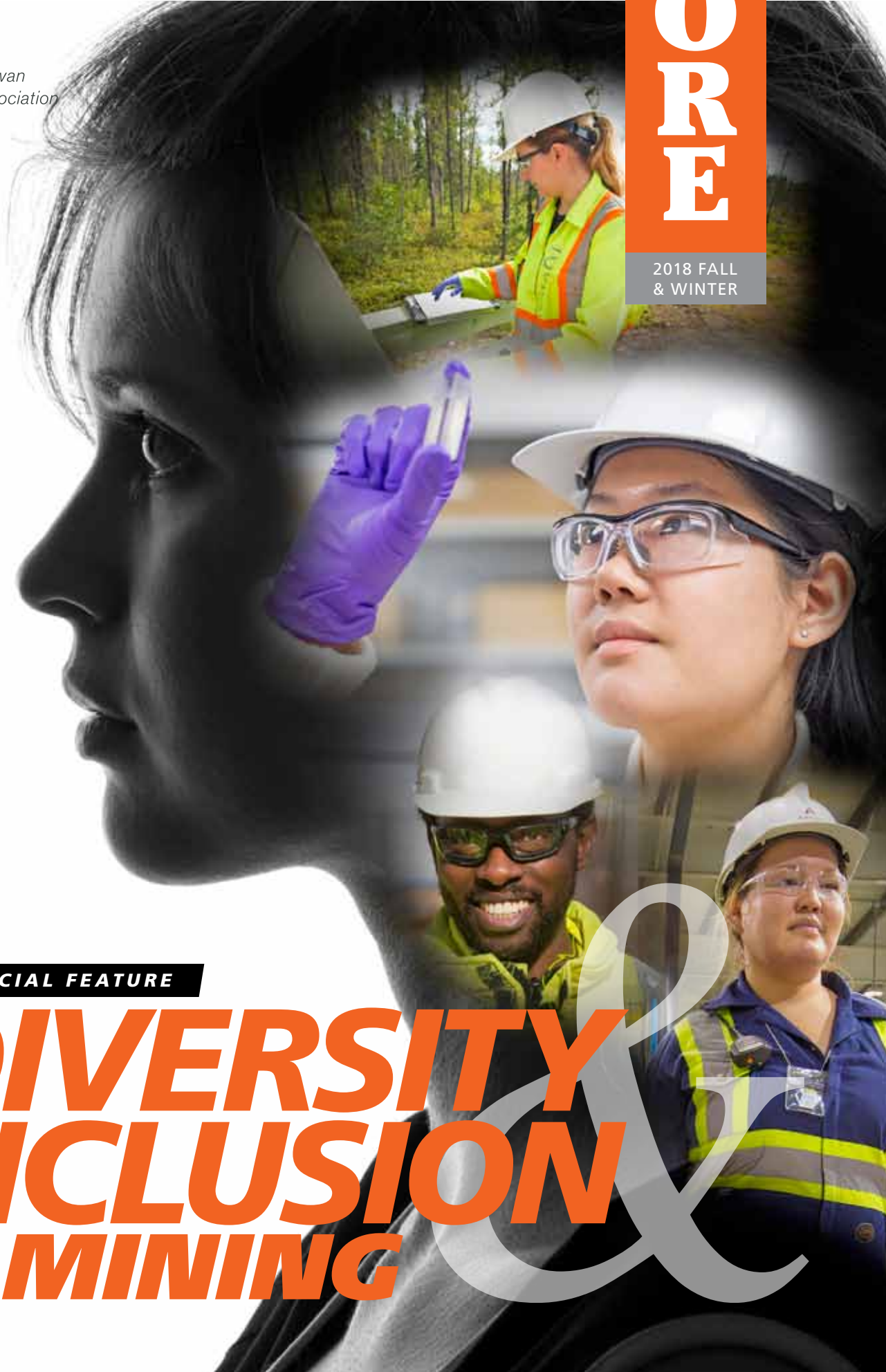




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SPECIAL FEATURE

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INCLUSION
IN MINING**





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Women are becoming increasingly involved in mine rescue. See story on page 22

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COVER PHOTO

Saskatchewan mining is evolving into a more diverse industry. In this edition of ORE, we explore the advances in gender inclusion, employee diversity and the programs that are making it happen.

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A MESSAGE FROM
SMA PRESIDENT, PAM SCHWANN

DIVERSITY AND INCLUSION

Changing the Face of Mining

Today's mining industry is changing fast – in both the types of technology used to explore for and mine ore, but also in what the face of a miner looks like.

It used to be that when you thought of mining, a stereotypical image of a middle-aged male with a grimy face, carrying a pick-axe or shovel, came to mind.

Today's mining industry is changing fast – in both the types of technology used to explore for and mine ore, but also in what the face of a miner looks like. While men still make up the dominant demographic within the mining sector, you are now starting to see women in management roles, and in "non-traditional" occupations such as engineering and trades. Indigenous communities across Saskatchewan are becoming more involved with the mining sector, including through both employment and business opportunities.

This edition of ORE explores how diversity and inclusion initiatives are literally changing the face of mining.

The question really is, what company wouldn't want the best and brightest working for them, regardless of the demographic, whether that be race, ethnicity, gender, sexual orientation, age, social class, physical ability or religion? Ensuring that all of society is welcomed and respected in our mining workplaces will provide the inclusive environment needed to successfully recruit and retain this skilled, representative workforce.

As we have seen in the pipeline stalemate in Canada, vocal community support is critical in determining whether a project proceeds in a timely and predictable manner. A company with a workforce that reflects the communities it operates

in is better able to anticipate potential concerns and address them, as well as understand what actions would benefit a community. A diverse and inclusive workforce is increasingly recognized as a business imperative for a company to be successful and this issue of ORE looks at some of the workforce initiatives underway at our member companies as well as the benefits that a diverse workforce offers.

Many of the barriers to having a representative workforce are societal in nature, and having a representative workforce isn't something that a company or sector can do on its own. There are many obstacles to entering careers that are common in the mining sector, and just as many deflections point off that pathway that need to be addressed. We can all do our part to ensure that future generations are exposed to inclusive learning environments that enable children to develop their interests, and then foster these interests into future career options. Insight into interactive experiences that offer this exposure are provided in the articles about the new Nutrien Children's Discovery Museum in Saskatoon and the SMA Youth First Responder Boot Camp.

This edition of ORE also looks at the diversity in technology that is being adopted to gather information and reduce the environmental footprint of exploration and mining as well as the multiplicity of uses for potash – one of the key minerals mined in Saskatchewan. We've come a long way. 🏔️

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Foundations
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THE IMPORTANCE OF *Diversity*

Susan Jones is the first woman to serve as President of Potash with a major Canadian mining company. Ever.

She started her role with the newly-formed Nutrien at the end of May, and while she recognizes her position is trailblazing, she prefers not to spend too much time talking about the milestone as her own.

"I have been supported and sponsored by men and women. It's not a female game. This is about everybody getting on board. However, by virtue of my position, it does elevate the mindset; and if it takes that to achieve it, I'm all in."

For Jones, welcoming diversity in the workplace, inclusive of gender, sexual orientation and Indigenous and immigrant peoples, is not just the right thing to do from a human respect perspective. There's a crucial business case to be made for it, and Saskatchewan mining companies are striving to make it happen.

"You have to just prove it out. And we know as a company that once you get over a 30 per cent threshold, you get to a tipping

point where the diversity is making a real difference. That's why we're looking at our senior leadership gender diversity targets and asking if they need to be higher.



Alice Wong, Senior VP and Chief Corporate Officer, Cameco Corp.

"Businesses with diversity are more successful. From my perspective, diverse teams by way of gender, cultural background and work experience, the decisions are richer. Having diverse views around the table, you arrive at much richer and well thought-out decisions because people are coming at it from all directions."

The research, although most of it has been done on the gender front, bears her out. In 2014, a Gallup study of 800 business units showed gender-diverse businesses have 14 per cent higher average revenue and 19 per cent higher average quarterly net profit than their less-diverse counterparts.

Another study conducted by MSCI Inc. from 2011-2016 found that American companies with at least three women on their boards had 45 per cent higher earnings per share compared to companies with none.

Jones has seen it in action. Over three years working in Europe, she was in a scenario of "diversity on steroids" where managers came from many countries including Belgium, Romania, Bulgaria, Italy, France

and the United Kingdom. But there were no other women at the leadership table.

"While I was there, I made a deliberate effort to diversify the gender balance on the leadership team. And the men said we were a better team for it," she said. "It's not just me telling people it's better. It's people seeing it, and voicing it."

"We currently have a 20 per cent target of women in senior leadership roles," said Jones. "Our board of directors gender diversity target is 30 per cent, so it starts from the top. We are a new company and we will be looking to be more aggressive in our targets. In addition to that, we focus a lot on supporting and providing education to a pipeline of women coming up the ranks."

Orano Canada and Cameco Corp., the two major operators in the Saskatchewan uranium industry, have been working hard at improving their diversity and inclusiveness for decades. Both companies routinely achieve 45 per cent Indigenous employment at the northern mines and mills.

"This impressive diversity number is in part due to the fact that since the onset of their operations, Orano and Cameco have had preferential hiring practices and multiple pick-up points from northern Saskatchewan," said Tammy Van Lambalgen, Vice-President Corporate Affairs and general

counsel for Orano Canada.

"It's important to Cameco," said Alice Wong, Senior Vice-President and Chief Corporate Officer at Cameco Corp., who was among the first group of women in high-ranking leadership positions at Saskatchewan mining companies.

"Particularly when you talk about Indigenous people, it's extremely important to have local hiring. Communities get engaged, and there's lots of local buy in."

It took commitment to entice employees and prepare them for the jobs available at the mine, but Cameco bore down and made it happen.

"At the beginning, it was a different work atmosphere for them," said Wong. "It was about engaging them and making sure they understood what it would be like working at an industrial site. We learned it was all about ensuring there was support in place to provide this background."

"It's the same with all diversity: if you haven't worked at a mine site before, it's important to have that kind of orientation. We learned a lot from that."

While great success has come from Cameco's programming, Wong said the company would like to see more northern people move up into higher positions.

"There's some work to be done there

and we're working to see what can be done about that, including discussions with different training institutions."

While Cameco's first focus was on Indigenous employees, "we have been focused the last couple of years on the gender piece, as well," Wong added. "We wanted to understand the challenges for women at all our operations, including head office."

To that end, Wong met in small groups with women across Cameco's operations and came away with a better understanding of how to improve human resources programs to ensure they are inclusive.

