

Mining = Opportunity for Indigenous Communities in Saskatchewan

Dave Lefebure, Ph.D., P. Geo.



April 2021 slide deck

Minerals in Your Life



Tantalum



Cesium - pollucite

Hinz, Ministry of Northern Development, Mines and Forestry, 2011 presentation

Presentation Outline

1. Opportunities for Indigenous mining jobs, businesses and agreements in Saskatchewan

question and answer session

2. Lifecycle of mining related to Saskatchewan and potential economic opportunities for indigenous communities
3. End with a few key points relevant to economic development officers related to mining

question and answer session

Why Talk About Mining?

Four reasons:

1. Jobs and contracts
 - mining is #2 employer of Indigenous people in Canada
 - goods and services contracted out by mining companies
2. Numerous agreements with Indigenous communities
 - potential for significant benefits
 - a relatively recent development (largely since 2000)
3. Mines are spread across Saskatchewan
 - remote, rural and suburban locations
4. Mining sector not well known
 - many people have never visited a mine or learned about them

Don't miss economic development opportunities!

1a. Indigenous Employment in Saskatchewan Mines

- 21% of Saskatchewan mine employees are Indigenous*
- For every mining job, there are at least two jobs in the mining supply and service sector
 - Total of 18,000 jobs in the mineral sector#
 - Third largest industry in the province#
- Many attractive jobs that build work skills
- Jobs exist in virtually all regions of the province, including near northern communities

* 2017 figures, Saskatchewan Mining Association mining infographic

<https://www.pdac.ca/communications/infographics> - Feb. 2021

Wide Variety of Jobs



April 6, 2021

Wide Variety Mine Jobs



Mine Workings
Surveyor`s helper
Miner
Driller
Heavy Equipment Operator
Shift Foreman
Etc.



Mill/Shop
Trades helper/
apprentice
Warehouse assistant
janitor
Technicians
Certified trades
Etc.



Offices
Students
Secretarial
Admin
Engineers
Geologists
Technicians
Accountant
Etc.



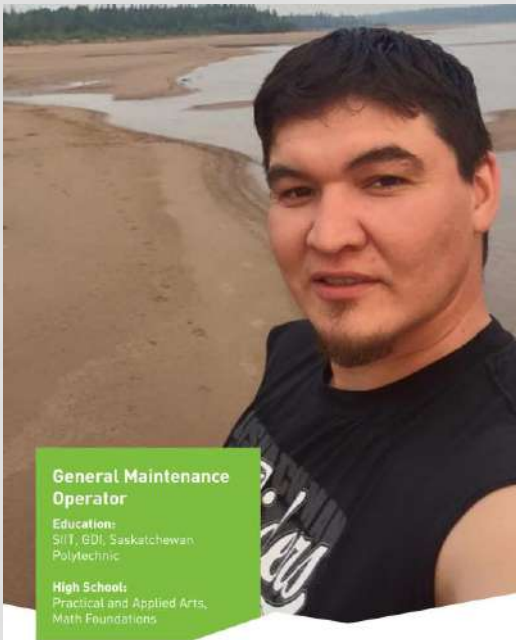
Camp
Janitorial
Kitchen
Cook
Admin
Repairs
Safety
Security
Etc.



Roads,
Etc.
Snow removal
Road work
Trucking
Gravel pit
Supplies
Diesel fuel
Explosives
Etc.

Over 160 different mining jobs

SMA - Career Profiles



General Maintenance Operator

Education:
SIIT, GDI, Saskatchewan Polytechnic

High School:
Practical and Applied Arts, Math Foundations

Bernard Power,
Orano Canada



Procurement Specialist

Education:
University of Saskatchewan, University of Regina, Saskatchewan Polytechnic

High School:
Accounting, Economics, Mathematics

Milton Greeyes,
Nutrien Ltd.



Indigenous Relations Manager

Education:
Saskatchewan Polytechnic, SIIT, GDI

High School:
Math, Accounting

Terry Bird,
K+S Potash Canada



Geological Technician

Education:
Northlands College, Saskatchewan Polytechnic

High School:
Chemistry 30, Physics 30, Foundations of Mathematics 30, Pre-Calculus and Calculus 30

Shaeden Klein,
NextGen Energy Ltd.

