THE OFFICIAL PUBLICATION OF THE SASKATCHEWAN MINING ASSOCIATION

ORE

FERTILE GROUND

CELEBRATING THE FIRST 50 YEARS

SASKATCHEWAN MINING ASSOCIATION

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Technology has dramatically changed mining over the last 50 years. Here, an operator uses remote control to operate a scoop tram at Cameco's McArthur River uranium mine.

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HEAD OFFICE
Suite 1500
2002 Victoria Avenue
Regina, Saskatchewan
S4P 0R7

Telephone: (306) 757-9505
Fax: (306) 569-1085

www.saskmining.ca

COVER PHOTO
A commemorative book entitled Fertile Ground was published earlier in 2015 to mark the 50th anniversary of the Saskatchewan Mining Association. Our cover reflects the design of the book's cover, featuring photographs from over the years.

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A MESSAGE FROM SMA EXECUTIVE DIRECTOR – PAM SCHWANN

DEDICATION

Since the early days of the province, the people involved in the exploration and mining companies have helped shape the economic base and community fabric of Saskatchewan. While they have faced many technical, regulatory, and political challenges along the way, these individuals saw the potential of Saskatchewan's mineral resources. They also had the shared vision of the benefits of a collective voice for the mining industry that would foster the development of a robust and diverse exploration and mining industry in Saskatchewan. And thus, the Saskatchewan Mining Association (SMA) was born.

This 10th edition of ORE celebrates the 50th Anniversary of the SMA, an industry-driven organization representing the mining and mineral exploration companies that operate within, and significantly contribute to, our great province. To commemorate its 50th Anniversary, the SMA published *Fertile Ground*, a memoir of the Saskatchewan mining industry in the era of the Association. Some of the articles in this edition of ORE are abridged versions from chapters of *Fertile Ground*. The book is a tribute to SMA member companies and their hundreds of extraordinary volunteers who have contributed to the progress of the activities of the SMA over its 50-year history, and to the Saskatchewan public and governments. This strong support affords the mining industry the social licence to responsibly develop Saskatchewan's world-class mineral resources, providing a foundation for a prosperous future for us all.

Through the participation of its members, the SMA has championed the evolution of the industry to one that is one of the safest of all industries in the province, is socially and environmentally progressive, is a leader in First Nations and Metis inclusion, while also advocating for sound government policies.

While the industry today is much different than at its inception, and will continue to change over time, the Association has focussed its activities on the pillars of Government Advocacy, Public Awareness, including Education Outreach, and Member Development. Although the diversity of programming within these pillars has evolved over time, Saskatchewan Mining Week, the Emergency Response/Mine Rescue Skills Competition, Saskatchewan Mining Supply Chain Forum, the GeoVenture Teachers Program and ORE are flagship events and programs of the SMA.

The visionary leaders of the exploration and mining industry staked a claim for the future of Saskatchewan that benefited all of us. The SMA is proud to be the champion for Saskatchewan's world class mining industry as we celebrate the first 50 years and continue to build an industry that will do the same for the generations to come.

Saskatchewan Chamber of Mines representatives heading north. E.F. (Eric) Partridge, prospector, and future chair of SMA Exploration Section, is at far right (with fedora and briefcase).

MESSAGE FROM THE PREMIER OF SASKATCHEWAN

On behalf of the Government of Saskatchewan, I am pleased to welcome readers to this commemorative issue of ORE magazine in celebration of the Saskatchewan Mining Association's 50th Anniversary.

Saskatchewan is a significant player in the global mining sector. With rich and varied resources, our province produces the minerals needed to feed and fuel a growing world. We are an important producer and exporter of potash, accounting for approximately 30 per cent of total production, and Saskatchewan is home to almost half of the globe's potash reserves. The province also produces 100 per cent of Canada's uranium and accounts for over 16 per cent of the world's primary uranium production; second only to Kazakhstan. Gold, coal, copper and salt are also mined here, and we are seeing growing interest in the exploration and development of other commodities such as diamonds, rare earth elements and platinum group metals.

Mineral exploration and production are important drivers of the economy and job creation in the province. The value of Saskatchewan's mineral production surpassed $7.3 billion in 2014, the third highest total among the provinces. All this activity bodes well for our province's economy and our people. Mining supports 30,500 direct and indirect jobs in Saskatchewan, providing real economic benefits for families, communities, and First Nations.

New projects and major mine expansions are underway across the province, thanks in part to our reputation as a stable mineral-producing jurisdiction.

K+S Potash is proceeding with the development of the $4.1 billion Legacy potash project north of Moose Jaw, which will be the first new potash mine developed in Saskatchewan in over 40 years. Exploration spending is also well above historic levels, with expenditures for 2015 forecast to be $239 million. So it comes as no surprise the Fraser Institute ranks Saskatchewan as the second-best jurisdiction in the world for mining investment.

Over the last seven years, Saskatchewan's population has jumped by more than 10 per cent – an additional 123,000 people. More people are coming to our province because our economy is diverse, dynamic and rich in opportunity. Our world-class mining industry is a big reason for this success. As a government, we will continue to support the industry by encouraging investment and trade, and by maintaining a stable and transparent resource royalty structure.

Mining has a rich history in this province. In 1880, the first commercial mine opened its doors here, producing coal. Since then, the mining industry has generated billions of dollars in economic activity and created thousands of jobs. We see an even brighter future ahead and look forward to working with the Saskatchewan Mining Association and its partners to ensure the responsible development of Saskatchewan's mineral resources continues for decades to come.

Brad Wall
Premier

Q&A WITH NEIL MCMILLAN, PRESIDENT OF THE SASKATCHEWAN MINING ASSOCIATION

Neil McMillan is the former president and CEO of Claude Resources, the chair of the board for Cameco Corporation, and president of the SMA. We caught up with him to get his thoughts on the SMA's role, and on mining in Saskatchewan, over the last 50 years and in the future.

Q: How has the SMA supported mining over the last 50 years?

A: Like many organizations that have a lobby function, the SMA does a wonderful job of gathering the views and interests of its members into a cohesive and legitimate voice to address the regulators, the public and the politicians.

Because mining has been such a key part of the development of Saskatchewan's economy, and because the decisions made by politicians that affect mining can be so dramatic, the representation on that front becomes extremely important.

In that sense it serves an understandable but extremely important role in the province. Certainly the association's constructive relationship with the last few governments in Saskatchewan is really witness to how influential it can be.

Secondly, and this is partly because of the people involved, the SMA is a very influential player on the national stage through the Mining Association of Canada, and that's because of executive director Pam Schwann. She's extremely well-regarded, and so is the Saskatchewan Mining Association.

Because the mining association is a collective representation of our mining industry, and aggressively represents their legitimate interests in the province and the country, the association has a very important role to play in educating and influencing politicians and regulators about things that are not just good for the mining industry, but we believe for the province and the country.

That includes things like labour policy, workforce development and increasing aboriginal participation. We're very active on that. It's one of our six major goals, to increase and improve aboriginal representation in the mining sector, and we're already awfully good at it.

It has been a very important group in the province. The organization functions very well. As president, I know how busy it is.

Q: How has the SMA supported Saskatchewan and its economy?

A: It's helped to ensure that the operational landscape in Saskatchewan is globally competitive, and it has to be, in order to retain capital and the jobs that go with it, and to bring in more capital.

A few years ago, the potash industry said to the government, if you adjust the royalty rates so they are competitive, we will invest billions in expansions, which they did. That's an example of what can happen when you have a constructive relationship between industry and government.

The government and the uranium industry also have a very constructive relationship.

The acid test for all of these things is, does it help create and retain or create quality jobs? Can we do that in a legitimate and sustainable way? And that is one of the key objectives of the SMA, to ensure the resources are there to create and retain high quality jobs. In this case, it's really important because of the aboriginal participation, with Cameco and AREVA being most successful on that front; hugely successful.

The other thing the SMA does that I think is important is it works hard on the public awareness of the role of mining in Saskatchewan and what it means to the province. According to survey results, there is a very high support rate among the people of Saskatchewan for mining.

The SMA has also done a great deal of good work on the employee safety front, very collaborative work between the companies through the SMA on improving safety. It's already a very safe sector, statistically, with a better safety record than health work and government administration work. Cameco's McArthur River, the largest uranium mine in the world, has won the national John T. Ryan safety award for no lost-time accidents in a year twice in the last few years.

I am the director liaison for the SMA safety committee and that group is so engaged in their work of advancing safety, that our meetings are standing room only. The SMA Safety Committee also has sub-committees working on separate projects.

The SMA has been a really successful organization and had a profound influence on the last 50 years. It has a very good reputation with the government, and did before with the (previous) government.

Q: What does the future look like for mining and the SMA?

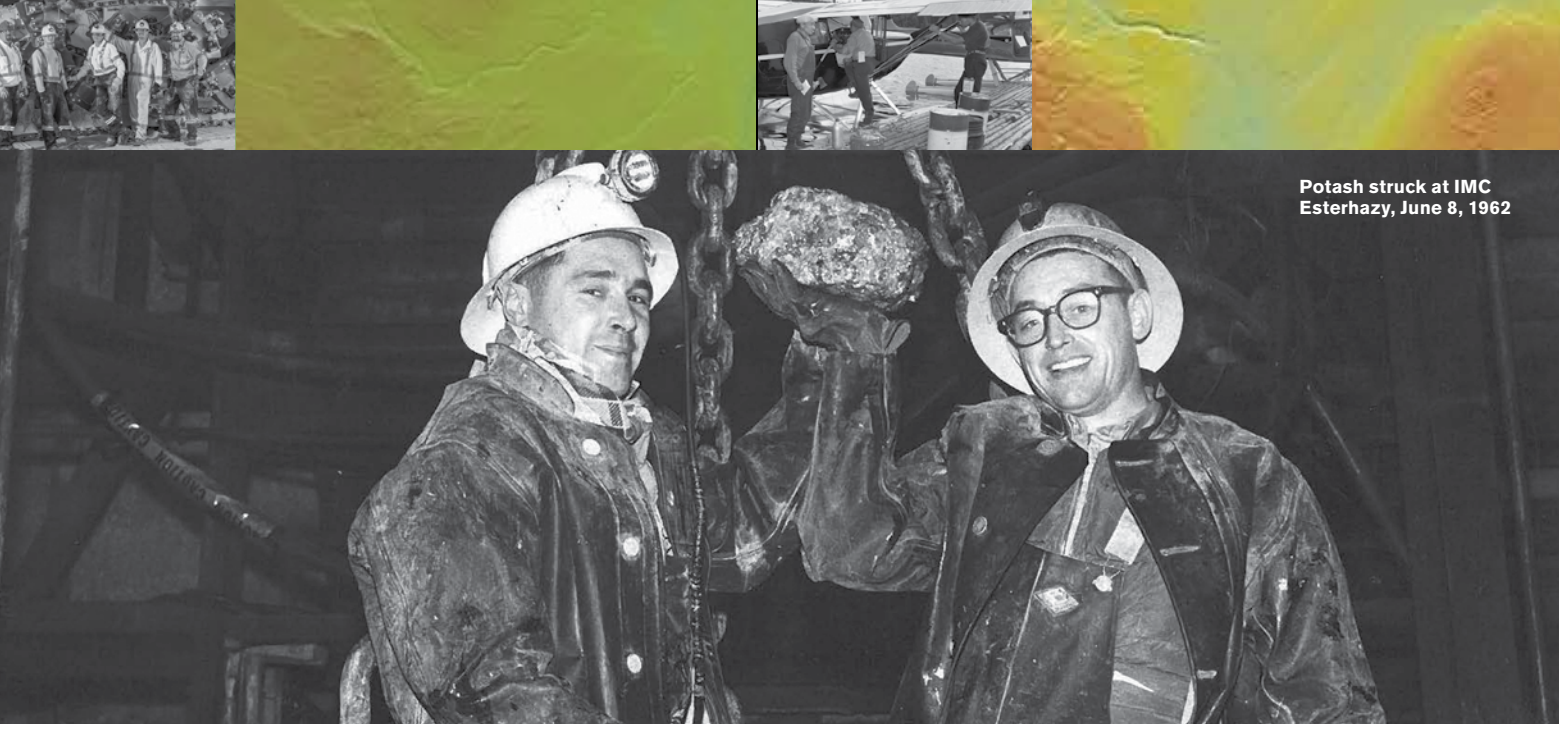
A: If our only mining sector in Saskatchewan was the lignite coal industry, I'd be concerned because of the global environment and pressure (around climate change). Fortunately the province has created a window of potential long-term stability for the coal sector in carbon capture.