"We're doing a review of our facilities, all our industrial sites, to make sure there are no accessibility issues for women or for other groups as well."

"We're going to do a review of our gender pay equity. We're pretty sure we're in good stead, but we're reviewing it."

"We are like most companies in this space. We are trying to make progress. It's challenging but it's the right thing to do — for your company competitively, because we do believe it helps position the company to perform better financially."

"It's the right thing to do also from the people side. If you don't have a diverse mix that reflects the community, reflects the

Having diverse views around the table, you arrive at much richer and well thought-out decisions.

SUSAN JONES
PRESIDENT OF POTASH,
NUTRIEN



world, how do you make decisions in the company that reflect those people? You become singularly focused if you are all the same. You need a mix, to make sure you don't have that group think."

Orano's Van Lambalgen agrees with Jones and Wong that a diverse, inclusive workforce contributes to a company's prosperity and sustainability.

"Not only does having diverse voices at the table improve decision making and business performance, but it contributes to employee satisfaction and engagement," she said.

Orano's McClean Lake site constantly works hard to maintain and improve the number of opportunities for Indigenous community members with innovative programs such as the Mill Utility Operator Trainee program for Mill Operator positions, as well as trades and technical apprentice programs to promote opportunities beyond the entry-level positions, said Van Lambalgen.

"The concept of employment equity or prohibition of discrimination in the workplace has been in place for over 40 years," she said. "At the very basic level, companies should have policies in place to prohibit discrimination in the workplace and I believe that all Saskatchewan mining companies are clearly beyond this minimum.

"But despite this, more needs to be done to promote diversity and inclusion, not only for the Indigenous population but for women and other minorities. As an executive in a mining company and member of the SMA board of directors, I have been pleased to see that the number of women in the senior positions is slowly increasing. But we still need to do more to ensure a representative workforce across all positions including at the CEO and corporate board levels. The mining companies are working on this."

Van Lambalgen said she was pleased that there is an active discussion at the SMA board level regarding inclusion of women in all positions.

"These discussions are being led by my male counterparts, who clearly deeply value the contribution of having a diverse workforce and want to recruit, retain and promote women in their companies. These discussions have been amazing," she said.

"Orano also is looking hard at its programs to ensure that we also actively promote inclusion at not only our mine site but our Saskatoon office. Initiatives such as cultural training and even mental health awareness open the door to discussions about individual differences and promote discussion and inclusiveness within the workforce.

"Our goal is to make our diverse work-

force feel included and engaged."

Mosaic Company, the first company to have a woman general manager at a Saskatchewan potash mine — Nancy Case at Belle Plaine — is now ramping up both its gender and Indigenous strategies.

"Philosophically, it's important to us as an organization to be representative of the communities we operate in," said Lisa Poissant, Vice-president Human Resources, Potash, for Mosaic. "You want to have the broadest group from which to access employees. The more participation you have from all members of your communities, the more perspective you have.

"There's real value in having people from different backgrounds bringing different viewpoints into the workforce, and having that diversity of thought as well.

"We wanted to understand the challenges for women at all our operations."

**ALICE WONG,
SENIOR VICE-PRESIDENT AND
CHIEF CORPORATE OFFICER,
CAMECO CORP.**

Mosaic is renewing its focus on gender diversity in 2019. "We have already been doing some work in the area of gender diversity," said Poissant. "We'll be looking at a more holistic strategy going forward."

Mosaic also supports and engages in the Women in Mining/Women in Nuclear (WIM/WiN-SK) mentorship program, which has allowed young technical female professionals to gain perspective on how they might build their careers, said Poissant.

"What's interesting about that program is the mentees and mentors are not necessarily in the same organization. That's unique in my view; people in the same industry but from different companies coming together to support early-career women professionals."

The company has also doubled its efforts on Indigenous engagement, with a goal to achieve 15 per cent of its community investment, procurement and employment among Indigenous communities.

"If there's a population that represents 15 per cent of the population of your province, and that population isn't participating in the workforce, you're missing out on potential employees, from a business case

perspective," said Poissant.

"Our goal has been to hire 15 per cent of our new hires to be self-declared Indigenous. For this year, we're just over 17 per cent, so we've seen some great progress there."

BHP, the massive Anglo-American firm now developing a potash mine near Humboldt, Sask., has a target of increasing female diversity to 50 per cent of the company's workforce by 2025.

Since the target was set in 2016, BHP has employed 2,000 more women, and raised the proportion of female workers from 17.6 per cent to 22.4 per cent. The company's strategy includes offering more flexible working hours, allowing women to stay in the workforce while they also raise families.

BHP's chief executive officer Andrew Mackenzie told *The Financial Times*, "Without new initiatives it would take us 30 years just to get to 30 per cent female representation.

"More must, and will, be done. And our 2025 aspirational goal is to achieve gender balance at all levels of the organization over the next decade."

The Canadian mining industry overall takes diversity and inclusion so seriously, it has its own Mining Industry Human Resources Council (MiHR). Executive Director Ryan Montpellier says MiHR's vision is to build a diverse, sustainable, safe and skilled Canadian mining workforce that is recognized globally.

Montpellier speaks to the national mining scene, and has worked closely with the SMA. He singles out Cameco and Orano on one factor.

"When it comes to Indigenous inclusion, Saskatchewan has been leading especially with its uranium mines," said Montpellier.

"In terms of female participation in Canadian mining, this is probably where we see the largest challenge in our sector, to recruit and retain women. Forty-eight to 49 per cent of the Canadian labour force is women; in mining that number is around 17 per cent.

"Clearly we need to recruit, develop and retain the next generation. We have an older workforce getting set to retire; we have to recruit a tonne of people in the next decade. Women would represent the largest opportunity to do that."

The problem is twofold, Montpellier said. One is a mining issue, but the other is more of a societal issue. Women are not choosing to pursue careers in the jobs the mining industry hires for.

"For example, for trades occupations, things like electricians, pipefitters, plumbers, carpenters, these are all occupations the mining industry hires for. Women make up two per cent of those trades in general, and in the mining sector as well."

In mining’s professional and geoscience positions, 16 per cent are women as compared to 20 per cent in other industries.

“The bulk of the issue is not that women aren’t choosing mining – it’s the occupations in mining that women aren’t choosing early on in their careers.”

Indigenous participation in the mining workforce, however, is increasing.

“If you look at Canada as a whole, Indigenous people represent three per cent of the workforce and six per cent of the mining industry. The mining industry has significantly outperformed other industries in that respect,” said Montpellier.

Improvement has come through proximity to Indigenous communities and partnership agreements: most impact and benefit agreements highlight employment and offer “tremendous training and recruitment of local talent,” he added.

Indeed, the mining industry is the largest

private sector employer of Indigenous people, with about 12,000 of 200,000 people working in the industry overall.

Immigrants continue to be a bit of a challenge for the mining industry, added Montpellier.

“They make up 23 per cent of Canadian

labour force, but 19 per cent of the mining labour force. There are a few reasons for that. Most new Canadians tend to settle in larger urban centres. Most of the employment opportunities in mining are in rural or remote communities, or smaller urban centres like Fort McMurray, Sudbury and Saskatoon.”

MiHR does not yet have statistics on LGBTQS2 or people with disabilities, but Montpellier said companies are starting to explore and put in place diversity policies around race, country of birth and sexual orientation.

“Our goal is to help build a more diverse, safe, skilled and adaptable mining workforce. We do that by working with almost all mining companies in Canada and 250 industry volunteers who collaborate on making sure the industry has the right people with the right skills at the right time, to build a more effective workforce.”

Our goal is to make our diverse workforce feel included and engaged.

**TAMMY VAN LAMBALGEN,
VICE-PRESIDENT CORPORATE AFFAIRS
AND GENERAL COUNSEL,
ORANO CANADA**





Michael Shellenberger, keynote speaker at the WiN Canada conference, with, at left, Veronique Loewen of Orano Canada, and Anne Gent, president of WIM/WiN-SK; Heather Kleb, President of WiN-Canada, to his right; and Tina Searcy, also of Orano, far right at the WIM-WiN conference in Saskatoon

WOMEN CAN LEAD THE CHARGE FOR NUCLEAR POWER: EXPERT

Michael Shellenberger was once a well-known environmental and anti-nuclear activist in the United States.

That was until an extended period of epiphany from 2007 to 2011. As he continued down his eco-path, he began to realize that nuclear power was not the problem. In fact, he recognized it as the biggest solution to climate change. He read everything he could find on the subject, travelled widely and thoroughly investigated the subject.

Today, Shellenberger is a well-known environmental and pro-nuclear activist, and the founder of Environmental Progress, a nuclear power lobby organization. He is also a Time Magazine "Hero of the Environment," and a regular contributor to Forbes, Scientific American, Nature Energy and other publications.

In 2016, he presented a TED Talk entitled "How fear of nuclear power is hurting the environment," which along with his 2017 talk have been viewed 1.5 million times.

In the speech, he noted that while clean energy sources have increased over the last 20 years, the percentage of electricity globally produced from clean sources has

actually dropped from 35 to 31 per cent, and that's obviously going the wrong way.

There's a strength in asserting the superiority of nuclear. It's the greatest technological achievement in many hundreds of years.

MICHAEL SHELLENBERGER

"If you care about climate change, you have to go the opposite direction to 100 per cent from clean energy sources as quickly as possible."

And that means persuading the global public to embrace nuclear power.

Shellenberger brought that message along with his considerable credibility to Saskatoon in October, when he addressed the Women In Nuclear (WiN) Canada conference.

But he had another message for the large group of women in the room, and that was their importance to the cause.

Why do 74 per cent of men but just 45 per cent of women favour nuclear? Why do so many women view it as dangerous? The world needs a new perspective on nuclear power, he argued, and that perspective is an emotional, more holistic approach — whether the viewpoint comes from a woman or a man. And the women today who wield influence in nuclear organizations can make an enormous difference.

In explanation, he pointed to Marie Curie, the famed Nobel-prize winning female physicist and chemist, who saw the benefits of radioactivity and would not waver in her cause.

Radioactivity is often cited as one of the problems of nuclear power; yet radioactive medical testing has saved millions of lives since Marie Curie used it in the service of humanity, said Shellenberger.

Like Curie, “we have to be more emotional” in advancing the benefits of nuclear power in the age of climate change.

“There’s a strength in asserting the superiority of nuclear. It’s the greatest technological achievement in many hundreds of years. Its effect on medicine alone is extraordinary.”