1b. Goods and Services Contracts

- Saskatchewan mines purchased \$649 million of goods and services from Indigenous-owned businesses in 2017
- Mines require a wide variety of goods
 - Food, lumber, gravel, vehicles and parts, signs, pickets, ...
- Mines often contract out specific services
 - Security, environmental monitoring, snow removal, food services, accounting, road maintenance, transportation, ...
- Companies of various sizes bid on these contracts
 - Many mines prefer to contract local companies and recognize the value of using Indigenous companies

Canada North Environmental Services (CanNorth)

- 100% owned by Kitsaki Management Limited Partnership, the business arm of the Lac La Ronge Indian Band
- Delivers independent and community monitoring programs that protect the environment for nearly two decades
- CanNorth works directly with Indigenous residents from the seven Athabasca-based communities to collect both technical and community samples
- Provides services related to communication between Indigenous and local communities and mining developments
- Established in 1997 with the support of Cameco and other uranium mining companies in northern Saskatchewan

Athabasca Basin Development (ABD)

- Owned by the seven communities in the Athabasca area
- These communities are largely Dene First Nations communities
 - Fond du Lac, Stony Rapids, Black Lake, Hatchet Lake, Wollaston Lake, Camsell Portage and Uranium City
- established to maximize local community participation in the opportunities in the mining industry



Lonona Contracting
ABD OWNERSHIP: 100%



Mudjatik Thysen
ABD OWNERSHIP: 29.5% and 35%



Points Athabasca
ABD OWNERSHIP: 75%



Points North Group of Companies
ABD OWNERSHIP: 48.3%



Team Drilling
ABD OWNERSHIP: 50%



Tru-North RV, Auto and Marine
ABD OWNERSHIP: 50%



West Wind Aviation
ABD OWNERSHIP: 65%

4 Souls Cleaning Inc.

- Providing 24/7 cleaning services for K + S Potash Canada since July, 2014 for 365 days a year
- The core value of 4 Souls Cleaning is a safe work environment for people
 - William Lavallee started company by purchasing two vehicles
 - Transported the bulk of his workers to and from work
 - Offered a good salary and created a positive team spirit and high morale



William Lavallee speaks to Vern Bachiu at the recent Saskatchewan Mining Supply Chain Forum.

**“You have to be the change you want to see.
I didn’t build this to be a millionaire.”**



True North Technical

Bridging the gap between
Employers and Professionals.

- **Strategically located in North West Saskatchewan**
- True North Technical (TNT) operates out of Ile-a-la-Crosse, Saskatchewan which is central to both the Oil Sands of Northern Alberta and the Uranium rich Athabasca Basin of Northern Saskatchewan
- Our staffing service finds the right individual for your Engineering, Technical, and Construction requirements
- Specializing in the Petroleum, Mining and Construction Industry