On the potash front, people have got to eat. The demand for potash is international; with an increasing global population, we have the resources to support that for hundreds of years.

The uranium sector is brightening significantly. The World Nuclear Association just reported that they think nuclear power production will increase 45 per cent between 2020 and 2040. We know how many reactors are under construction in the world, and it's growing steadily.

The uranium sector in Saskatchewan is probably in position for long-term stability, and that's again because of global warming concerns. People can't ignore nuclear power as a baseload.

There will be a robust mining sector in Saskatchewan for the foreseeable future because of food and energy. And as long as there is an active mining industry in Saskatchewan and the peripheral businesses that go with it, the existence of the SMA as an umbrella organization representing and advocating for the mining sector is sound. And the province will be better because of it.



Potash struck at IMC Esterhazy, June 8, 1962

FERTILE GROUND

A BRIEF–*VERY BRIEF*– HISTORY OF SASKATCHEWAN MINING

By Edward Willett

In 2015, the Fraser Institute rated Saskatchewan as the best mining jurisdiction in Canada and second only to Finland in the 122 jurisdictions rated around the world. Although led by the potash industry (Saskatchewan is the world's top producer) and the uranium industry (where Saskatchewan ranks second), mining in Saskatchewan, beyond those two flagship minerals, also includes gold, coal, salt, sodium sulphate, silica sand, copper, zinc, silver, and bentonite – and there's potential for many more, including diamonds and rare earth elements.

Employing more than 30,000 people and contributing, on average, $1.5 billion a year to the provincial economy, mining in Saskatchewan is vital to the province's well-being – and the future looks even brighter, as countries around

Underground coal miners, Bienfait, 1905

the world focus on energy and food production, for which Saskatchewan's resources are vital. Technologically, environmentally, and socially, the Saskatchewan mining industry shines on the global stage.

It's come a long way since its humble beginnings.

Mining in Saskatchewan began with coal: In 1880 a Winnipeg-based expedition dug a 70-foot tunnel into a seam near Roche Percee, intending to ship coal down the Souris River to the Assiniboine. The scheme proved uneconomical, so for the next few years coal mining was strictly the provenance of local entrepreneurs like Robert J. Hassard, who sold coal from a seam near his farm to other homesteaders for a dollar per wagonload.

The 1892 opening of the Soo Line rail spur made commercial mining viable. The Hassard Mine became the Souris Valley Coal Mining Company in 1895 and Western Dominion Collieries Ltd. in 1905. The Great Depression hit those early underground mines hard, but the industry was saved by new technology, in the form of the six-ton electric shovel with an eight-yard bucket which the New York mining company Truax-Traer put into use in 1930. As strip-mining took hold, production boomed and costs dropped. The last underground mine closed in 1955.

Saskatchewan's metallic-mineral mining kicked off with the 1915 discovery of a copper-zinc deposit north and east of Amisk Lake, which led to the 1931 opening of the Flin Flon mine. A 1934 discovery on the north shore of Lake Athabasca spurred a gold rush and the establishment of the now-abandoned town of Goldfields, but the really significant find came a year later: uranium. Technically the prospectors were seeking radium (then worth $2 million an ounce), and saw uranium as a waste product, but the Manhattan Project changed all that, making uranium a vital (and secret) military resource during the Second World War.

In 1944 the federal government expropriated Eldorado Gold Mines Ltd., creating Eldorado Mining and Refining Ltd., whose Beaverlodge claims became the Gunnar mine and mill complex and gave birth to Uranium City. The 1948 lifting of the wartime ban on private staking of uranium triggered one of the largest staking rushes in Canadian history.

In the south, meanwhile, the post-war story was potash: Enormous deposits discovered in the late 1940s and early 1950s led to the International Minerals and Chemical mine at Esterhazy, the province's first commercially successful underground mine, and the first successful solution potash mine at Belle Plaine in 1964.

The burgeoning potash industry also gave birth to the Saskatchewan Mining Association. For 50 years, it and its member companies have been intimately involved in the struggles and successes of the Saskatchewan mining industry.

1965-1974: A New Generation of Mines

Potash production increased annually for the first few years of the SMA's first decade, but a global wheat glut in 1969-70 depressed demand and spurred Premier Ross Thatcher's Liberal government to work with the government of New Mexico to create the Potash Conservation Board, the precursor of Canpotex.

Up north, the discovery of the Rabbit Lake uranium deposit in 1968 by Gulf Minerals Ltd. and Uranerz Exploration and Mining Limited led to a new staking rush and hopes for awakening what M.D. Lawson, chairman of the SMA's Metallic Minerals Section, prophetically called "the sleeping giant of Northern Saskatchewan."

Sodium sulphate, a major industrial mineral mined in the south, faced a shift in demand from salt cake (used in the pulp and paper industry) to detergent-grade sodium sulphate. This led to the construction of the state-of-the-art Ingebright plant by Saskatchewan Minerals in 1966. Sodium sulphate producers thought the future looked bright. So did coal producers, as new mines opened to feed the growing demand for power.

Key to exploration that first decade was the province's Precambrian Assistance Plan, inaugurated in 1964. In its first year, the SMA estimated, the plan at least doubled and possibly quadrupled exploration activities in the Shield. It ended in 1969, victim of its own success, when the Rabbit Lake-spurred uranium rush resulted in the number of applicants outstripping the funds available.

While all this was going on, the fledgling SMA was struggling to find a long-term general manager. The first, Jack Roper, soon gave way to Bob Basserman, followed in short order by M. Glazier. Glazier resigned in 1971, and his replacement, J. T. Cawley, resigned the very next year to become Manitoba's Deputy Minister of Mines, Resources and Environmental Management.

But in 1973 geologist Dr. Ralph Cheesman assumed the role. He would serve as general manager until 1990, becoming all-but-synonymous with the SMA over those years. Bob

Joel MacKenzie, Jim Brady, and Claude Freemont taking off to stake for Pre-Cam Exploration and Development Ltd. in Stinson Voyageur CF-EXU, 1957 *Saskatchewan Archives Board Photograph RPS-57-311-09*

Underground workers at four-rotor miner, PCS Rocanville

Cunningham served from 1990 until 1997, when Phil Reeves became executive director. Pam Schwann has been executive director since 2007.

Dr. Cheesman passed away on June 27, 2007, at the age of 83.

1975-1985: Nationalization and a New Dawn

Post-Rabbit Lake, French-controlled MOKTA and German-controlled Uranerz sought similar finds. MOKTA succeeded first, identifying the Cluff Lake uranium deposit, but Uranerz made its own intriguing find: a highly radioactive boulder.

Knowing that under federal law it had to have Canadian ownership to develop the potential discovery, Uranerz informed the recently elected New Democratic government of Allan Blakeney that one of its oil-industry partners, Bell Oil, was willing to sell its one-third interest. Seizing the opportunity, in 1974 the government bought that interest for a few hundred thousand dollars, and formed the Saskatchewan Mining and Development Corporation (SMDC), intended to govern all mining in Saskatchewan.

The very next year, the exploration team found the Key Lake deposit.

The creation of SMDC worried the industry, but a bigger shock came on Nov. 12, 1975, when the government, unhappy with the reporting of potash revenue, passed a bill giving itself the right to purchase any potash mine in the province at fair market value. The new Potash Corporation of Saskatchewan ended up buying half the province's mines: Allan, Duval, Alwinsal, and Hudson Bay.

The industry's relations with the government soured further the next year when the government announced a public board of inquiry would determine if Cluff Lake and other uranium discoveries in the north should be developed.

The Cluff Lake Board of Inquiry, chaired by Mr. Justice E.D. Bayda, began formal hearings in the spring of 1977. The final report favoured development, as long as the environment was protected, and the development benefited the people of the north. Those recommendations set the tone for all future uranium development.

With that approval, the Key Lake mine began operation in 1983. At the time, it was the richest uranium deposit in the world, but as the decade wound down a discovery at Cigar Lake was estimated to hold even greater reserves, with a grade at least three times richer.

That good news was tempered by bad: in 1982 Eldorado shut down the Beaverlodge Mine, turning Uranium City into a ghost town.

In coal, the biggest development of the decade was the construction of the Poplar River Power Station and associated coal mine near Coronach.

1985-1994: Gold Takes the Spotlight

Gold took the spotlight in the SMA's third decade, starting with the Star Lake Mine, which produced 76,750 ounces of gold from 1987 to 1989. Several similar high-grade, short-lived mines came and went. Only Claude Resources' Seabee Mine, a fly-in operation 125 km northeast of La Ronge, remains in production: to date, it has produced more than one million ounces.

Hudson Bay Mining and Smelting Co. began mining its Callinan ore body, straddling the Manitoba-Saskatchewan border, but in 1984 closed the South Main shaft of the Flin Flon Mine, located on the Saskatchewan side of the border, nine years after the North Main Shaft. The Main Mine produced a total of 63 million tonnes of ore in its lifetime.