But energy generation from nuclear is the present issue, and we are in nothing less than a climate crisis without it, he said.

“According to the most comprehensive and recent study published in the British medical journal Lancet, nuclear power is the safest way to produce reliable electricity.

“Nuclear doesn’t contaminate the air, and air pollution results in the premature deaths of seven million people per year.”

But facts like these don’t matter enough because if they did, nuclear would be the most popular source of energy in the world. And it’s not; indeed, we are in danger of losing four times more nuclear power now than the loss over the last decade.

All forms of energy come with their own challenges. For example, solar panels produce 300 times more waste than nuclear plants, and require 5,000 times more land space to produce the same amount of energy.

Wind turbines disrupt migration patterns and kill birds, and have caught on fire, killing people performing maintenance on them.

Solar and wind have been making huge strides, and some people believe that will make enough difference to climate change. But it will not come fast enough, said Shellenberger. The pollution argument is particularly compelling: nuclear is even lower-carbon than solar, and beats all electrical generation sources other than wind.

Given the many benefits of nuclear, the question is, why doesn’t nuclear enjoy broader support? Schellenberger says that in part, it’s because of a long history of irrational stigmas perpetuated by emotional appeals to the public by institutions like the Sierra Club, and celebrity activists like Jane Fonda, who starred in the anti-nuclear movie *The China Syndrome*, he said.

The gender gap was wide at the nuclear table, and the engineering-focused, male-dominated nuclear industry wasn’t able to effectively counter the anti-nuclear messaging. Technical facts from the nuclear industry were difficult to understand, while emotional arguments were more compelling to many in the public.

“The cause of the clean energy crisis is not from our machines. It’s from within ourselves,” he said in his TED Talk, adding, “We’re not in a clean energy revolution. We’re in a clean energy crisis.”

In Saskatoon, he exhorted the women of

WiN to spread the message that nuclear is the solution to the clean energy crisis.

“It’s a vocation,” he said. “It’s a life commitment. Let people see your commitment.”

Anne Gent, President of Women in Mining and Women in Nuclear Saskatchewan (WIM/WiN-SK) and a Director of the WiN Canada Board, said the 15th annual WiN-Canada conference welcomed more than 200 delegates from across the country to Saskatoon in October. The participants represented more than 45 companies working in nuclear, radiation, mining and other supporting industries.

Gent said both the provincial and national WiN organizations recognized that a joint partnership, the first of its kind, would help each to grow membership and spread the message to a new audience.

“As Saskatchewan is home to the world’s richest uranium mines, it was a natural fit,” she said.

“As a woman in the nuclear industry, I, like many others, consider myself an advocate. As an industry insider, all of us may be asked about uranium radiation or nuclear power at any time by our friends, family or acquaintances. Events like this conference allow us to network and expand our knowledge of the industry. As discussed by Mr. Shellenberger, women play a key role in the public acceptance of nuclear power.”

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ABOUT WOMEN IN NUCLEAR

Women in Nuclear (WiN) Canada is the Canadian chapter of WiN Global. Founded in 2004, WiN Canada has promoted the role of women in the Canadian nuclear and radiation related industries. As its website explains, “WiN Canada brings women together into a supportive environment to provide opportunities to succeed through mentoring, networking, and personal development initiatives.”

WiN Canada has a diverse membership representing skilled and technical disciplines, as well as those who support the industry in other roles such as lawyers, accountants, financial professionals, salespeople and administrators.

WiN Canada works to make the public, especially women, aware of the many benefits of nuclear energy and radiation applications, and the career opportunities that they provide. To learn more, go to canada.womeninnuclear.org/about.

WIM/WiN SASKATCHEWAN

WIM/WiN-SK supports the goals and objectives of their parent organizations on a provincial level.

WIM/WiN-SK aims to provide opportunities for personal and professional development for members working within the fields of minerals, mining, nuclear and radiation; and to make the public aware of the benefits of minerals, mining, nuclear, and radiation applications and of the safety measures undertaken to ensure protection of the public and the environment.

Provided by the Ministry of Energy and Resources, Government of Saskatchewan

POTASH

ONE OF SASKATCHEWAN'S GREATEST RESOURCES

Home to the world's largest potash resource, Saskatchewan has been the world's largest producer of potash since 1992, and in 2017 accounted for roughly 30 per cent of world production.

WHAT IS SASKATCHEWAN POTASH USED FOR?

Globally, potash use falls into two primary categories: agricultural fertilizer, which makes up the vast majority at 90 to 95 per cent, and industrial use, which comprises the remainder. The industrial uses of potash are numerous and include the production of potassium hydroxide, oil-well drilling fluids, aluminum recycling, pharmaceuticals, and many other products.

Although all crops require potassium, the particular plant being grown and the soil in which it is grown control how much, and what type, of potash fertilizer is needed to maintain and boost yields. These factors—as well as issues like weather, farmer knowledge, crop economics, and potash

availability—all create very different situations for potash fertilization in countries around the world.

WHAT DOES THIS MEAN FOR SASKATCHEWAN'S BIG POTASH MARKETS?

Saskatchewan's main potash export destinations are all countries that produce a lot of potassium-dependent crops, either for their large populations, for export, or a combination of both. This means that in the United States, Saskatchewan's leading potash market, the biggest consumer of potash is their corn crop, the largest in the world. Meanwhile, in the spot markets of Brazil, Indonesia, and Malaysia, oilseeds production for export continues to increase annually, and potash use along with it. Comparatively, in China and many other Asian countries, rice as well as fruits and vegetables which are consumed domestically receive the majority of potash application.

Saskatchewan's Top 10 Potash Markets

From 2008-2017

Total tonnes K₂O delivered

- > 20 million tonnes
- 5 to 20 million tonnes
- < 5 million tonnes



HOW DO THINGS LOOK FOR THE FUTURE?

The two fundamental trends that give a lot of strength to rising potash demand are the increasing global population—now at 7.6 billion and projected by the World Bank to reach 9.7 billion by 2050—and world economic growth; the OECD projects world real GDP to more than double by 2050. Of these, the latter is expected to be the most influential. More people means more mouths to feed, but it’s the economic growth in developing nations that will continue to shift the diets of billions of people towards more potash-intensive items like fruit, vegetables, and protein.



HOW IS SASKATCHEWAN POSITIONED TO TAKE PART IN PROVIDING THE POTASH THE WORLD NEEDS IN THE YEARS AHEAD?

The Saskatchewan potash industry has

dedicated more than \$20 billion to expanding its mining, milling, and transportation capacity over the last 15 years. This has included major expansions at every existing potash mine in the province by the Mosaic Company and Nutrien Ltd., the new Bethune mine constructed by the K+S Group, and a sizeable investment by BHP. towards the development of its first potash mine at Jansen. In addition, there are multiple other projects in Saskatchewan that are at various stages of evaluation.

Saskatchewan is home to the largest and richest potash resource in the world, and at current rates of production Saskatchewan could supply the world’s potash needs for several hundred years. 🌱

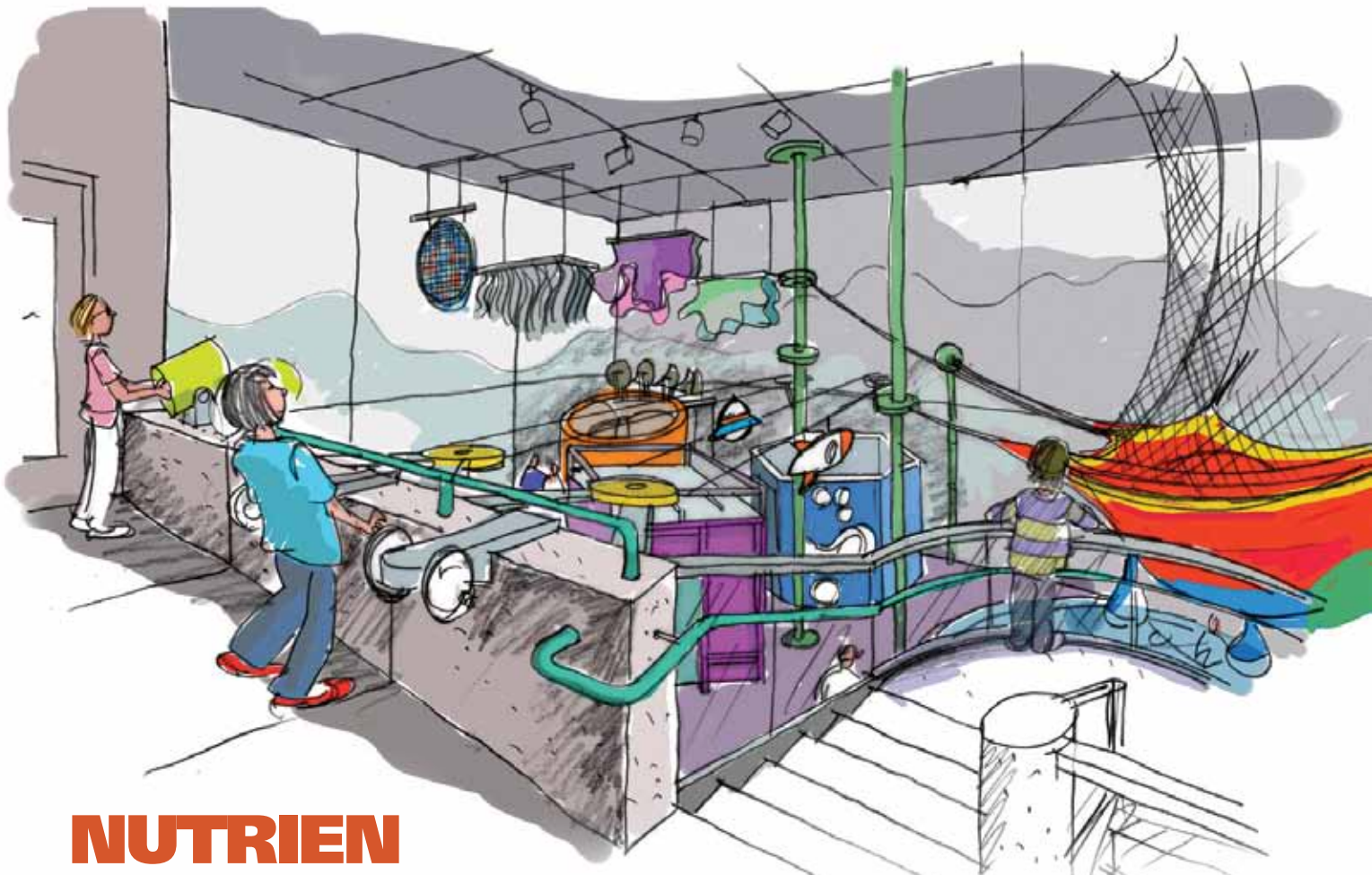


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NUTRIEN CHILDREN'S DISCOVERY MUSEUM HANDS-ON EXPERIENCE FOR LITTLE MINERS

The children of Saskatchewan are about to experience something completely new, exciting and educational. They will soon become mini miners.