Multi-Sector Contractor

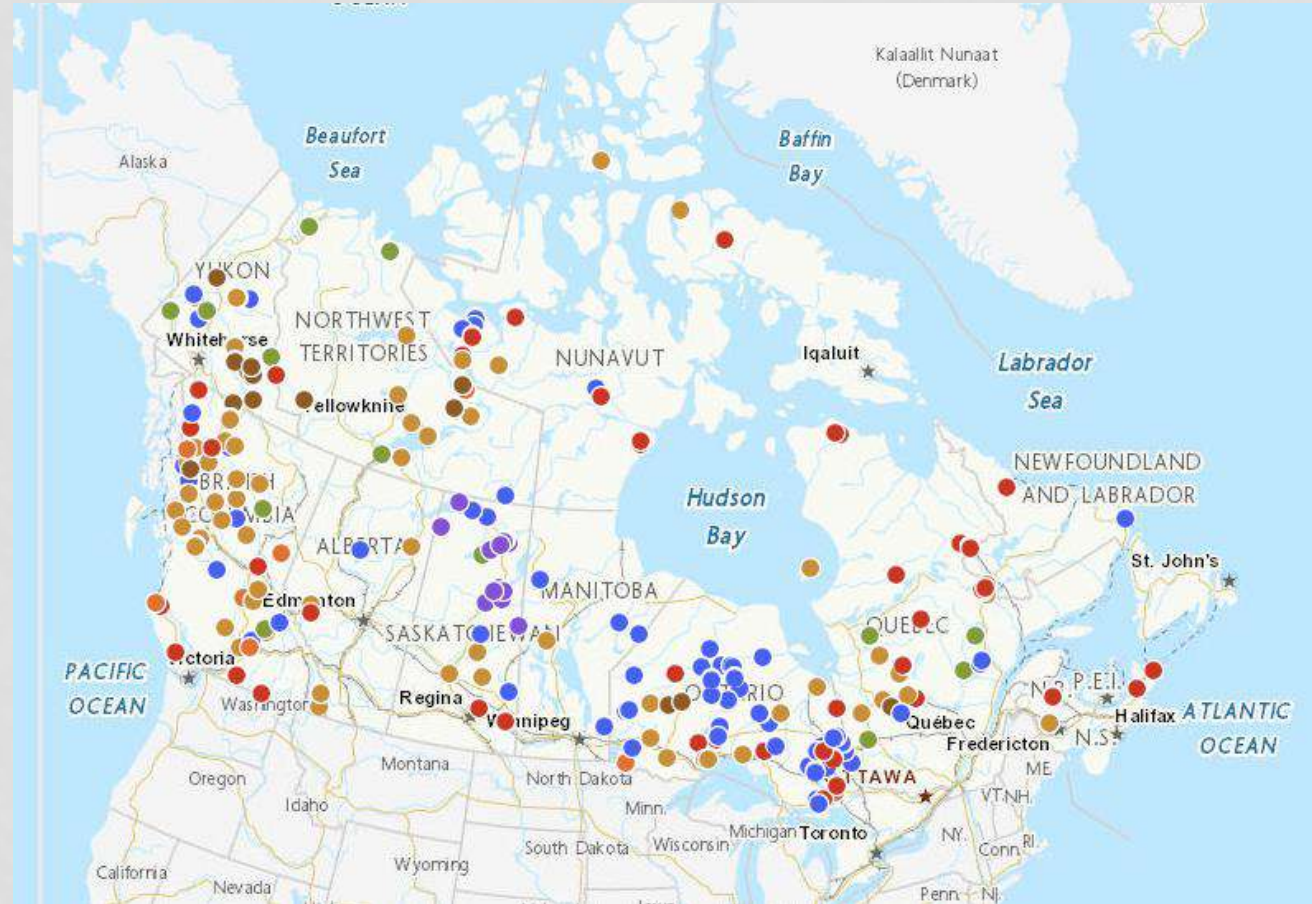
- **Misty Chemco is an industrial general contractor whose goal is creating opportunity and prosperity for Indigenous people and their communities across Saskatchewan.**



2. Indigenous Community Active Mining Agreements


Active Agreements

- Impact and Benefits Agreement
- Socio- Economic Agreement
- Exploration Agreement
- Participation Agreement
- Cooperation Agreement
- Memorandum of Understanding
- Letter of Intent
- Surface Lease Agreement
- Other Agreement Type




Agreements with First Nations Southern Saskatchewan

Muscowpetung FN

Active Agreements	
 Muscowpetung	
Projet name	Muscowpetung
Mining company	Encanto Potash Corp.
Mining company website	http://www.encantopotash.com/
Signatories	Muscowpetung First Nation
Agreement type	Impact and Benefits Agreement
Projet status	Exploration
Year agreement signed	2009