In 1988, Eldorado Nuclear Ltd. and SMDC merged to form Cameco Corp., which soon announced the discovery of world's largest known deposit of high-grade uranium ore at McArthur River.

In 1991, the Joint Federal-Provincial Panel on Uranium Mining Developments in Northern Saskatchewan formed to review Cameco's McArthur River Joint Venture, Amok Ltd.'s Dominique-Janine Extension, the South McMahon Lake Project by Midwest Joint Venture (Denison Mines Ltd.), Minatco Ltd.'s McClean Lake Project, and the Cigar Lake Mining Corporation's project. In October 1993 the panel recommended (subject to certain conditions) approval of the Dominique-Janine Extension and McClean Lake, and rejection of the Midwest Joint Venture proposal. Deliberations continued on McArthur River and Cigar Lake.

In 1989, the provincial government's direct involvement in potash mining ended with the privatization of Potash Corp., which went public on the Toronto Stock Exchange on Nov. 2.

More environmentally-friendly practices in the pulp and paper and detergent industries hit the sodium sulphate industry hard. The number of producing companies dropped to four, and in 1988 the Saskatchewan

Minerals plant sold to Kam-Kotia Mines Ltd.

A new mineral burst onto the scene as news emerged that Monopros Limited, a subsidiary of DeBeers Consolidated, had found a kimberlite pipe at Sturgeon Lake. A diamond rush followed. In 1990, Uranerz, in partnership with Cameco, reported it had recovered several small diamonds from the Fort à la Corne kimberlite field, one of the world's largest. Exploratory and feasibility work by Shore Gold continues on this deposit.

1995-2004: Finding the Balance

On Feb. 28, 1997, the Joint Federal-Provincial Uranium Panel recommended approval of McArthur River, commenting that "northern people, because they must bear the greatest environmental risk associated with this project and because of their traditional roots in this part of Canada, deserve to share more generously than other Canadians" in the benefits. Approval followed later that year for the Midwest and Cigar Lake projects.

The Key Lake mine depleted its ore reserves in 1997, but the mill continued operating in expectation of the McArthur River mine opening. In 1999, the McClean Lake project began operations.

In December 2002, the McArthur River/Key Lake operation set a world record for uranium production, producing 18.7 million pounds U3O8. That same month Cluff Lake, in operation since 1980, produced its last pound of uranium (of more than 60 million in total). On Dec. 20, 2004, Cigar Lake received its surface construction licence from the Canadian Nuclear Safety Commission.

Down south, mergers and acquisitions had reduced the number of companies mining potash in Saskatchewan to three: Potash Corporation of Saskatchewan, IMC (which became Mosaic following its 2004 merger with Cargill), and Agrium.

Cameco's Key Lake mill is the world's largest uranium mill.

An interesting development in the coal industry was the 2003 construction of a $6.5 million pre-dryer at the Bienfait Coal Mine, which increased char production by approximately 40 percent. Char is used primarily in charcoal briquettes: every bag of Kingsford briquettes sold contains char made from Bienfait coal.

2005-2015: Growth and Expansion

In 2008, Saskatchewan was Canada's top mineral producing jurisdiction, with mineral production valued at over $9.7 billion. In June of that year, PotashCorp became Canada's most valuable company listed on the TSX. That drew the attention of global mining giants BHP Billiton, Vale, and Rio Tinto to Saskatchewan potash. In August 2010, BHP made a $38.6 billion (U.S.) hostile bid for PotashCorp, withdrawn after both the provincial and federal governments opposed the takeover.

In the past 10 years, Mosaic, PotashCorp, and Agrium have invested more than $15 billion in increased production capacity. Just this past March, Mosaic announced a further $1.7 billion investment in its five-year-old K3 mine project.

New projects include

the $4.1-billion Legacy Project, announced by K+S Aktiengesellschaft in 2011 with production targeted for 2017. This new solution-mining facility north of Moose Jaw will be the first "greenfield" potash mine in Saskatchewan in nearly 40 years. Meanwhile, BHP Billiton is continuing feasibility studies on a greenfield conventional underground mine at Jansen Lake, the world's largest should production go ahead.

In total, the Saskatchewan potash industry invested more than $15 billion in expansions between 2007 and 2015, with an additional $8 billion invested in greenfield development.

Saskatchewan's share of global uranium production declined during the decade, from around 30 percent in 2005 to just over 15 percent in 2013, but the start of production in February 2014 at Cigar Lake could turn that around. With an estimated 217 million pounds of high-grade uranium, Cigar Lake is the world's second-largest deposit of its kind.

The largest is, of course, McArthur River, which supplies more than 13 percent of global production from ore which is 100 times richer than the world average. And meanwhile, like (appropriately enough) the Energizer bunny, Rabbit Lake, which began production in 1975, just keeps going and going and going as it celebrated it's own 40th anniversary in 2015.

In July 2009, Hudbay Minerals imploded its South Main mine headframe, built in 1939 and in 2010, Hudbay closed the Flin Flon copper smelter, a centerpiece of its operations for eight decades.

A major development in coal during the decade was the construction of the Bienfait Activated Carbon Plant, a joint venture of Norit Canada and Prairie Mines & Royalty Ltd. The market for activated carbon, used to remove mercury from the flue gas of coal-fired power plants, is expected to grow as legislation requiring its use is implemented around the U.S.

Claude Resources' Seabee mine has produced more than one million ounces of gold.

More than $2.5 billion was invested in exploration in Saskatchewan from 2005 to 2015. Major discoveries include the Roughrider Zone, a new high-grade uranium find on the eastern flank of the Athabasca Basin, announced in February 2008 by Hathor Exploration, and a shallow, unconformity-style uranium deposit at South Patterson Lake, on the southwest flank of the Athabasca Basin, announced in late 2012 by Fission Energy and partner Alpha Minerals. The latter breathed new life

into exploration in the Basin, initiating a modern-day staking rush.

Modern staking rushes are very different from those of the past, as a result of the Mineral Administration Registry Saskatchewan (MARS), an online system for issuing mineral permits, claims, and leases. Launched by the Saskatchewan government in December 2012, this web-based system replaces the traditional ground-staking approach, using electronic grid maps to define the location of mineral parcels. With MARS, whomever closes the grid on the computer first is awarded the claim, in contrast to the earlier-ground staking system, where the earliest completion time inscribed on the No. 1 Northeast post of the claim determined who held the claim.

With growing demand for the resources Saskatchewan has in abundance and with a mining industry second to none in terms of technological know-how and practical experience, the Saskatchewan mining industry faces a bright future.

The second 50 years of the Saskatchewan Mining Association promises to be even more exciting than the first.

Edward Willett *(www.edwardwillett.com)* is a freelance writer in Regina. In addition to writing the 50th anniversary book for the Saskatchewan Mining Association, Fertile Ground, from which this article is adapted, he wrote the centennial history books for the Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS) and the Saskatchewan Land Surveyors Association (SLSA). A former science columnist for the Regina Leader-Post and CBC Radio, he's the author of more than 50 books of non-fiction and fiction on a wide variety of topics, with a special focus on science and technology. He can be reached at *ewillett@sasktel.net*.

Mining connected to communities

Saskatchewan communities benefit from mining for over 50 years

For decades, John Nightingale has seen the benefits of mining to communities around Saskatchewan, from the northern fly-in operations to the southern potash mines.

The former president of the Saskatchewan Mining Association was also the President and CEO of Key Lake Mining Corp., President of Cigar Lake Mining Corp. and general manager of IMC at Esterhazy, now Mosaic.

Nightingale is officially retired, but was instrumental in establishing the Saskatchewan Potash Interpretive Centre in Esterhazy, supported by Mosaic Co., PotashCorp and Agrium.

Across the province, mining has created and sustained jobs, contributed to local community development, supported infrastructure through taxes and participated in skills training, said Nightingale.

"When I was at Key Lake, we increased northern employment by close to 40 per cent and it's still close to that," he said. "It's important to have those people who live in the north employed in the industry and working with the industry.

"We employed as many people as we could from many northern communities. The fly-in situation, flying people in from many parts of the north, was in place when I was there and is still in place. People can live in their own communities and work at the mine."

In the southern locations, there's an enormous local effect, he said: most of the southern mines affect communities within a 100-kilometre radius.

"Companies have been very good about employing local people and training local people instead of bringing people from afar."

Uranium Road, Uranium City 1957. *Saskatchewan Archives Board Photograph R-B6776-2*

While employment is mining's biggest local economic effect, mining also encourages the establishment of local suppliers, Nightingale said. Some suppliers are located within the communities, while others are located in Saskatoon, Regina and other communities at a greater distance from the mines.

"It has quite a big effect on suppliers in the province," Nightingale said.

"Mining companies also invest in the communities in other ways. They have always supported communities in a large way, contributing to schools, recreation facilities, infrastructure and the towns themselves.

"For instance, at Esterhazy, the mining company in the early days advanced taxes to allow for a larger school to be built. In the Yorkton area, the mining company has made a large donation to improve certain facilities in the school system.

"The companies are pretty consistent in their generosity to the communities they work in."

Mining companies are also subject to taxation based on a complex distribution formula, where rural municipalities receive funds based on how much the mines are extracting in their areas, he explained.

And, he says, mining companies strive to be good citizens in other ways, as well.

"I can tell you without a doubt the Saskatchewan mining industry is very environmentally-conscious. It has continually advanced and it's a big highlight of their way of doing business."

Tom Bayer, Points Athabasca's manager of safety, health and environment, can attest that mining companies have invested heavily in Saskatchewan communities. He grew up in Uranium City, which for decades was the northern community most closely linked to mining.

"There was huge support (from the mining companies), which made it a great community to grow up and live in," he said. "Because Eldorado was in there, we had excellent recreational facilities, excellent schools, and the ability to attract good teachers from the south."

Several mines were in the "U City" district, such as the Lorado, Gunnar, and the Eldorado mines. "In the U boom there was a lot of activity, and a lot of companies in there," noted Bayer.

Because Uranium City sits nearly at the northern tip of the province, there was a little bit of isolation; but food was brought in by barge or winter road, and there were flights in and out every day – on big planes.

"737s were being flown in and out," he noted; the airport had a one mile strip. "Families could jump on that plane unlimited times per year.

"Even for sporting events, school events, planes were sponsored to fly teams into the Northwest Territories and south. There was very good hockey, competitive baseball, broomball, curling, and all the regular intramural sports. There was a full complex available to the public at the mine site, with a full gym,

weight room, bowling alley and theatre."

Uranium City's population once peaked at about 4,500, although it had fallen to 3,000 to 3,500 while Bayer was growing up. Yet, that was a fairly good size for such a far-northern community, and was likely because people were paid well, the food was healthy, and the housing was inexpensive.

"That's why you got people from all over the country, and a lot of people stayed long-term."