Specifically, once the Nutrien Children's Discovery Museum opens in the spring, kids will have the opportunity to explore a mine, run machinery and drive vehicles.

"They'll get their vests, gloves, and hardhats, and go into the elevator; there's movement and sound and narration to make them feel they're going underground. And when they emerge from the elevator, the entire room is scenically treated from floor to ceiling," explained museum Executive Director Amanda McReynolds Doran.

Once "off" the elevator, there's a boring machine and an experiential mining video game, in which the kids can sit and operate the steering wheel, gas pedal and brakes of a vehicle that simulates a drive through

a potash mine. The experience puts kids in the driver's seat, which also folds up so that children requiring wheelchairs can also participate. Children will see footage of a Saskatchewan potash mine and they'll be able to explore the mine, discovering tunnels, a mine dry, mechanical and electrical equipment, heavy machinery, and more.

"Whenever they turn right, the camera turns right with them. They get to decide where they turn, how fast they go, and when to brake," said McReynolds Doran. "They also get to go over to our motor pool section where there's a vehicle on a hydraulic lift. There's also a lab where they can look at the rocks and minerals in the earth."

A train table fitted with a miniature mine allows kids to move boring machines through it instead of trains, she added.

It's one of many exhibits now being built

for the new museum, to be housed in Saskatoon's former Mendel Art Gallery and supported by a large donation from Nutrien.

"It was \$2.5 million, a very generous contribution we're really excited about," said McReynolds Doran. "This inspiring gift has helped us to renovate the Mendel building and design world-class exhibits for the children of Saskatchewan."

"Nutrien has been very helpful with our design team to make sure the exhibit is accurate, fun, and engaging," she added. "It will demonstrate what is mined in Saskatchewan, and what is done with the ore once it's brought to the surface."

Another local company involved in the project is Prairie Machine and Parts.

"They have made a cash donation to the project and are also building a mining vehicle for our Discovery Mine exhibit," said McReynolds Doran. "The vehicle will be a

smaller scale version of the vehicles they build every day here in Saskatoon. We are thrilled about the level of detail and authenticity they will be providing this exhibit."

Mining is a big component of the museum, notes Tammy Van Lambalgen, Vice-President Corporate Affairs and General Counsel at Orano Canada and chair of the museum board.

"I am very excited to see the progress of the Nutrien Children's Discovery Museum that is slated to open next spring in the Mendel building," she said. "The children, and likely the adults that will come with them, will have an opportunity to learn more about our industry while having fun. What better way to introduce our industry to young children and maybe spark their interest in sciences, technology, engineering and math so they can become our employees, consultants or contractors of tomorrow."

Indeed, the exhibit's New York-based designers were taken aback by how many fields of employment there are in the mining sector, said McReynolds Doran; so they've also put together information about the positions available, such as engineers and geologists.

"It should be an exciting place for kids who have no familiarity with the mining sector, but also those with parents working in the mining sector. It's a chance to see what their parents do day to day."

Construction of the children's museum has been underway since February. McReynolds Doran said it has been quite a joy to watch the Mendel building go through a complete transformation.

They took it down to concrete and studs, and will replace all the flooring, add a bay of windows on the river-facing side, replace all the washrooms, repair the staircase and add a passenger elevator, "always considering the building's heritage," she said.

In February, the exhibits will be installed. They are presently being built around the country in places like Halifax and Gatineau, under the watchful eye of the New York designers.

In addition to the Discovery Mine, the museum will also offer several other interactive exhibits:

TOON TOWN: The main gallery is dubbed Toon Town, recreating a city where kids can pretend to be working in various occupations and dream about what they want to

be when they grow up.

LITTLE BRIDGES: Aimed at children aged zero to four, the exhibit recreates the riverbank with bridges and provides motor skill activities.

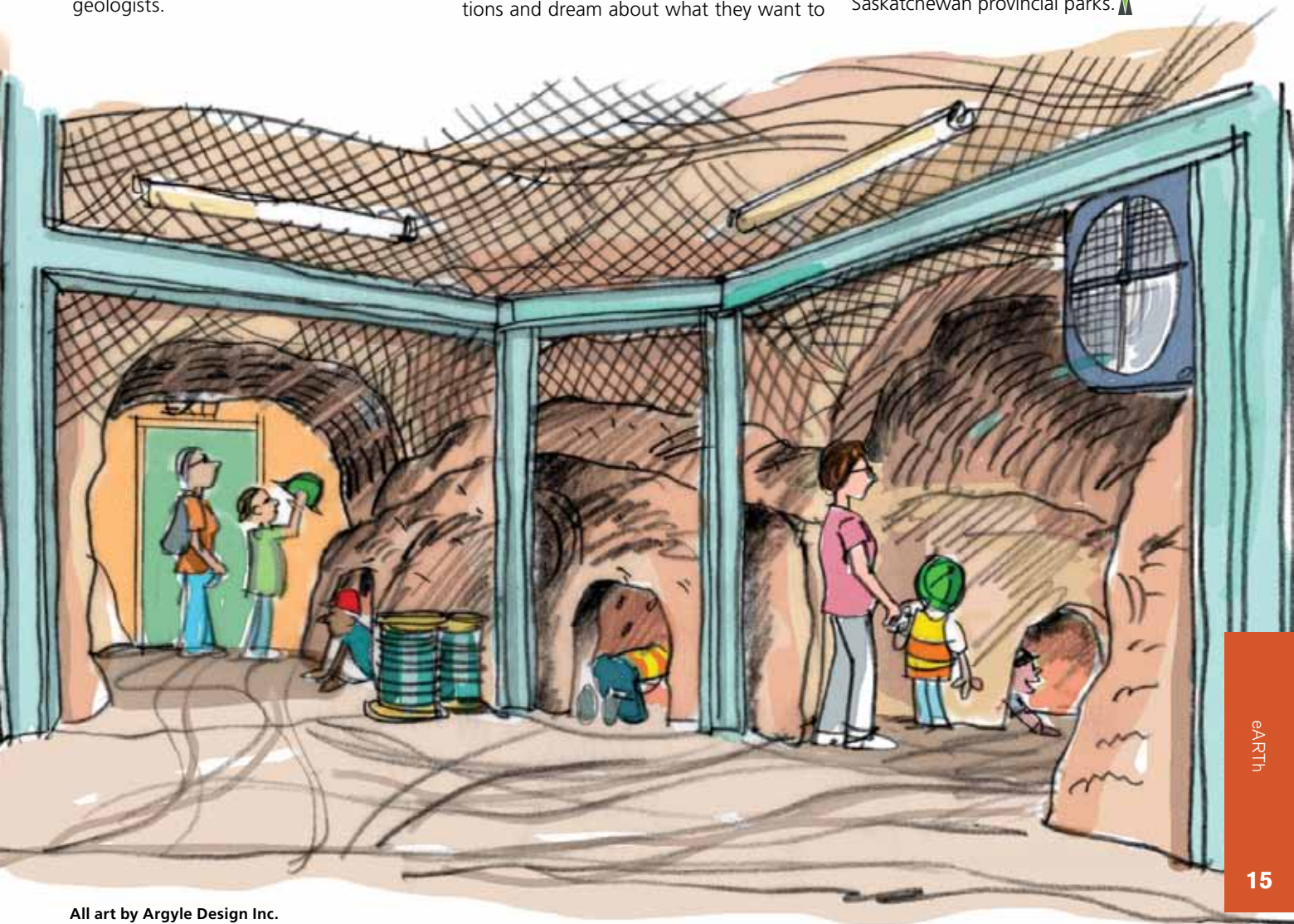
NORTHWOODS: The Northern Saskatchewan-based exhibit, complete with lake and boat, will be treated floor to ceiling to look like the Canadian shield.

AIR POCKET CLIMBER: Simply, a "fantastic climbing exhibit."

BOXES OF FUN: This is where making noise comes in. Boxes of Fun includes a recording studio and various ways to make sounds, and also includes a "mystery box." You never know what might be inside.

CREATE SPACE: This exhibit is a combination of a maker space and art space, allowing kids to do everything from "building roller coasters to wood burning art to using a 3D printer to create our own toys."

TEMPORARY EXHIBIT AREA: The temporary space will be changed regularly, but will be populated by Parks Canada for the opening with a display about the animals of Saskatchewan provincial parks. 🌲





ALLISON BOUDREAU

PRODUCTION
SUPERINTENDENT
MOSAIC K2 SURFACE
OPERATIONS,
ESTERHAZY

If your impression of a chemist is of a quiet person bent studiously over a petri dish and test tube, meet Allison Boudreau. She will explode those stereotypes.

TAGGING ALONG

Allison Boudreau had a passion for the physical sciences early on in her life, leading her to complete a Bachelor's of Science degree with Honours at the University of Guelph. Then she took a degree in teaching.

Today, she's the production superintendent for The Mosaic Company at its K2 surface operations in Esterhazy, with dozens of people reporting to her.

"I love the people side of it the most," said Boudreau, who hails from Manitoulin Island in Lake Huron. "In operations you get to work with so many different people. All of the groups have to interact with us, the maintenance and work flow and engineering and capital teams. We're interconnected with everyone."

Perhaps that fascination for both science and interacting with people began with an engaging teacher, who had the same skills. Allison took that combination through university, where she originally enrolled in applied pharmaceutical chemistry.

"After my second year, I went to pure chemistry. It was a co-op program – we got to do four four-month work terms, which was awesome," she said.

"I spent eight months with an organic synthesis lab. We actually made pesticides,

which is kind of interesting because I'm now making fertilizers.

"I had two other work terms offset from the university working closely with the Canadian Food Inspection Agency (CFIA). At the time we were doing some testing on fruit tree leaves. The last four months was with the Land Resource Science department at the U of Guelph still doing chemistry type work around the uptake of heavy metals by plants.

"It was all kind of coincidental – the connection each work term had combining chemistry and agriculture – it was very interesting to me. Now it all comes together with my career at Mosaic."