Somewhat farther south, and much farther east, lies the town of Creighton, population about 1,500. Directly across the Manitoba border from Flin Flon, Creighton is an important community to the nearby HudBay copper and zinc mine.

Creighton's mayor Bruce Fidler said 350 to 400 people from his town work at the mine.

"We are significantly dependent on the mine here," said Fidler. "A lot of families have had people working at the mine for generations.

"It's part of life here. It's been very beneficial throughout the years. They've supported the communities of the area very well over the years, through community involvement and the jobs.

"Fortunately, in the mining industry, the wages and benefits are quite healthy. People have enjoyed quite good incomes over the years."

HudBay gets involved in Creighton by sponsoring local events, supporting various groups, and making donations around the community for various projects.

The copper and zinc mine is among the oldest in Saskatchewan, at 83 years, noted Fidler.

"The year that they celebrated their 80th anniversary, the company put up a million dollar donation over a few years to donate to different projects for community improvements and well-being throughout the area," he said. "Over a matter of three to four years, this was spread out and donated to different projects throughout the area.

"That went over really well. People were really supportive and thankful for that."

John Nightingale, former president of the Saskatchewan Mining Association, directs a tour at the Saskatchewan Potash Interpretive Centre.

Deep in the southeast corner of the province, Estevan is home to Saskatchewan's oldest mines. Coal has been mined continuously in the area since the 1800s, making the region one of longest-lived mining areas in North America.

Roy Ludwig has seen the effects of mining from two sides: not only is he the city's mayor, but he is also employed by Westmoreland Coal Company.

Estevan became a city in the 1950s, but its history stretches back to 1892, when the first settlers began to arrive in the area.

"Coal has played a large part in our history – coal as well as oil," said Ludwig. "We've been blessed with more than one natural resource. We've gone through a few oil booms going back to the 50s.

"Of course, oil tends to be cyclical. Right now, we're down 50 per cent from a few years ago on oil, so we're feeling that pinch. But because of the fact that we have coal, and the power plants that use coal, the impact on a one-resource town would be a lot worse than in our case."

Coal mining employs about 400 people in the area, he said.

"That along with the spinoffs, the purchases with the trucks, the fuel, the equipment – and then when you take in the power plants – it is tremendous, the economic spin-offs that benefit Estevan. It is huge.

"We're proud of the fact that we have a long history in coal and oil. That really helped to put us on the map."

Also putting the Estevan region on the map is the new clean coal project at Boundary Dam. The SaskPower $1.4 billion facility has sophisticated equipment for carbon capture and storage.

"(It is) the largest of its kind in the world, and that's been proven successful. We have countries from literally all over the world that are coming to look at this technology."

Estevan, in other words, is also benefiting from industrial tourism. In the summer, Estevan offers tours of the mines, power plant and the mine pits. "It's been very, very popular," said Ludwig.

Westmoreland, an American company, is now operating the coal mine, which has had numerous owners over its 100-plus year history. Westmoreland is described by Ludwig as "a very astute mining company."

"They appear to be a good corporate citizen. They're very big on safety. All these large corporations have to be involved and proactive on the safety side, and Westmoreland is a leader in safety."

Pauline Chewka, mayor of Esterhazy, says her town has also enjoyed a close working relationship with all the mining companies – from IMC to Mosaic – that have called "Potashville" home for over 50 years.

"They have always shown themselves to be strong community ambassadors," said Chewka. "They have always worked cohesively with the town to help meet the demands of being a mining community and are excellent corporate citizens."

The potash industry was instrumental, for instance, in the development of the Saskatchewan Potash Interpretive Centre. "The centre shows hundreds of visitors each year what a working potash mine looks like and gives them a glimpse into the day of a miner," said Chewka.

Esterhazy's population today is more than 3,100, up considerably from 2,474 in 2011. That growth created significant challenges, such as building roads and housing transient employees hired to work on the mine's expansion. Small businesses had to work hard to keep their employees as the mine attracted workers.

But it was all worth it.

"These things have now stabilized, and have led us to improvements and growth," said Chewka. "We now have new supporting businesses, new hotels, new restaurants, homes and apartments, all which will remain when construction of the mines is over. Developers have come to build new residential areas, all of which increase the value of our community overall.

"Mosaic, in its willingness to continually invest in the long term sustainability of its mines, is ensuring the future of Esterhazy for years to come," said Chewka. "It has been responsible for every growth we have ever undergone and continues to push us ahead."

Skylar, Perry and Meril Bryksa, left to right, represent three generations at PotashCorp's Lanigan mine.

Saskatchewan mining all in the family

Generations working together across the province

Katelynn Kimbley was not yet born when her father began working at Saskatchewan's uranium mine and mill operations. You could say she has grown into the industry.

Kimbley, 24, is a mill operator at AREVA's McClean Lake operation, following in the career footsteps of father Tommy Roy. The two are on the same shift at McClean Lake, although, due to regulations, on different crews.

Kimbley has been with AREVA Resources Canada for two years, and a mill operator since March, 2014. Her father encouraged her to train for the position.

"He suggested that I take the course at McClean Lake, so I had the experience of doing everything, seeing it in the field and doing it in class," said Kimbley. "I really enjoyed what I was learning, and what the future had in store for me."

Kimbley and Roy are representative of many Saskatchewan families with more than one generation in mining, which supports thousands of families across the province.

Roy has been a mill operator for over 20 years, and has developed a strong reputation for his expertise and experience. He's a lead hand at McClean.

"I am real proud of her," said Roy, who is pleased that his daughter is working in the stable mining industry. "Up here, the jobs around here are at the mines. There are (other) jobs, but they pay very little compared to what they pay at the mines.

"She's doing a good job," added Roy. "She's holding her own."

Roy, who took the first mill operator course at Northlands College Mining School, started his career at Key Lake in 1983, when its mill was just starting up. "It was a brand new mill; I was there for the commissioning," he said.

He moved on to McClean Lake when its mill was restarted to take uranium ore from Cigar Lake, and has been there ever since.

While they don't cross over a lot at work, Roy and Kimbley travel together from their homes in Beauval along with a group of other workers. They drive to Buffalo Narrows, which takes about an hour, and then fly another hour to Points North. Buses take the crews the rest of the way to McClean.

"I do hope that I'm one day as good as my dad is," said Kimbley. "Not many people know he's my dad. Some days, I'll hear people brag about how good he is. That inspires me to be just as good as him.

"He definitely inspired me to work hard to provide for my family like he did for his. I am a brand new parent to a baby girl born in April. She is also my dad's first grandchild," said Kimbley.

She may be the third generation of Roys and Kimbleys at McClean Lake.

Much further south, three generations of Bryksas have held a wide variety of jobs at the PotashCorp Lanigan mine.

It began with Meril Bryska, who worked at Lanigan from 1968 to 1993, mainly as a heavy equipment operator. He manned loaders, Broderson cranes, forklifts, dump trucks, bobcats – any and all types of heavy equipment.

Perry Bryksa joined the mine in 1980 as a labourer and became mill production supervisor in 1999, a position he still holds. Son Skylar came on board in 2010, and another son, Evan, is a scaffolder at the PotashCorp Cory mine.

"We're all mining," said Perry Bryksa in an interview.

Bryksa was keen to get into the workforce and wanted to emulate the success he saw his father was having at the mine. He decided to give it a try.

"He had a pretty good living with it. Some people say well, I'll stay five years and then move on. I didn't say that. In the end, that was my full intention that I was going to stay. And I'm stlll here."

It was great to work with his dad, now retired, and now it's also great to work with his son, he said.

"He's doing good, there's no doubt about it. I wouldn't tell

Katelynn Kimbley, left, and her father Tommy Roy both work in AREVA's mill at McClean Lake.

anybody to come work here if I didn't think it was a good place to work. There were lots of jobs out there a few years ago, and they (his sons) could have gone anywhere, but they came here."

For instance, they could have chosen to work in the oilpatch, and Skylar did try out working in Calgary, but decided to come home to mining.

"When he got hired he was pretty happy. He's been here ever since. He'll be here a long time. I'm pretty sure of it anyway."

Brothers Albert, left, and Richard Gauthier are joined at Cameco's Key Lake operation by Richard's son Eddie.

The Gauthiers are a growing Key Lake family.

Albert Gauthier has more than 30 years in at the Cameco mill and former mine, and today is a general foreman. Brother Randy is an Operator One with site services, working with equipment such as cranes, haul truck and graders.

Brother Richard is a mobile equipment trainer. He trains new employees to grade roads, operate loaders, drive buses, de-ice planes and drive forklifts, among other duties.

Most recently, Richard's son Eddie has joined Cameco's Key Lake team, as has one of Richard's nieces, Robin. (Another brother is also in mining, at the Diavik mine in the Northwest Territories.)

"It's really exciting," said Richard of the next generation joining in. He's very pleased for Eddie, who is "making his own money, and even talking about buying his own house."

Richard has homes in Prince Albert and Beauval; Randy and Robin are also in Beauval; and Albert is in Green Lake. Even so, getting to work is an all-in-the-family event.

"We work together, and we fly together all on the same day. We all fly on Tuesdays," said Richard.

Once at the mill, the Gauthiers are often together after shift, joining in the many activities going on in the evenings. They head out to the nearby lake, play bingo and golf, baseball and floor hockey.

"They have a nice base," said Richard of the world's largest high-grade uranium mill site. "We can go paddling and canoeing, kayaking and now they also have paddle boats.

"Key Lake has always been good. They even have family visits, where you can bring up family."

Working for Cameco has been a true boon for the Gauthier family, said Richard.

"It's always nice to make a good living for the family. You can buy all the good things in life – a vehicle, travel… and of course, a house. It's actually bought me a house in Prince Albert, working up there."

It's a big added attraction to be able to work with family, real and 'adopted.'

"Everyone is like family up there. You're working together all the time. It's nice to have your family there too."

Technology transforms mining

An operator remotely controls a jet-boring machine at the Cigar Lake uranium mine

Many advances in last 50 years driven by safety

There was a time when engineers used a drafting board and a pencil to create their designs for a mine.

If they wanted to communicate their ideas to a mine manager, they would get up from their desks and walk over to his truck or office.

That manager was probably driving a regular vehicle of some kind, and his crew went underground with basic safety gear.

Today, the mine design is created with software like Autocad, and sent electronically to the mining managers and crew. They're driving safe vehicles with roll bars and seat-belts, and have sophisticated machinery, systems and personal protective equipment (PPE) to protect them.

Before they even go underground, they know exactly what's there because of the use of three-dimensional (3-D) imaging done from surface.

It's a sea change, said Arnfinn Prugger, vice-president technical services for PotashCorp, and much of that change has been driven by mining companies' determination to keep their people safe.

"Now we have a much bigger infrastructure to make sure the people we put in the mines are well-trained, and we have good training materials – and support staff to help them with safety auditing," he said.