After she graduated, Boudreau attended teacher's college at the University of Ottawa. She also volunteered at a high school and spent four years as a basketball coach.

But after that, she found herself underemployed.

"I had a temporary term teaching and some tutoring but didn't have a full time teaching job," she said. "I had a friend working out here (in Saskatchewan) from Ontario who said, you're from the country, just try it. It's an awesome place to work."

Boudreau applied, and landed a research

chemist's job with Mosaic.

"Esterhazy has a brine inflow, so lots of my research work was done with the inflow group," she said. "I worked in research for about three and a half years focusing on geochemistry, on the grouting methods we were using at the time and developing new alternative grouts. There were many exciting challenges to work on in this department because it's so unique. The inflow is something we've been managing here for over 30 years now."

During this time, Boudreau had research technicians who reported to her, and had gained some valuable supervisory experience. That experience led her to an opportunity in operations at another Mosaic site.

"I went to Belle Plaine on a temporary term, covering for seven months as a production lead. It was very different being involved directly with production. That was pretty amazing, seeing a different potash mining process; a solution mine versus an underground mine. This opportunity also highlighted the dynamics of different workplaces.

"That gave me the first real taste of operations. I came back to Esterhazy to K1 as a continuous improvement co-ordinator, working on specific operational

and improvement projects for the K1 mill.”

After nine months, she applied for and was awarded a general foreman role at K2.

“That’s full-blown operations, eight production supervisors reporting to me, 80 operators; that was very cool.”

The job evolved into the role of production superintendent, the position Boudreau now holds.

“It’s exciting,” she said. “Every day is different. Every day we’re making potash, but also advancing in many other ways – like safety performance and environmental stewardship. We get to ask, what does the next five years look like for Mosaic Esterhazy?”

“We’re at a very exciting place right now. The K3 (new underground mine) overland belt to K2 has been finished. We

will be getting K3 ore to K2 mill in the very near future. For us, this means we will have ore supply from both K2 and K3 mines.

“That’s been a big focus of mine in the last six months to a year. Now we’re ramping up to be able to handle the new additional ore tonnes.”

Outside work, Boudreau continues to coach basketball, now at the Langenburg high school.

“When I first moved here, they needed people and I really enjoy the community – a small community of about 1,500 people,” she said. “They support each other, support local businesses. It started as, ‘sure I’ll help you out,’ and I’ve probably done it six or seven years.”

She loves the outdoors, enjoying hiking and camping. She is also a sailor, having

grown up on the Great Lakes, and does as much travelling as she can when she has time off.

“I’ve been to Cambodia and Thailand. Iceland I really enjoyed; that was probably my favourite trip. And I do lots of travelling through North America.”

Boudreau is clearly up for adventure, both at work and in her own time.

“I came here on an adventure thinking it would only be a year or two, and now I’ve been here almost ten,” she noted.

“Some of my career opportunities have happened because I took a chance and others have happened because someone was willing to give me a chance. I see so much potential and future growth. There is growth in our industry, in my company, and at my site. It’s a very exciting time.”



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INDIGENOUS YOUTH EXPLORE FIRST RESPONDER CAREERS



Youth from Saskatoon Tribal Council communities participate in a mine rescue relay.



Simulated firefighting scenario

This past summer, 20 youth from seven Saskatoon Tribal Council (STC) communities took experiential learning to a whole new level at a week-long Youth First Responder Boot Camp. It was the first event in a two-year pilot program designed to give Indigenous youth a chance to explore first responder careers.

Participants ranged in age from 14 to 17. Over half were young women, which SMA President Pam Schwann sees as a positive trend.

“We’re hopeful programs like this will inspire more women to consider careers in mining and first response. It’s important to us that we have a diverse and representative workforce, and that we are an industry that underrepresented groups like women and Indigenous people want to be a part of,” she said.

During camp, the youth received training in search and rescue, firefighting and emergency response. This included hands-on experience in everything from vehicle extraction to fire extinguisher and fire hose training, rappelling and aerial (ladders), team building, critical stress debriefing and incident investigation. The camp culminated in a youth first responder competition at Dakota Whitecap First Nation, where participants’ fire and first aid and practical skills were put to the test.

Throughout the week-long camp, the Camp Co-ordinator, Joshua Mansfield, led the group in a combination of presentations and hands-on activities helped promote a fun

and engaging learning environment. “We were so fortunate to have Josh involved in this pilot camp. He just infused his passion and enthusiasm for first responder training into all activities throughout the week, and the participants could relate to this,” said Pam Schwann. The impact could reach well beyond encouraging youth to pursue careers in first response or mine safety. Participants returned home with a wealth of new experi-

ences as well as practical skills in emergency response. They also earned certifications in St. John Ambulance Emergency First Aid, Workplace Hazardous Materials Information System (WHMIS) and Young Worker Readiness.

“A lot of safety people at Saskatchewan mines are first responders in their own communities, and we see real value in the training these first responders get at the

mine,” Schwann said. “The most important take-away for the boot camp students was to gain confidence and see that this is something they can do as a profession, and within their communities.”

The Youth First Responder Boot Camp is a partnership between the Saskatchewan Mining Association, STC and International Minerals Innovation Institute (IMII). Funding for the camp was provided by a grant from the IMII Diversity and Inclusion Program. IMII has confirmed funding for additional boot camps next year, and SMA plans to expand to new locations to help spark interest across the province.

A number of organizations helped make year one of the program camp a success: Saskatoon Tribal Council Education Unit, Whitecap Dakota First Nation, Nutrien, Mosaic Company, SSR Mining, Orano Canada, Cameco Corp., K+S Potash Canada, Saskatoon Fire Department, Warman Emergency Rescue Team, Medavie Health Services, STARS, St. John Ambulance, Bridges Health and Artisan Safety Solutions. Kim Hanson of Nutrien Allan assisted with recruiting many third party providers as well as with planning and delivery. 🌱



Students learning about STARS role in emergency response



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In each edition of ORE, we go beyond the official bios to give our readers insight into the leaders of Saskatchewan's mining and exploration companies.

Beyond the Bio

SAM FARRIS PRESIDENT, K+S POTASH CANADA AND GENERAL MANAGER, OPERATIONS



They say that if you want a job done well, give it to a busy person.

The axiom held true when Sam Farris, General Manager of K+S Potash Canada's Bethune Mine, was also named president of the company on July 1.

The dual role, at first glance, may seem overwhelming; but Farris takes it fully in stride.

"Right now, there's a lot going on in both worlds, so it's a little hectic; but I like it," said Farris in an interview. "I think we can integrate better with the two roles. I have more contact with all the operations, not just the mine.

"We've integrated our management meetings, we have a better connection between the sites. It fits our vision for where we're heading with the whole group, which is one K+S."

Farris remains professionally located at Bethune and lives in Regina, while KSPC's head office is in Saskatoon.

"We have a lot of discussions with the people in Saskatoon and a very good video conferencing system," he said. "It's interaction between managing the site, making sure everyone is pointed in the right direction and a pretty significant interface with

the people in Germany as well." K+S Potash Canada is an arm of the German mining company, K+S AG.

Farris took over from former president Dr. Ulrich Lamp upon the latter's retirement. He joined K+S in 2011, rising to the roles of

**The more you
move up in an
organization, the
greater your scope.**

SAM FARRIS

senior vice-president and general manager before his recent promotion.

Farris, born and raised in Saskatchewan, holds a bachelor's degree in mechanical engineering and a master's in science (thermal science and fluid dynamics) from the University of Saskatchewan. The two degrees have served him well on the technical side; but to his surprise, they have also helped on the leadership side.

"Once you delve into the leadership side you leave the technical side behind a bit," he said. "It's very helpful to have a technical background in my role, but the job becomes more about leading people and the organization, and helping ensure you position the team to meet targets and are continually improving. You're using those analytical skills you learned in engineering, but in a different way."

Farris is married with two sons, and his advice to his elder child entering the U of R's Science program, holds for anyone going into an engineering discipline as well.

"My advice to anybody considering a technical career path is to not get caught up on which discipline you go into, unless you plan to really specialize. I've met engineers and scientists in all different disciplines and the skill set and what they can do with it, is not so different. You can go down a lot of career paths with a good education. Get in there and see where life takes you."

He speaks from experience.

"I had no idea what I would be doing when I was in university," he said. "Most of my colleagues went into oil and gas. I was a summer student between my third and fourth years at the Mosaic Belle Plaine mine (then IMC),

and that was my first exposure to potash. It was very low profile at the time, through the '90s, because it wasn't booming yet."

When he graduated, there were few engineering jobs available in a relatively stagnant provincial economy. Fortunately, his wife was working as a teacher.

Then he landed a job with a consulting engineering company, and found himself involved again with Belle Plaine. He ended up staying from 2000 to 2011.

"I really had a lot of good years there; it was fun. I was in operations and projects, and then came to K+S in 2011 with a great opportunity to build a greenfield potash mine. It was a great opportunity for any Saskatchewan engineer."

A greenfield mine comes up "maybe once every two generations and even then you have to be lucky to be part of it," he noted.

Now leading 420 people between Saskatoon, Bethune and the Vancouver logistics office, there's no doubt the work has been challenging.

"We're a little over a year into operation and we've made a significant amount of progress, but we've had some challenges with quality. We're still ramping up; it's a multi-year ramp-up and we're doing a lot of things for the first time every month it seems."



Sam Farris and his family enjoy travelling together whenever possible.

Keeping up with his demanding schedule means keeping fit, and Farris hits the gym with dedication.

"I try to stay in reasonable shape, and the older you are the harder it gets," he said, laughing. "You have to try to make it so."

His private time is spent with his wife and teenage sons.

"We typically like to travel. We like to do mountain biking, hiking and try to go skiing at least twice a year. Once in a while we like to go somewhere else. This summer we had

a really nice trip we always planned for when the boys were old enough, to Germany, Austria, Slovenia and Italy."

Taking time off and seeking some work-life balance is extremely important, he added.

"The more you move up in an organization, the greater your scope; there's always a problem to solve. The challenge is to look for positives and you have to try to take care of yourself. It's absolutely critical if you plan to be in the job for more than a few years. Which I am." 🏔️

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K+S Potash Canada



WOMEN IN MINE RESCUE

In the traditionally male-dominated mining industry, women on mine rescue teams are challenging stereotypes and showcasing the benefits of workplace diversity.

When Lindsay Haeusler captained Orano’s McClean Lake mine rescue team at the 50th Annual Emergency Response/Mine Rescue Skills Competition in Moose Jaw this past summer, she was focused on the job at hand. But she also knew she was representing something more.