"That didn't really exist when I started 25 years ago. This is a cultural change."

Technology has enormously advanced safety in ways that may seem unexpected. For example, 3-D seismic mapping from surface, first done in Saskatchewan in 1986, allows potash companies to see areas that are unstable before they even approach them underground.

"With foreknowledge of where those areas are, we're not mining into them," said Prugger. The goal is not to find more potash, but to demonstrate "the safety and security of the ore zone. It also dramatically reduces the possibility of flooding out your mine."

Safety and protection from flooding began in the early 1960s, when the Blairmore Ring was first installed at Esterhazy to hold back the sandy, wet soil. Today, the same concept is often used, although with new approaches or materials, such as tubbing rings and steel shafts.

And, everything has become bigger. "The hoists are bigger, the machines are bigger, the conveyor belts are longer. Everything is better instrumented, and there's better communications underground," said Prugger.

That sea change also extends into uranium mining. The first mines in the Athabasca Basin date to the 1950s, when there was limited technology to protect workers from potential hazards.

Today, "the major differences are in environmental protection, health and safety, and radiation protection and mining systems which are an order of magnitude ahead of what was used during the '50s," said David Bronkhorst, Cameco's vice-president of mining and technology.

"Enhancing worker health and safety is a key consideration in designing our mining systems and has resulted in innovations like the non-entry methods used at McArthur River and Cigar Lake that allow safe mining of the exceptionally high-grade ores in these deposits."

Cameco mines in exceptionally challenging geological conditions, where ground freezing technology and mining robotics have been crucial to extracting ore.

"These methods are so effective, that workers' radiation exposure at McArthur River and Cigar Lake is less than what is experienced in much lower grade operations," said Bronkhorst.

Other examples of high-tech advancement are controls on water and the tailings transport system that provide instant alerts to leaks or other issues; sophisticated radiation sensors and dosimetry devices that monitor conditions in facilities and accurately track worker exposures; and advanced water treatment technologies that remove contaminants from effluent.

For Jared Keller, computer software has revolutionized mining from the office to the dragline.

The engineering manager at Westmoreland Coal cites Autocad and Excel, two computer programs, as two of the biggest and most positive changes to mining in the last decade.

"You pretty much do the work that 10 guys could do, back in the day," said Keller. "You can redo it and not spend hours and hours redoing a drawing. For communication

An operator works in the control room at the Key Lake Uranium Mill.

of design, you can get it out there, and everyone can see it in a couple of minutes.

"It's transforming to a point now of getting everything electronic – getting away from paper entirely. Communication is the biggest thing…the ability to share information quickly and accurately."

Autocad is used to design basic pit layout and design, do long range planning, budgeting and 3-D designs. All of Westmoreland's drawings for pads and draglines (excavators that remove overburden from ore) are done in 3-D, and then shared with the dragline crew who work off their global positioning systems (GPS).

"There's also a safety element. It's getting the information out to everybody. In a matter of minutes, you can get a new design out and can tell people where to stay away from."

Excel is another "absolutely fantastic" tool for forecasting, budgeting, even basic design work. "It's absolutely priceless," said Keller. And, as with all the tools he uses, "it's all about getting the product out of the ground in a safe, efficient and productive manner."

Perhaps the newest coming thing is radar, said Prugger.

"We've installed radar equipment on our borers to look up, so as we're cutting into the rock, we're getting an image of what's going on up above. Now he can see up into the rock above him. If there's a geological change he recognizes, he can react much more quickly."

The radar alerts the borer operator to put in rock bolts, if they are needed to stabilize the area.

"The radar has taken in the order of 20 years to get through here," said Prugger. "We've been working on it for decades."

Clearly, technology has taken huge leaps in the last 50 years, and will continue to advance in the mining industry for the next 50.

SMA will fulfill crucial roles for many years to come

Fifty years ago, Saskatchewan's mining industry was growing into its own. Although economic deposits were being discovered and technology developed, the industry was comprised of various independent mineral interests and did not have a collective voice.

Today, Saskatchewan mining is globally recognized and far more integrated. In fact, the province is ranked by the Fraser Institute as among the best jurisdictions in the world for mining, based on its geological attractiveness and government policies that encourage exploration and investment.

The Saskatchewan Mining Association (SMA) has been an integral part of taking this province to number one in Canada and second best in the world, says one of its former presidents.

"The SMA has done a wonderful job," said Tim Gitzel, Cameco Corp. president and CEO. "The mining association in Saskatchewan has really punched above its weight for a long time – decades.

"Rather than operating independently, mineral by mineral, the mining association has really drawn everyone together. They have great leadership, and they've had great credibility with government and regulators in Saskatchewan and Canada. When they speak, people listen."

The SMA advocates for the mineral resource industry to establish a favorable environment for its growth. The Association provides support to members primarily through various committees composed of peer members. It also conducts public surveys and publishes ORE, the official publication of the Saskatchewan Mining Association

SMA President, Kelvin Dereski, with Minister Bill Boyd, launches 2009 Saskatchewan Mining Week at Construction Careers Regina with students from St. Pius X School.

Over the past 50 years, the SMA has become known at the "Voice of the mining industry in Saskatchewan" with public education and government outreach programs.

Mining Week in Saskatchewan is one of the key annual public outreach events and is an opportunity to recognize and celebrate the importance of the mining industry to Saskatchewan residents, Canada and the world. The week culminates with the annual Emergency Response/Mine Rescue Skills Competition that showcases teams from mines across the province competing in firefighting, first aid and mock mine and surface events and written and bench test exams.

The Mining Supply Chain Forum is a more recent annual event hosted by the SMA in partnership with the Ministry of Economy and SIMSA, that that brings together the mining industry and their suppliers to discuss operations and related supply opportunities.

The SMA provides education outreach programs to primary and secondary schools, including the week-long SMA GeoVenture Teachers Program that brings selected teachers to minesites across the province; the development of curriculum-correlated lesson plans and resources and workshops for educators to familiarize themselves with SMA

Underground Mine Event at the 2014 Emergency Response/Mine Rescue Skills Competition

resources.

The SMA is in regular and continued contact with the provincial and federal governments to support policy and regulatory efforts that support responsible resource development – including environment, safety, education and labour market programs.

Those who have been involved with the SMA over the last 50 years believe it will continue to fulfill these vital roles in the half century to come.

Harold MacKay, counsel with MacPherson Leslie & Tyerman LLP, said the association has played a valuable role in educating the public.

Honourable Ed Fast, Minister of International Trade, speaks with Jeff Hryhoriw and SMA Directors Bob Steane and Mark Fracchia.

"They started out with a heavy lobby interest, and that continues, but they are also representing the industry to the public, where I think they have done an increasingly good job," he said. "Saskatchewan citizens are way more aware of the significance of the industry."

Current SMA president Neil McMillan agrees.

"I sense that the public's appreciation of the mining sector continues to improve," he said. "They're starting to be more understanding of how important it is from an economic point of view. Its role is better understood and appreciated."

It is also extremely important to stay in front of politicians and regulators, and to be aware of what is happening in the policy arena.

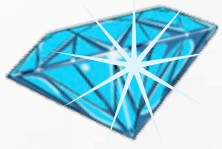
"I believe that what the association has been doing will be necessary forever," said former SMA president and Cameco CEO Bernard Michel. "As long as there is mining, and there will be mining for a long time – and as long as there are governments, and there will always be governments – the mandate of the association to speak with one voice will be invaluable."

It has been that single voice for mining that has made the SMA invaluable in other ways, as well, said McMillan.

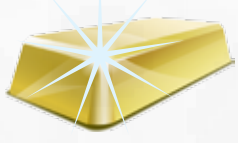
"You know your business and partners, but for mining people in the uranium sector to really understand the challenges faced in potash and coal, a chance to get together under the umbrella of the SMA leads to a lot of best-practices sharing," he said. "It would be a dramatically different environment for mining in Saskatchewan without the SMA.

"The SMA today is probably more important and influential than at any time in its 50-year history."

50 FASCINATING FACTS About Saskatchewan Mining



1. **Saskatchewan mines have produced potash, uranium, coal, copper, zinc, lead, gold, silver, platinum, palladium, nickel, cadmium, sodium sulphate, kaolin, bentonite, diamonds, salt, and silica sand.**
2. There are over 25 mining operations in Saskatchewan.
3. Saskatchewan is the world's leading producer of potash, and the second-leading producer of uranium.
4. Saskatchewan's first true mine was the Hassard Mine, owned by Souris Valley Coal Mining Company. It began commercial production in 1895.
5. A copper-zinc deposit found by Tom Creighton in 1915 led to the creation of the Flin Flon mine, which was in production from 1931 – 1992.



6. The first significant gold discovery in Saskatchewan was made in 1916 in the Amisk Lake area, which started production as the Prince Albert (Monarch) Mine in 1923.
7. The first successful large scale strip coal mine went into operation in 1930.
8. Uranium was discovered in 1935, on the north shore of Lake Athabasca, near Goldfields. The discovery became a major uranium mining camp that formed Uranium City.
9. Diamonds were reportedly first found in 1946 by a prospector named Johnny Johnson, between Prince Albert and Flin Flon.
10. Potash was discovered in 1942 near Radville in core from oil and gas well drilling.
11. Every bag of Kingsford briquettes contains char from the Bienfait coal mine.

12. Bentonitic clays in southern Saskatchewan, formed from volcanic ash deposits, are used in "kitty litter," toothpaste, adhesives, drilling mud and even chocolate!
13. Kaolinitic clays of the Whitemud Formation, exposed along the Frenchman River Valley, are used to make pottery.
14. The first successful sinking of a potash shaft occurred at Esterhazy in 1962 when the enormous, 28-ton steel Blairmore rings were used to hold back the frozen, water-saturated sands of the Blairmore Formation.
15. The first potash solution mine opened in Belle Plaine in 1964.
16. The new 500,000 tonne storage facility at PotashCorp Rocanville is one of the world's largest buildings and can be seen from space. Its capacity would fill 4,854 potash railcars, stretching for 68 kilometers.
17. Mosaic Esterhazy's K3 headframe is the tallest structure between Winnipeg and Calgary.
18. The discovery of uranium at Rabbit Lake in 1968 by Gulf Minerals Ltd. and Uranerz was the beginning of today's modern uranium industry in Saskatchewan.
19. The Seabee Mine, owned by Claude Resources, opened in 1990, and has produced more than one million ounces of gold.
20. Monopros, a division of DeBeers, found kimberlite erratics near Sturgeon Lake in 1988. Kimberlite pipes and subsequently gem-quality diamonds, were later found at Fort a la Corne.
21. Exploration is the R&D phase of mining – it takes 10 to 20 years to take a deposit into production.
22. **In the last eight years, exploration expenditures have totaled $2.5 billion. On an annual basis, they reached an all-time high of $475 million in 2008.**
23. All mining developments as well as significant changes to existing operations are required to submit an Environmental Assessment Report to the Ministry of Environment. This must be approved by the Minister before a development is allowed to proceed.

24 **Mining is a temporary use of the land. Its footprint occupies 0.1 per cent of available land in the province, less than the size of Saskatoon.**

25 All Saskatchewan mines provide financial assurance monies to government to ensure that there are funds in place to reclaim mine areas.

26 Saskatchewan mines have regulatory oversight from a number of provincial and federal agencies, including the Ministry of Environment and Environment Canada. The primary regulator for uranium mines is the Canadian Nuclear Safety Commission (CNSC).

27 Today's uranium miner receives, on average, an annual radiation dose of <1 mSv (millisievert), less than the average annual radiation dose received by an international airline pilot and well under the regulated annual limit of 50 mSv.

28 Coal mines in Estevan, Bienfait and Coronach, provide the primary source of energy in Saskatchewan, accounting for over about 40 per cent of the province's available power capacity.

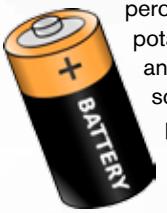
29 Potash was Canada's MVM (Most valuable mineral) by value of production from 2007 -2013.

30 NASA has a connection with Saskatchewan mining. Potash is used in rocket fuel, and clay from Saskatchewan was used to construct bricks on rocket launch pads.

31 Conventional underground mining techniques are used for mines where potash is located at about 1,000 metres depth; solution mine technology is used when potash depths are greater than 1200 m.

32 Potash is primarily used as fertilizer for crops such as grains, fruits and vegetables and oilseeds.

33 Industrial grade potash accounts for approximately 10 percent of global potash consumption and is used in water softeners, food products such as Coca-Cola, pharmaceuticals, soaps, de-icers, batteries and drilling muds.



34 Over half of Saskatchewan potash is exported to the U.S., with Brazil, Indonesia, China, India and Malaysia making up the bulk of the remaining exports.

35 **Potash was the No. 1 product shipped by rail from Saskatchewan in 2012 in terms of both volume and value.**

36 The mining industry is one of the safest industries in the province, averaging less than one lost time accident for every 200,000 hours worked, which represents a lower lost time injury rate that the provincial average.

37 Candu High School in Uranium City was named after Canada's Candu reactor.

38 **The McArthur River and Cigar Lake Mines, operated by Cameco, are the world's largest high grade uranium mines, averaging 100 times the grade of other uranium mines. Non-entry, remote-controlled mining techniques are used to limit the amount of radiation exposure to worker.**

39 The Rottenstone Mine, which operated from 1965 to 1968 produced platinum, palladium, nickel, copper, gold and silver.

40 Nuclear power is a non-GHG emitting source of energy, using fission to create heat and electricity.

41 Nuclear power from Saskatchewan uranium, provides over 50 percent of Ontario's electricity – more than one in every two lightbulbs!

42 Nuclear is the most land-efficient means of clean electricity production; nuclear generates 47.6 MWe/km2 (megawatts-electrical); solar generates 3.1 MWe/km2; wind generates 1.6 MWe/km2.

43 Saskatchewan uranium is used in nuclear technology that supports medicine, materials science, advanced manufacturing, food safety and energy production.

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50 FASCINATING FACTS About Saskatchewan Mining

44 There are over 120 occupations in Saskatchewan's mining sector.

45 The average weekly salary of an employee in the mining industry is almost twice that of the average weekly salary of Saskatchewan employees in other sectors.

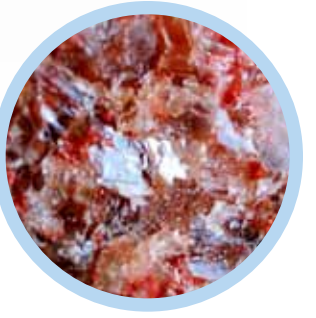
46 The mining industry in northern Saskatchewan is the leading industrial employer of Aboriginal people in Saskatchewan, comprising just under 50 percent of the workforce.

47 The Saskatchewan mining industry spends over $3 billion annually on wages, goods and services

48 **The mining industry in Saskatchewan employs more than 30,000 people (one in every 16 jobs) and makes up 12 per cent of the province's GDP.**

49 Smart phones are made with about 20 mined products including nickel, gold and silver.

50 Sylvite (potash) was proclaimed Saskatchewan's Mineral Emblem in 1996.



Grade 7 students at Caswell Community School in Saskatoon were among the winners of the second annual Digging Deeper Challenge

The High-Tech Future of Mining

Students provide a glimpse into the next 50 years

As the Saskatchewan Mining Association celebrates its first 50 years, it is also looking straight ahead into the next 50.In this context, the SMA's education outreach program asked the perfect question to students across Saskatchewan: What will Saskatchewan's mining industry look like in the next 50 years?

It was the direction given to students participating in the second annual Digging Deeper Challenge. Young people in Grades 4 to 12 are the demographic focus, although anyone can participate.

The challenge asked students to prepare videos – in whatever creative form they chose – and post them

on YouTube. The link to the video was then submitted to the SMA, and judged by a committee made up of SMA members, staff, teachers and media experts.

"The Digging Deeper Challenge is a great way to combine science, language arts, arts education, visual arts and the practical and applied arts/communication media into one project," said Kate Grapes Yeo, education outreach co-ordinator for the SMA.

One of the winning videos was prepared by Caswell Community School's Benjamin Gaskin, Brayden Johnson and Liam McRorie-Wilson, who took first place in the Grades 6-8 competition with their newscast-style video.

Their broadcast revealed that six per cent of Saskatchewan people are employed in mining, and that 85 per cent of Canadian potash is mined in our province –making mining a crucial part of the provincial economy.

The three young newscasters interviewed industry officials, who noted that as it becomes increasingly difficult to reach deep seams of ore, robotics will be used more in the future. Companies are also increasingly using 3-D modelling to help them "see" underground, and widely adopting the use of drones to evaluate topography and geology.

"One of our largest industries is bound to change," said McRorie-Wilson, in wrapping up the video.

Students in the Energy and Mines 20/30 program at Wynyard Composite School took first place in the secondary school division.

Students were given about five months to prepare the two-minute video presentations. This year there were first, second and third place, Honorable Mention, and Best Class Effort awards for each grade category.

Why Dig Deeper?

The SMA and the mining industry will need a new generation of workers as existing employees retire and mining operations expand, and to that end, the SMA reaches out to students at all levels of education.

The Digging Deeper Challenge was launched based on the success of the Ontario Mining Association's (OMA) *So You Think You Know Mining* competition.

"The new generation has grown up in the digital age, which is characterized by a proliferation of interactive online information, blogs and social networking," said Grapes Yeo.

"The goal of Digging Deeper is to enable, inspire, influence and engage the opinion makers and workforce of tomorrow. It gives students in Saskatchewan the opportunity to research a topic and compete for cash prizes by submitting a video that profiles the benefits of mining to them, their community and to Saskatchewan."

The winning entries can be viewed at *http://www.saskmininged.com/winners.html.*

More education on the MAP

Minerals and Products (MAP) is a one-day, SMA-sponsored exhibition that showcases six main stages of the mining cycle: exploration, mining, processing, products, sustainability, and safety, their roles in the mining cycle, and the diversity of career opportunities.

This year's MAP event was held at Campus Regina (Cochrane High School) on Oct. 28. Approximately 360 Grade 7 students from the Regina Public, Regina Catholic, and Prairie Valley School Divisions and the File Hills Qu'Appelle Tribal Council schools attended. MAP is delivered in partnership with the SMA and Regina District Industry Education Council.

Saskatchewan mines make the grade for 50 years and more

Mosaic Esterhazy K3 head frame

Mining began in Saskatchewan in the late 1800s, and has continued ever since as various minerals have been discovered and new mines have opened from border to border, north to south and east to west.

Six of these mines have attained the milestone of being in continuous operation for over 50 years, demonstrating the legacy of prospecting, determination and investment in our province since before it was incorporated. In many instances the mine resources outlasted the names of their operators.

ESTEVAN COAL MINES, 1880

In 1880, an expedition from Winnipeg to Roche Percee started the coal mining era in Saskatchewan. Miners dug a 70-foot tunnel, loaded coal into barges, and sent them down the Souris River to the Assiniboine.

By 1892, a number of small mines were producing about 5,400 tons annually and selling it locally.

The Hassard Mine became Saskatchewan's first commercial coal operation in the same year. The mine changed hands many times over the years, but coal has been mined continuously in the region for 135 years.

Today, the coal located in and around the Estevan area is mined by Westmoreland Coal Co.

FLIN FLON COPPER AND ZINC MINE, 1931

Known historically as the Flin Flon mine, Hudson Bay Mining and Smelting's copper and zinc mine, which straddled the Saskatchewan – Manitoba border, was continuously mined from 1931 until 1992.

Located north and east of Amisk Lake, the copper and zinc deposit was discovered in 1915 by Tom Creighton, for whom the town nearby was named. Today, HudBay continues to mine copper and zinc from its 777 deposit, adjacent to the historic Flin Flon (Main) mine.

UNITY SALT MINE, 1949

The salty soils of Saskatchewan contain more than potash. In the 1940s, oil drilling revealed a substantial salt deposit at Unity, and a mine was established in 1949.

Today, the Sifto Canada mine is still operating, and is the community's largest employer.

PATIENCE LAKE POTASH MINE, 1958

Potash exploration began as early as 1917 in the Weyburn area, but the first confirmed discovery came in 1942 through oil drilling. As exploration continued, it became increasingly certain that Saskatchewan held enormous deposits of the mineral.

The first attempt to mine potash came at Unity in 1951, but the first underground potash mine was opened at Patience Lake near Saskatoon in 1958. It was forced to close due to flooding, but reopened as a solution mine in 1989. It is still producing after 57 years.

ESTERHAZY POTASH MINE, 1962

The Esterhazy potash mine, now owned and operated by Mosaic Co., was opened by International Minerals and Chemical (IMC) after overcoming significant water problems. The first potash shaft was historically sunk at this mine in 1956, incorporating the Blairmore rings that held back the quicksand-like soils.

The mine went into production in 1962, and has proved to be a major resource. Mosaic has recently expanded the mine considerably, ensuring its life for many years to come. It has been in continuous operation for 53 years.

BELLE PLAINE POTASH MINE, 1964

The world's first successful solution potash mine is also its largest. The mine was opened at Belle Plaine in 1964, and has been continuously operated since that time.

Now 51 years into its life, the Mosaic-owned mine continues to add capacity.