Haeusler, a professional engineer and a metallurgist at the McClean Lake mill, and a handful of others were demonstrating that women can be strong members of mine rescue teams. In the traditionally male-dominated mining industry, that’s no small feat.

“I’ve admired the men and women who volunteered on the Emergency Response Team (ERT) since starting at McClean Lake nine years ago,” Haeusler said. “When an opportunity came up to join the team, I took it, even though I didn’t know a single thing about emergency rescue.”

She made it onto the competition team after her first year. “I never felt like I wasn’t accepted. The guys have always been super supportive.”

In 2017, Haeusler became the team’s vice-captain with Tracy Gaudry as captain. “We were the first female-led ERT team at the

provincial competition—that doesn’t happen without a lot of support from teammates and coaches,” she says.

After Gaudry moved on, Haeusler became captain and led the team to a win in the proficiency category and runner-up in firefighting at the 2018 competition. “I was the only woman on the team this year,” she said.

There were two women on the Nutrien Patience Lake mine rescue team: Caitlyn Lahonen and Karley Simpson. “We thought if we did it together, we wouldn’t feel alone—but the guys were awesome to work with.



Orano McClean Lake Surface Team (L to R): Mitch Desjardins, Les Churko, Geoff Gerbrandt (vice-captain), Lindsay Haeusler (captain), Tyrel Braaten, Chris Stansfield (coach), Dwayne Kashuba (Coach)
Front: Jeff Catte, Brett Arnott.

They've been supportive from the beginning," says Lahonen, an EIT and process engineer at the site.

It was volunteering as a 'casualty' during a training session that got her interested in mine rescue. "I also remember going to one of the competitions and noticing that there weren't many women doing it. I thought it would be a challenge."


Lahonen loves a good challenge. "I've always been an active person. Growing up, I remember watching the boys play hockey and wanting to play too. It wasn't a typical girls sport, but I remember thinking, I can do that. I went on to play on the Women's Varsity Hockey Team at Queen's University."

It's important for women to be on mine rescue teams... it demonstrates inclusion and diversity.

**LINDSAY HAEUSLER,
ORANO'S MCCLEAN LAKE
MINE RESCUE TEAM**

With few women on Saskatchewan's mine rescue teams, Lahonen and Haeusler seem to understand the importance of being role models for women in mining.

"I remember at my first competition, we had two women on the team, and we could see other teams underestimating us. In the end, we did really well. After, one of guys from another team came up and said, 'wow, I'm really impressed.' So, we're setting an example by showing what women can do. It's pretty cool. A lot of young families come to watch these competitions, and I hope we can show girls that mining is a career option," said Lahonen.

Haeusler echoed that sentiment. "I think it's important for women to be on mine rescue teams, because it demonstrates inclusion and diversity. But it still takes a special personality and interest in the field to work at a remote mine, whether you are male or female. I've been in some uncomfortable situations, whether it's off topic conversations or people having doubts in my abilities. But, I've also had a lot of support, from men and women. And I absolutely appreciate that support. I just want to be able to choose the career I want and do the work I want. I wish we didn't have to keep having this conversation of being a female in male-dominated industry, I wish women's participation was commonplace." 



Team members compete in the First Aid challenge.

When Naomi Fugle stepped off the plane in Ekaterinburg, Russia this past September, she admits to feeling both nervous and excited. She and other members of the Diamonds in the Rough emergency mine rescue team were about to make history as the first all-female team to compete at an International Mines Rescue Competition. It almost didn't happen.

"Russia doesn't allow women to work in underground mines, so we didn't learn that we'd be allowed to compete until March," said Fugle, an environmental officer and volunteer ERT member at Cameco McArthur River. "After that, it was a whirlwind of preparation."

Led by co-founders Kari Lentowicz and Bruce Coley, the team had to raise enough money to bring eight female team members from across Canada together for a training session in August and then to the competition in Russia. The team represented six companies from five jurisdictions.

The goal of Diamonds in the Rough is to raise the profile of women in industry and in non-traditional roles through mine rescue.


"Women aren't allowed to work underground in a number of the countries we competed against, so we arrived thinking, 'they don't want us here,'" said Fugle.

"Instead, we were more welcomed than we could have hoped for. At the opening ceremonies, the crowd went wild with support when we were on stage. It was amazing."

That support was evident throughout the competition. When the team's gear didn't show up on time, members of other teams loaned their equipment.

"Despite all the differences, we're all in the same line of work. So, it was natural to come together and help—that's what we do," said Fugle.

On September 25 and 28, 2018, the women competed in seven separate events: underground simulation, fire-fighting, first aid, relay, virtual reality, written exam and technician event. The Diamonds in the Rough team came in fifth in the underground simulation and finished 15th out of 25 teams. They were also awarded the People's Choice Award at the competition, as well as a special award from Dzega for their contributions to mine rescue.

"We saw a change in attitude over the course of the competition. At first, I'm not sure they took us seriously. By the end of the week, I felt we were heard and respected—and I think we opened a lot of people's eyes to what women can do." 

TAKING TECHNOLOGY TO THE NEXT LEVEL

Reducing the footprint of exploration and mining



NexGen Energy Inc.'s Arrow deposit project

Technology never stands still in the mining industry.

Techniques are constantly being developed, adapted and improved to make exploration efficient while reducing environmental impact.

"Innovation in exploration is about the application of technology, cost-effectiveness and safety," said Scott McHardy, chair of the exploration section for the Saskatchewan Mining Association and Vice-President, Exploration, for Cameco Corp.

For example, directional drilling, which was developed two decades ago, continues to be an excellent option in Saskatchewan's north.

Cameco and Orano Canada — among the most experienced mining companies in Saskatchewan — use advanced drilling methods, including directional drilling, whenever possible and have done so for years. This technique's advantage is that multiple holes can be drilled from one drill set-up location, thus minimizing surface disturbance.

"Directional drilling can provide significant cost savings by not re-drilling the

top portion of the drill hole and minimizes impact on the environment with fewer drill set up locations," said McHardy.

John Robbins, Manager New Projects in Orano Canada's Exploration Department, has been involved with various directional drilling techniques in the diamond drilling industry for almost 20 years. He continues to value the approach, and its advancement.

"I am very happy to see that numerous companies are continuously adapting this technology to suit their needs. This technique has provided me with cost savings, corrected unwanted deviations and reduced surface disturbances in my drilling programs."

Among those companies is NexGen Energy Inc. The exploration and development company is using leading edge innovations and proven techniques to develop its portfolio of uranium projects in the south-western Athabasca Basin, including the high-grade Arrow deposit.

"At NexGen, technology and innovation are key to improving efficiencies across the organization, whether it be exploration or environmental designs. This will ensure Arrow leads the way in terms of respon-

sible environmental mine management," said Karina Tyne, the company's corporate manager for Saskatchewan. "The company is using several techniques as well as reviewing multiple other options that aren't typically used in this phase of exploration and development."

In addition to using directional drilling, NexGen also collects the water used and the mineralized cuttings produced by drilling. A centrifuge is then used to separate the water from the cuttings. The water is cleaned and reused in the drilling process. The mineralized cuttings are stored in purpose-built, surface storage facilities that are protected from snow and rain. Cuttings will be stored onsite during the exploration program. If the project moves forward to the mining stage, the cuttings will be processed along with mine production; if not, they will be shipped to an existing mill to process.

"NexGen has gone the next step in building an innovative facility to process the drill cores at the Arrow Deposit, which has already drilled over 220 kilometres of core," said Tyne. "The core processing facility is actually two big facilities with eight fully

ventilated, climate-controlled stations. The stations are designed so the core boxes are moved and handled as little as possible—that’s really improved the ergonomics.”

Each station is hooked up to the company’s computer network, giving geologists onsite access to current and historic information in real time.

Another innovation is NexGen’s proposal to return tailings generated by future mining back underground in an underground tailings management facility or UGTMF. The company explains the concept behind the UGTMF in its Preliminary Economic Assessment of the Arrow Deposit, saying “it is superior to place the tailings back into the solid, competent bedrock in which it was first extracted.”

Tailings generated from the process plant will be filtered in preparation for use as cemented paste. The paste generated from tailings will be used to fill the voids created by mining, with purpose-built excavation chambers planned to store the excess.

“It’s an innovative technology that could result in having no mineralized tailings on surface, which would allow NexGen to again minimize the surface disturbance. This approach would allow for ongoing reclamation during mining,” said Tyne.

NexGen is focused on creating a potential future mine that will set a new standard across the industry.

**KARINA TYNE,
CORPORATE MANAGER - SASKATCHEWAN,
NEXGEN ENERGY INC.**



Big data is another innovation that’s moving the industry forward.

“With innovations of advanced modelling software and processing power, it makes data, especially big data, more valuable,” said McHardy. “The Saskatchewan Geological Survey digitized the historical exploration activities, data and results making this data more consumable, more valuable and builds a platform for the integration of the geosciences.

“Innovation of air and ground geophysical equipment and methods and equipment produces stronger, cleaner signals to image mineral systems at greater depths and defined drill targets. Innovation in processing software and visualization extract more value from larger data sets.”

Modern hydraulic operated drills with increased guards and shielding, as well as automatic rod handlers, have improved safety in the diamond drill industry, McHardy added. Other advances have addressed the tough conditions in northern Saskatchewan, where the climate is a big factor.

“Exploration typically works in remote locations and relies on winter access via frozen lakes,” said McHardy. “Tools such as Ground Penetrating Radar (GPR) can be used for determining safe ice thickness conditions for travelling and working on ice.”

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SAVING THE SPECIES

Conservation biologist proposes a cost-benefit approach to recovering species at risk

To save species at risk, you must first do the math.

That's the view of Dr. Tara Martin, a conservation biologist at the University of British Columbia, who has recently published a paper making the case that precious funding must be used judiciously and to the greatest effect for species recovery.

The paper, entitled *Prioritizing recovery funding to maximize conservation of endangered species*, appeared in the scientific journal *Conservation Letters*. It demonstrated a cost-benefit approach to prioritizing conservation strategies for 15 species at risk in an area of southwestern Saskatchewan known as the South of the Divide (SoD.)

"At the moment, recovery of species at risk in Canada and around the world is failing," Martin said bluntly in an interview. "We're in a situation where we have more species at risk than resources to recover them all. As a consequence, we are losing species.

"There are many reasons why we are in this situation, not least that pressures on our biodiversity continue to outpace actions to recover and protect our biodiversity.