RABBIT LAKE URANIUM MINE, 1975

While the Rabbit Lake mine – the oldest existing uranium mine in Saskatchewan – does not quite make the 50-year list, any view of mining in the province is incomplete without a nod to the history of uranium mining.

Uranium was discovered in 1935 and mining began in the 1940s, leading to a uranium rush after the Second

World War and the founding of Uranium City. The northern town was a major uranium mining camp from 1953 until 1982, when the nearby mines were closed.

Rabbit Lake stands as the mine with the longest individual history. The deposit was discovered at Wollaston Lake in 1968 by Gulf Minerals and German-owned Uranerz, and mining began in 1975.

Owned and operated today by Cameco Corp., Rabbit Lake is the longest-operating uranium production facility in North America, and Key Lake the world's largest high-grade uranium mill.

Original Rabbit Lake open-pit mine.

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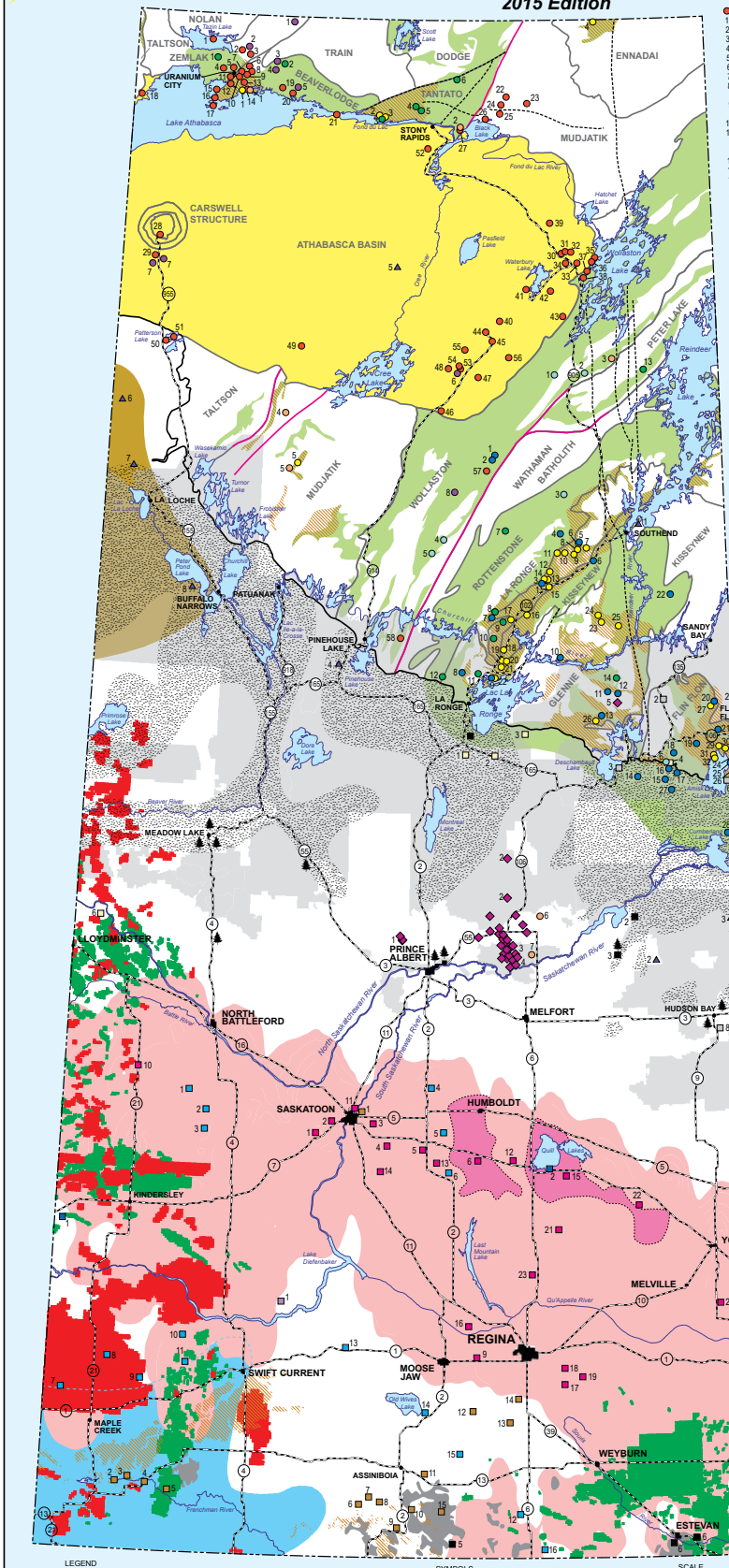
RESOURCE MAP OF SASKATCHEWAN

2015 Edition



KEY TO NUMBERED MINERAL DEPOSITS†

URANIUM
1. Laird Island deposit
2. Nesbit Lake prospect
3. Arty Lake deposit
4. Pitch-ore mine (closed)
5. Beta Gamma mine (closed)
6. Eldorado HAB mine (closed) and Baska prospect
7. Eldorado Eagle mine (closed) and ABC deposit
8. National Explorations and Eldorado Dubyna mines (closed) and Strike deposit
9. Eldorado Verna, Ace-Fay, Nesbitt Labine (Eagle-Ace) and Beaverlodge mines and Bolger Open Pit (closed)
10. Martin Lake mine (closed)
11. Rix-Athabasca, Smitty, Leonard, Cinch Lake and Cayzor Athabasca mines (closed); St. Michael prospect
12. Lorado mine (closed)
13. Black Bay/Murmac Bay mine (closed)
14. Consolidated Nicholson Bay and Fish Hook Bay mines (closed)
15. Gulch mine (closed)
16. Gunnar mine (closed)
17. Stewart Island prospect
18. Maurice Bay deposit
19. VIC Claims prospect
20. Matthews Lake prospect
21. Fond-du-Lac deposit
22. Charlebois Lake and David deposits
23. Mozzie Lake deposit
24. Row, West Row and ART prospects
25. Higginson Lake and Corrigan Lake prospects
26. Paisley Lake prospect
27. Nisto mine (closed)
28. Cluff Lake mine (closed) - D, Dominique-Peter, Claude and Dominique-Janine (North, EX OP, UG and EX Pods) deposits
29. Shea Creek - Anne, Kianna and Colette deposits
30. Midwest mine - Midwest and Midwest A deposits (not producing) (AREVA Resources Canada Inc., 69.16%; Denison Mines Inc., 25.17%; OURD (Canada) Co. Ltd., 5.67%)
31. Roughrider and J Zone deposits
32. Dawn Lake deposit
33. McClean Lake mine - JEB, Sue A, B, C and E deposits (mined out); McClean, Caribou, Sue D (AREVA Resources Canada Inc., 70%; Denison Mines Inc., 22.5%; OURD (Canada) Co. Ltd. 7.5%)
34. Tamarack deposit
35. Eagle Point mine (Cameco Corp.)
36. Collins Bay 'A' and 'B' Zone deposits (mined out)
37. Rabbit Lake mine (mined out); mill processing Eagle Point mine ore
38. Horseshoe and Raven deposits
39. La Rocque Lake deposit
40. Paul Bay Ore Shoot deposit
41. Cigar Lake mine (Cameco Corp., 50.025%; AREVA Resources Canada Inc., 37.1%; Idemitsu Uranium Exploration Canada Ltd., 7.875%; TEPCO Resources Inc., 5%)
42. Wolf Lake and Sand Lake deposits
43. West Bear deposit
44. McArthur River mine - McArthur River deposit (Cameco Corp., 69.805%, AREVA Resources Canada Inc., 30.195%)
45. McArthur River - BJ Zone deposit
46. Key Lake mine - Gaertner and Deilmann deposits (mined out); mill (Cameco Corp., 83.333%; AREVA Resources Canada Inc., 16.667%) processing McArthur River mine ore
47. Moore Lake - Maverick deposit; 525 and 527 prospects
48. Millennium deposit
49. Centennial deposit
50. Patterson Lake South deposit
51. Arrow deposit
52. Black Lake prospect
53. Phoenix deposit
54. Gryphon prospect
55. Mann Lake prospect
56. Harrigan Zone prospect
57. Burbidge Lake (BURR) prospect
58. Duddridge Lake (Thor) deposit

COPPER-NICKEL-(PGE) AND COPPER-COBALT
1. Dianne Lake deposit
2. Dinty Lake deposit
3. Cole Lake prospect
4. Currie Lake deposit and Pine Channel prospect
5. Axis Lake and Rea Lake deposits
6. Dumas Lake deposit
7. Rottenstone mine (closed)
8. Gochager Lake deposit
9. Mal Lake prospect
10. Triangle Lake deposit
11. Nemeiben Lake (Dunlop) deposit
12. Howard (Little Clam) Lake deposit
13. Swan Lake prospect
14. Hidden Lake deposit
15. Namew Lake mine (closed) (in Manitoba)

LEAD-ZINC
1. Johnson Lake (Marina) prospect
2. George (Brakewell) Lake deposit
3. Deception Lake prospect
4. Sito Lake deposit
5. Fable Lake deposit
6. Western Nuclear mine (closed)

POTASH AND SALT
1. Vanscoy potash mine (Agrium Inc.) and salt plant (NSC Minerals)
2. Cory Division potash mine (PotashCorp) (by-product CaCl$_2$ brine)
3. Patience Lake Division potash solution mine (PotashCorp)
4. Allan Division potash mine (PotashCorp)
5. Colonsay potash mine (The Mosaic Company)
6. Lanigan Division potash mine (PotashCorp)
7. Esterhazy K-1 and K-2 potash mines (The Mosaic Company) and salt plant (Compass Minerals)
8. Rocanville Division potash mine (PotashCorp) and salt plant (NSC Minerals)
9. Belle Plaine potash solution mine (The Mosaic Company) and fine salt plant (processes waste salt from potash mine) (Canadian Salt Co. Ltd.)
10. Unity solution salt mine and plant (Compass Minerals)
11. Saskatoon chloride-based chemical plant (ERCO Worldwide)
12. Jansen project
13. Young project
14. M & J project
15. Wynyard project
16. Legacy project
17. Milestone project
18. Kronau project
19. Sedley project
20. Melville project
21. Muskowekwan project
22. Foam Lake project
23. Southey project

SODIUM SULPHATE
1. Aroma Lake deposit
2. Whiteshore Lake (Palo) deposit
3. Lydden Lake deposit
4. Muskiki Lake deposit
5. Berry Lake deposit
6. Little Manitou Lake deposit
7. Bitter Lake deposit
8. Ingebrigt Lake plant (closed)
9. Vincent Lake deposit
10. Snakehole Lake plant (closed)
11. Verlo East deposit
12. Ceylon Lake (Salt Lake) deposit
13. Chaplin Lake plant (Sask. Minerals)
14. Frederick Lake (Bishopric) plant (closed)
15. Horseshoe (Shoe) Lake plant (closed)
16. Sybouts East (East Coteau Lake) plant (closed)

POTASSIUM SULPHATE
1. Alsask Lake plant (closed)
2. Big Quill Lake plant (Compass Minerals)

MAGNESIUM SULPHATE
1. Beechy plant (Touchwood Resources)

CLAY RESOURCES
1. Saskatoon clay quarry and plant (Cindercrete Products Ltd.)
2. Ravenscrag clay quarry (brick) (I-XL Industries Ltd.)
3. PR-1 and PR-3 clay deposits (stoneware)
4. Eastend clay deposit
5. Frenchman clay prospect
6. Wood Mountain - Fir Mountain kaolin prospect
7. Flintoft clay pit (refractory and ball clay) (closed)
8. Gollier Creek kaolin quarry
9. Rockglen clay pit (brick clay)
10. St. Victor bentonite deposit (swelling bentonite)
11. Readlyn ball clay deposit and Willows clay pit (refractory and ball clay)
12. A.P. Green Claybank brick plant (closed)
13. Truax bentonite quarry (Canadian Clay Products Inc.)
14. Wilcox bentonite plant (Canadian Clay Products Inc.)
15. Willow Bunch clinker quarry (Colored Shale Products Inc.)