"But there's also another important point — and this is the basis of a lot of my work — is that we're not using the resources we do have most effectively and efficiently."

Martin argues that we're often investing in species with the lowest likelihood of recovery at the highest cost. By default, other species are being neglected.

"If our goal is to address the biodiversity extinction crisis by saving as many species as possible, then our current way of investing

in species at risk doesn't really make much sense."

Martin and her colleagues used the South of the Divide to investigate the utility of her approach for prioritizing recovery strategies for 15 species at risk in the region. They chose the region because a governmental action plan, described by Martin as "probably the best species action plan published to date," had just been released.

Having returned home to Canada after 20 years in Australia, where she worked on a similar project, Martin wanted to find a case study to test her methodology in Canada.

Within the SoD region, her paper states, nine species are listed as either extirpated

(gone), endangered, or threatened: the black-footed ferret, burrowing owl, eastern yellow-bellied racer, greater sage-grouse, prairie loggerhead shrike, mormon metalmark, mountain plover, Sprague's pipit and swift fox. Four species are listed as special concern — the black-tailed prairie dog, long-billed curlew, McCown's longspur, and northern leopard frog. They also included two additional threatened species, the ferruginous hawk and chestnut-collared longspur.

The burrowing owl, for example, is in extreme danger and "needs more than just investing all our resources in the SoD. We need to invest in the entire flyway, which includes the U.S. and Mexico," said Martin.

"All of our species are migratory. When they start to cross international borders it starts to become even more challenging. Where do you get the biggest bang for your buck? Should you be investing in the U.S., Mexico, Canada or all three?"

Martin and her team used the tools developed initially in Australia, where they were applied to a third of the Australian continent. A similar process is in effect for all species in New Zealand.

The approach involves costing of management actions, benefit analysis and assessment of feasibility.

"Without those three things, it's very hard to take that paper plan and turn it into action on the ground," she said.

Martin has spent some time consulting with government, industry and nature groups, and said the response has been "huge."

"For industry, this approach makes a lot of

THE FIVE CATEGORIES IN THE SPECIES AT RISK ACT ARE, FROM WORST TO BEST:

■ EXTIRPATED:

The species no longer exists in a certain habitat, although it may exist elsewhere, such as the black-footed ferret

■ ENDANGERED:

The species is in imminent threat of disappearing in Canada, such as the Sage Grouse

■ THREATENED:

The species is threatened by various factors, like the caribou

■ SPECIAL CONCERN:

There is concern about species; it is suffering some threat but doing all right

■ NOT AT RISK

sense. It's a similar approach you use to run a successful business. What we're trying to do is make endangered species a successful business.

"In conversations with industry, they're looking for certainty. (For example) if we give up this bit of land, will we actually achieve conservation? If there's an opportunity cost for business, they'd like to know that cost is leading to biodiversity conservation."

Mark Wayland, who led the development of the South of the Divide Action Plan for the Canadian Wildlife Service of Environment and Climate Change Canada in Saskatoon, said priority threat management is "one of many good approaches" to saving and recovering species.

The SoD Action Plan was developed under the federal Species at Risk Act, which requires planning for those species. A mixture of federal and provincial funding supports the action plan.

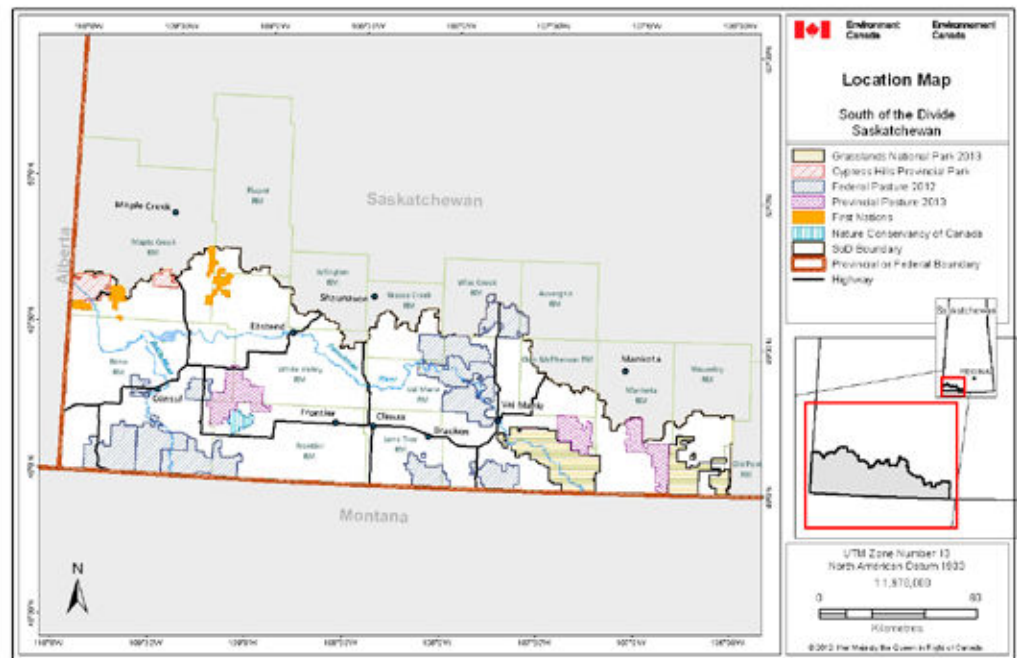
"We've finalized the document and done the consultation on it and now it's being implemented," said Wayland. "We have been able to, from various sources, put a substantial amount of financial resources into habitat conservation and a lot of the work is being done by a non-government organization called SODCAP (South of the Divide Conservation Action Program)."

The SoD area has considerable amounts of remaining native grassland in comparison with other parts of the province and other areas of the prairie eco-zone including Manitoba and Alberta, said Wayland.

"There is a remaining concentration of species at risk there, and the habitat is still good for the most part."

Applying Martin's cost-benefit approach is "a good lens to use to decide how to allocate money" to those species, he said; however, "We can't use that exclusively. It's a good tool but we have to be aware of other factors."

"The approach is sound, especially from an economic perspective, but could result in avoiding potentially-costly recovery efforts, the outcomes of which may be somewhat iffy. It needs to be recognized that this approach could



The South of the Divide region in southern Saskatchewan

have the unintended outcome of neglecting to invest in species when the outcome of the investment cannot be predicted with confidence.

"Other considerations may also be important in deciding how to allocate scarce recovery dollars – for example the urgency to act, the extent of Canadian responsibility for the species — in other

words the extent to which the species occur in Canada only versus in other countries too — and co-benefits for other species being examples of that.

"Sage grouse (for example) is an expensive species to recover, but it is recoverable. It's going to take time. Maybe it's up to society to decide."

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Nutrien employees participate in the Saskatoon Pride Parade

BUILDING A DIVERSE TEAM

Good hiring practices, outreach and support groups help mining companies create inclusion

When all the faces of your community are reflected in your company, you know you've built a diverse team that can take on the future and its challenges.

Yet some of those faces remain in the minority, whether that's simply a factor of where you live, where your operations are, or the kinds of people who apply for work in your industry.

In today's work environment, that means overt support and inclusion are still important.

"Many of my colleagues in the diversity space would say diversity is inherently a positive thing," said Lionel Laroche, who has spent years working with companies striving for diversity. "My experience is that it creates challenges and opportunities. The challenges come first, and the opportunities come later."

Laroche, principal of MultiCultural Business Solutions, says companies must take a long-term view of building diversity and inclusion. It cannot happen overnight, and many external factors — such as boom and bust cycles, or being unable to find people with the right skill sets — come into play.

"People have to be able to develop the skills needed to work in a diverse environment, and the organization has to provide the opportunities necessary to raise the average level of skills in that area," said Laroche.

That takes time, too. Companies must seek people who have the characteristics necessary for any given job; and in mining,

there are extra requirements because so many positions require people to spend a great deal of time together.

"It doesn't mean it cannot be done. What it means is the people who live in these environments need to have certain characteristics," said Laroche.

People have to be able to develop the skills needed to work in a diverse environment.

**LIONEL LAROCHE,
MULTICULTURAL BUSINESS
SOLUTIONS**

"Whether you're part of the majority or not, you will need those characteristics to be successful in that environment. You need emotional resilience, physical endurance and the ability to let go at the end of the day, because when you go to the cafeteria (after shift), you're going to be with the same people."

He gives the example of firefighters or any emergency response jobs to illustrate what he means.

"In emergency response jobs, a lot of their time is spent doing drills. The purpose

of drills is that I will know what you will do without us having to discuss it. We are creating one common way of thinking."

Once people are appropriately hired and trained, creating a unified workforce requires a commitment to supporting those who are not part of the traditional majority, he said.

Mosaic Company is among the Saskatchewan mining companies that see the importance of focusing on the long run.

Mosaic engages with the Mining Industry Prep Program (MIPP) at the various educational institutions in the province. It gives students the opportunity for exposure to the mining industry, hopefully leading to long-term engagement, and allows mining companies to connect with Indigenous people interested in the field.

"Some of our early successes were with the MIPP Program," said Lisa Poissant, Vice-president Human Resources, Potash, for Mosaic. "It's created some great advocates and champions within our own workforce who help speak to overcoming potential biases or perspectives that people may have had. When you start to gain traction, you see how a diverse workforce can benefit."

It's crucial to reach young people, even at the elementary and high school levels, to encourage them to achieve the academic background necessary for many mining careers, she added. For that reason, Mosaic has built awareness by spending time at career fairs, some of them on First Nations, and doing student outreach.



SIIT 2018 MIPP practicum team at Mosaic Belle Plaine

“As we think about developing talent for the future, we have an Indigenous summer student program to help bring young professionals into the workforce,” Poissant added. “And for gender diversity, as it relates to science and technology, young women have to make the decision to study science and math at the elementary and high school level.”

Mosaic has also just added, last year, a

new strategy supporting Indigenous engagement.

“We’re in the process of rolling out cultural awareness training throughout our business unit. That’s meant to help people understand the different cultures with whom they work,” said Poissant.

Site management teams have been through the cultural awareness programs and it is now moving through the entire

workforce.

“The next phase is to make sure we educate and support our hiring managers around cultural awareness to manage the unconscious bias out of the hiring process.”

At Nutrien, one approach to support comes in the form of employee resource groups, or ERGs. ERGs are groups of like-minded employees who come together in the workplace based on shared characteristics or life experiences.