COAL AND PEAT
1. Lac La Ronge lignite (sub-bituminous) deposit
2. Carrot River peat moss mine (Premier Tech Horticulture)
3. Carrot River peat moss plant (Premier Tech Horticulture)
4. Hudson Bay area coal deposits
5. Poplar River coal mine (Westmoreland Coal Company)
6. Estevan coal mine (Westmoreland Coal Company)

BUILDING MATERIALS
1. Neyrink Lake black and grey granite (diorite) building stone
2. Sahli green granite building stone
3. Deschambault marble (dolomite) quarry (Graham Construction)
4. Mystic Lake "Verde Antique" marble (veined amphibolite) building stone
5. McNally Lake buckskin marble (dolomite) building stone
6. Amisk Lake red marble (dolomite) building stone
7. Waskwei River cement rock deposit
8. Hudson Bay cement rock deposit

SILICA SAND
1. Bow River silica sand deposit
2. Nipekamew River silica sand deposit
3. Wapawekka Lake silica sand deposit
4. Hanson Lake silica sand quarry (Preferred Sands Unlimited)
5. Red Deer River silica sand quarry (Red Deer Silica Inc.)
6. CanFrac silica sand quarry (CanFrac Sands Ltd.)

GOLD
1. Box mine (closed), Athona deposit and Frontier Adit prospect
2. ELA prospect
3. Pine Channel prospects
4. Nirdac Creek prospect
5. Ithingo Lake deposit
6. Twin Zone and Wedge Lake deposits
7. Golden Heart mine (suspended)
8. EP and Komis mines (closed)
9. Corner Lake deposit
10. Tower East and Memorial deposits
11. Birch Crossing deposits
12. Jojay deposit
13. Star Lake mine (closed)
14. Jolu and Decade mines (closed)
15. Jasper mine (closed)
16. Greywacke deposit
17. Roy Lloyd mine - Bingo deposit (suspended)
18. North Lake deposit
19. Contact Lake mine (closed)
20. Preview North and South, PAP A, B, and C and PAP/Preview SW deposits
21. Sulphide Lake deposit
22. Anglo-Rouyn tailings
23. Seabee mine (Claude Resources Inc.)
24. Porky Main/West deposits
25. Santoy 8/Santoy Gap mines (Claude Resources Inc.), Santoy 7 deposit
26. Brownell Lake occurrences
27. Manson Bay (Schotts Lake) deposit
28. Eccles Lake (Dolly) prospect
29. Graham mine deposit
30. Robinson Creek deposit
31. Prince Albert (Monarch) mine (closed)
32. Laurel Lake (Amisk Gold) deposit
33. Newcor, Bootleg (Rio), and Henning-Maloney mines (closed)
34. McMillan prospect

COPPER-ZINC
1. Janice Lake prospect
2. Jansem prospect
3. Frog Lake prospect
4. Reef Lake prospect
5. Discovery Lake prospect
6. Brabant Lake PEG/McKenzie deposit
7. Borys Lake deposit
8. Elizabeth Lake deposit
9. Anglo-Rouyn mine (closed)
10. Pitching Lake deposit
11. SAD Zone (HBED Zone) deposit
12. Hook Lake (Gee Lake) deposit
13. Brownell Lake deposit
14. Bigstone Lake deposit
15. Miskat Lake prospect
16. McIlvenna Bay deposit
17. McDermott Lake (Balsam Zone) prospect
18. Ramsay (Quandt/Keputch) deposit
19. FON and Abbott Lake deposits
20. Schotts Lake deposit
21. Otonadah Lake deposit
22. Knife (Mokoman) Lake deposit
23. Flin Flon and Callinan mines (closed)
24. Birch Lake and Flexar mines (closed)
25. Konuto Lake mine (closed)
26. Coronation mine (closed)
27. Grassberry deposit
28. Archibald Lake deposit

IRON FORMATION
1. Fish Hook Bay deposit
2. Triana deposit
3. Spence Lake prospect
4. Nyberg Lake (VH) deposit
5. Ithingo Lake prospect
6. Kelsey Lake deposit
7. Choiceland deposit

RARE EARTH ELEMENTS
1. Hoidas Lake - Nisikkatch Lake (+ uranium and thorium)
2. Bear Lake (+ uranium and thorium)
3. Aces Lake (+ uranium and thorium)
4. Oldman Lake
5. Archie Lake (+ thorium)
6. Maw REE Zone
7. Douglas River
8. Kulyk Lake (+ uranium and thorium)

KIMBERLITE
1. Sturgeon Lake
2. Candle Lake
3. Fort à la Corne kimberlite field
4. Star Kimberlite
5. Pikoo

MISCELLANEOUS
1. Deep Bay graphite
2. Pasquia Hills oil shale
3. Bainbridge nodular manganese
4. Pinehouse limestone
5. Wolverine Point phosphate
6. Simonson Lake bitumen resource
7. Clearwater River bitumen show
8. Peter Pond Lake bitumen show

LEGEND
- Uranium potential
- Base metal potential
- Gold potential
- Major peat resource potential
- Coal field
- Helium resource potential
- Oil pool
- Gas pool
- Bitumen (oil sands) potential
- Potash and salt resource area
- Carnallitic region (magnesium)
- Commercial forestry

SYMBOLS
- Edge of Precambrian Shield
- Precambrian domain boundary and name
- Major bounding shear zone
- Major fault
- Road
- City
- Town
- Forest products mill

SCALE
25 0 25 50 75 Kilometres
25 0 25 50 Miles

† Mine = Past, present, and test producing mines
Deposit = Developed prospect with or without calculated reserves/resources - numerous drilling delineated mineralized intersections (not NI 43-101 compliant in all cases)
Prospect = minumum of three drilling delineated mineralized intersections

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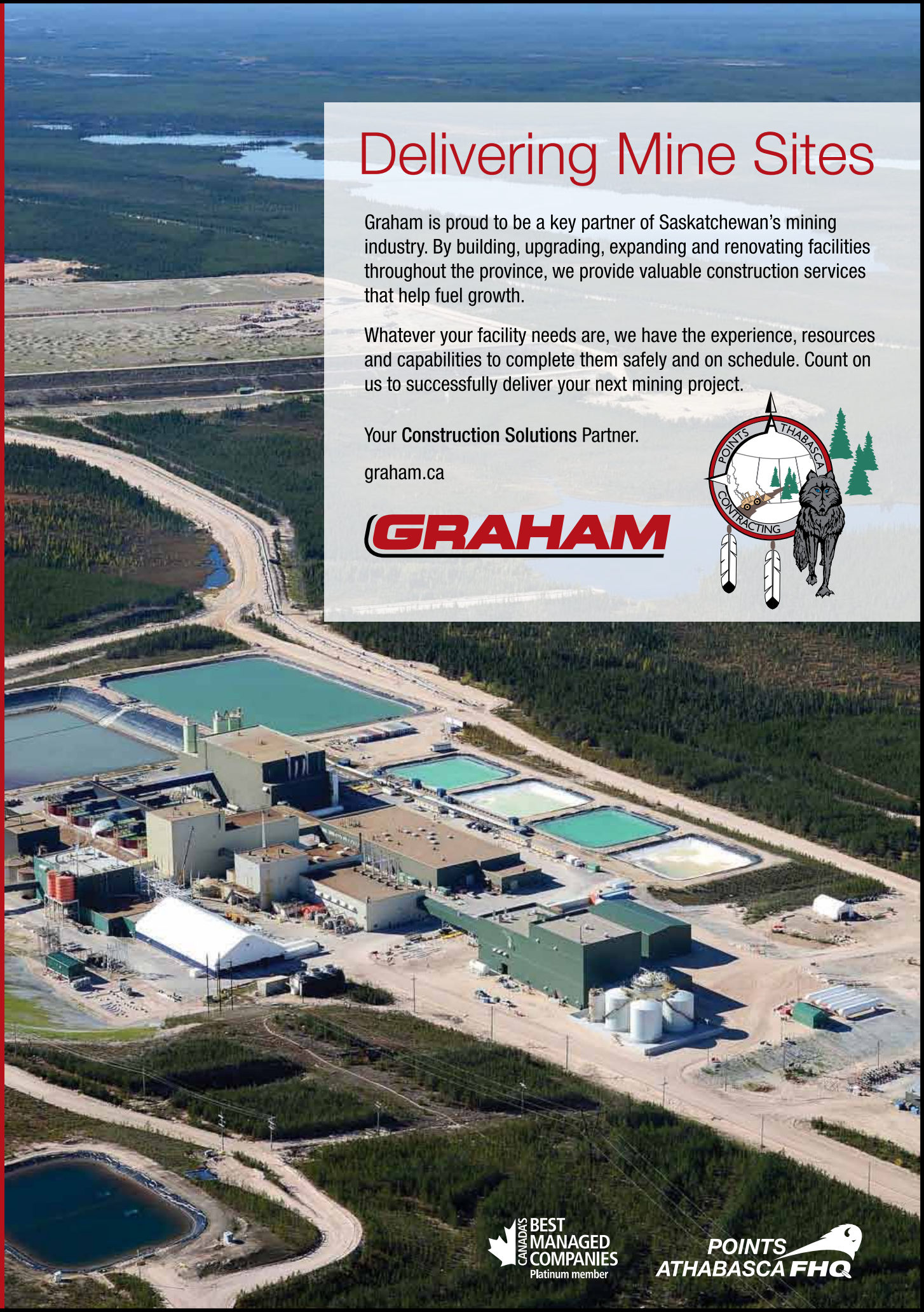

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