“One of the purposes of the ERGs is to provide support to each other and enhance career and personal development in the work environment,” said Amber Northcut, Nutrien’s Senior Adviser for Organizational Effectiveness.

“Another purpose of our ERGs is to provide a platform so employees can communicate with leadership and do it in an effective way.”

One of Nutrien’s ERGs is a PRIDE network which started with a chapter in Saskatoon with representation from the mining sites.

“It’s a fairly small network currently, but we are already in the process of growing it and expanding it other Nutrien locations,” said Northcut.

“The great thing about this ERG is their inclusivity. Representatives from our PRIDE network put an invite out to all employees to come out and support the PRIDE parade, and they had a fantastic turnout. The network



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mosaicco.com



gets the participation supported by the Nutrien brand. Nutrien is also a big sponsor of the Glitter Gala (which took place Nov. 3 this year.)

"It is a very enthusiastic group. They've had a great deal of support from leadership and the company. It speaks to how our society is becoming more inclusive. People are becoming more comfortable in being their full selves at work. Are we 100 per cent of the way? Not yet, but it's definitely moving in the right direction."

Another ERG supported by Nutrien is WINTER, or Women in Non-Traditional Environments and Roles. This ERG supports women engineers, earth scientists, technicians, geologists, maintenance workers and others "who don't get to sit in the office, but are on the front lines in the mine or mill," explained Janelle Appleyard, Director of Mine Development.

We understand that all women in non-traditional roles have challenges.

**JANELLE APPELYARD,
DIRECTOR OF MINE DEVELOPMENT**

WINTER connects and supports these women, offers mentorship and provides a trusted and influential voice to company leadership.

"We understand that all women in these non-traditional roles have challenges," said Appleyard. "In 2016, eight per cent of the potash part of former PotashCorp (which merged with Agrium earlier this year to form Nutrien) were women. However, when you looked at just the technical people on site doing this type of work, just three per cent were women."

"What we found was the challenges the technical group faces are similar to what every woman in the industry faces; but some are very different because they are the front line."

"The mission expanded from developing women leaders to furthering career development, and to bring awareness around why it's important to have a diverse workforce, and what the roles are that

women can play in that," said Northcut.


A third ERG, the young professionals' network came from a similar idea.

"What is it that the age 18 to 34 bracket can do to move to the next level? You don't necessarily always know how to navigate that. What are those learning and development things we can do?"

ERGs are not just about getting people

together to talk, Northcut added.

"There really is a benefit to the business. We're looking at retention. If people are engaged, they are more likely to stay with an organization."

"When people are feeling happy and part of something bigger, they're going to talk about it in their communities. We have ambassadors who are going to talk about why it's great to be part of Nutrien." 



Mosaic's student outreach engages children in science-based activities

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Learn more at: mining.ca/reconciliation-in-action



FUN & GAMES

Safety Dress Up

Canada is a world leader in the mining industry. Safety is the industry's number one most important practice. Help Andy get dressed for a day at the underground mine site in his Personal Protective Equipment (PPE).

Match the correct words with the safety equipment, and then match the equipment to Andy.

Safety Gloves

Ear Muffs

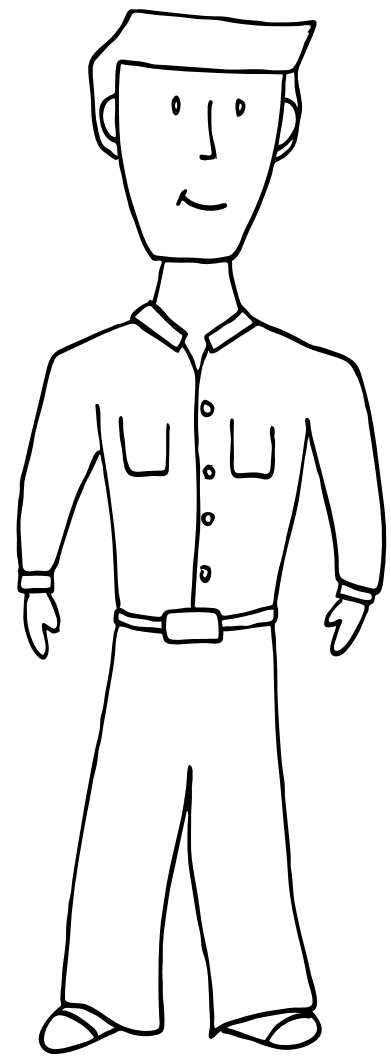
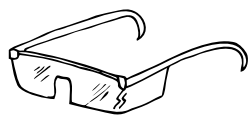
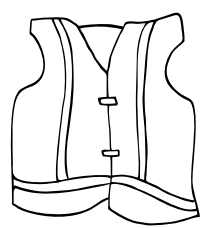
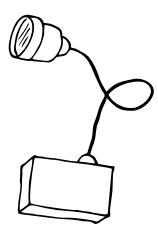
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Head Lamp and Battery Pack

Safety Glasses

Safety Boots

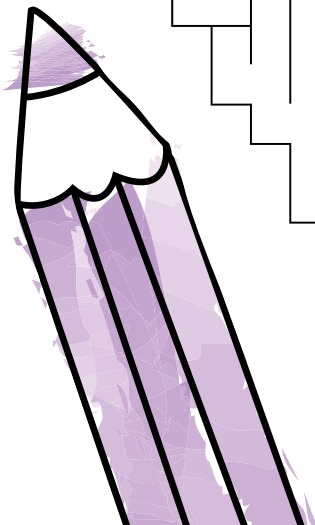
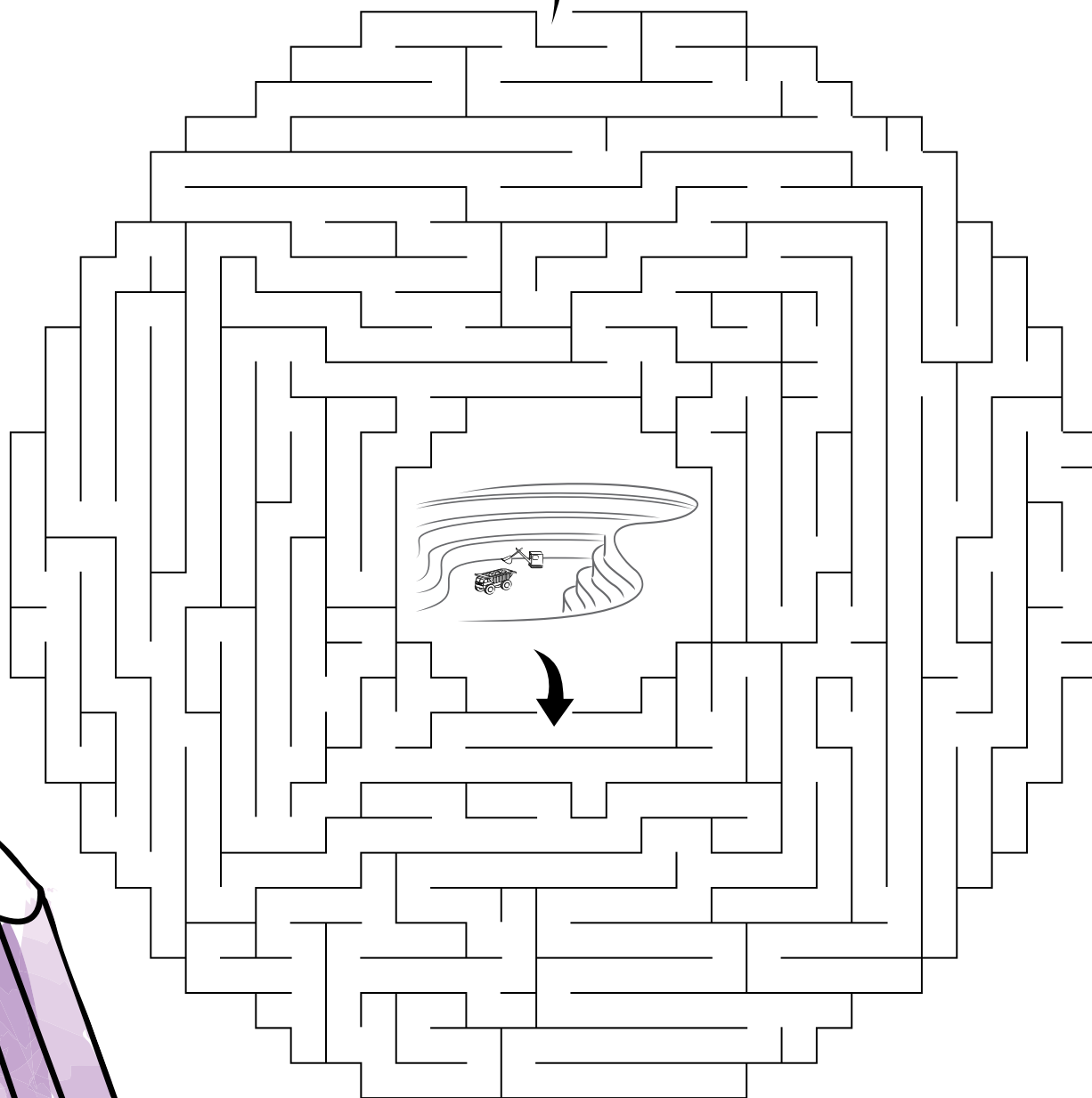
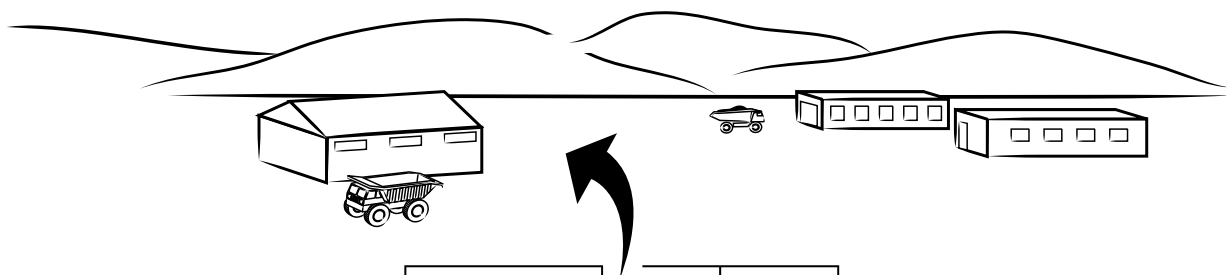
Safety Vest





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Help the mining truck driver haul the ore out of the surface mine and deliver it to the processing plant. Ore is a rock that contains a valuable metal or mineral.



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