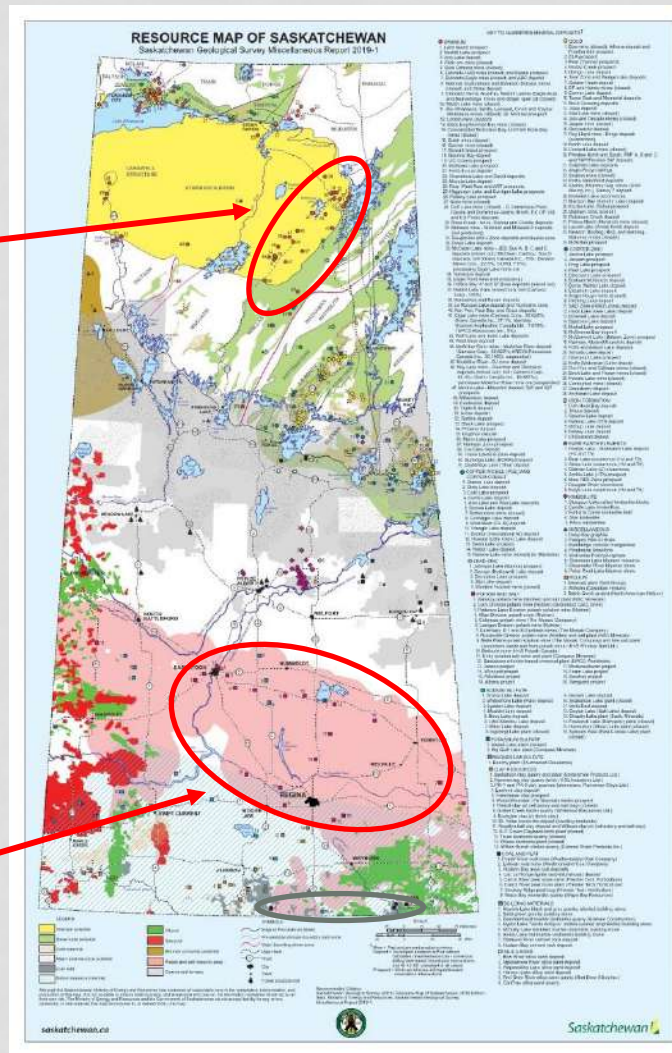
Swan Lake FN, Day Star FN, Muskowekan

Active Agreements	
 Jansen	
Projet name	Jansen
Mining company	BHP Billiton
Mining company website	http://www.bhpbilliton.com/
Signatories	Swan Lake First Nation, Day Star First Nation , Muskowekwan
Agreement type	Other
Projet status	On Hold
Year agreement signed	2013

3. Mining All Over Saskatchewan

operating uranium mines

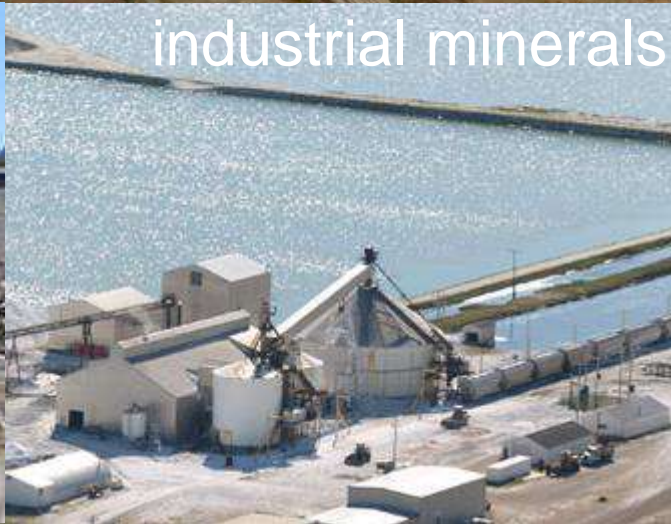
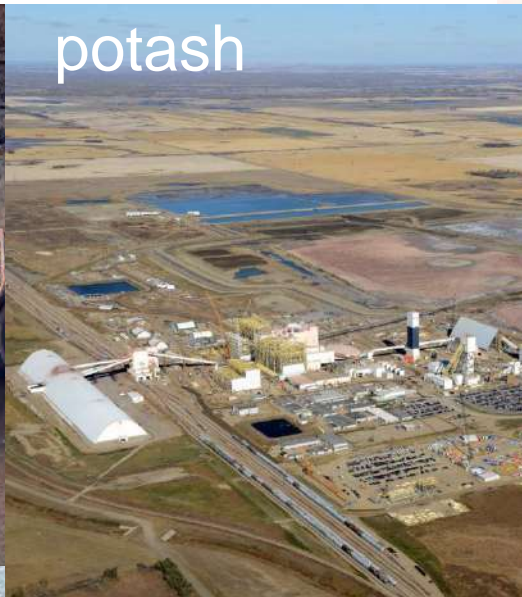
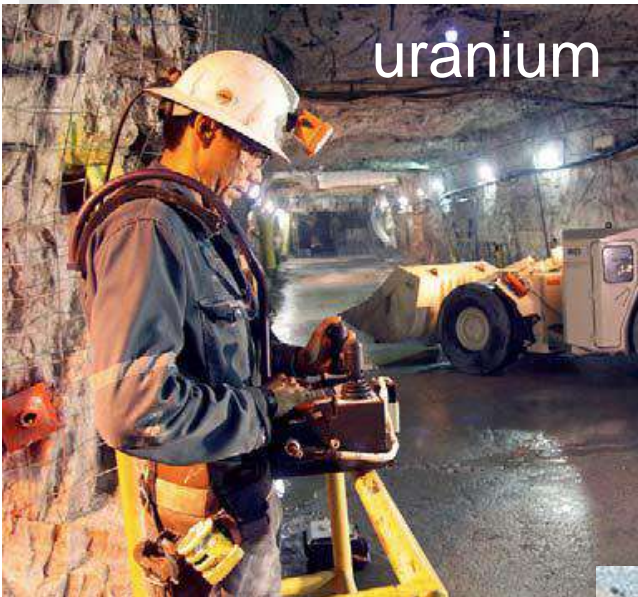
potash mines



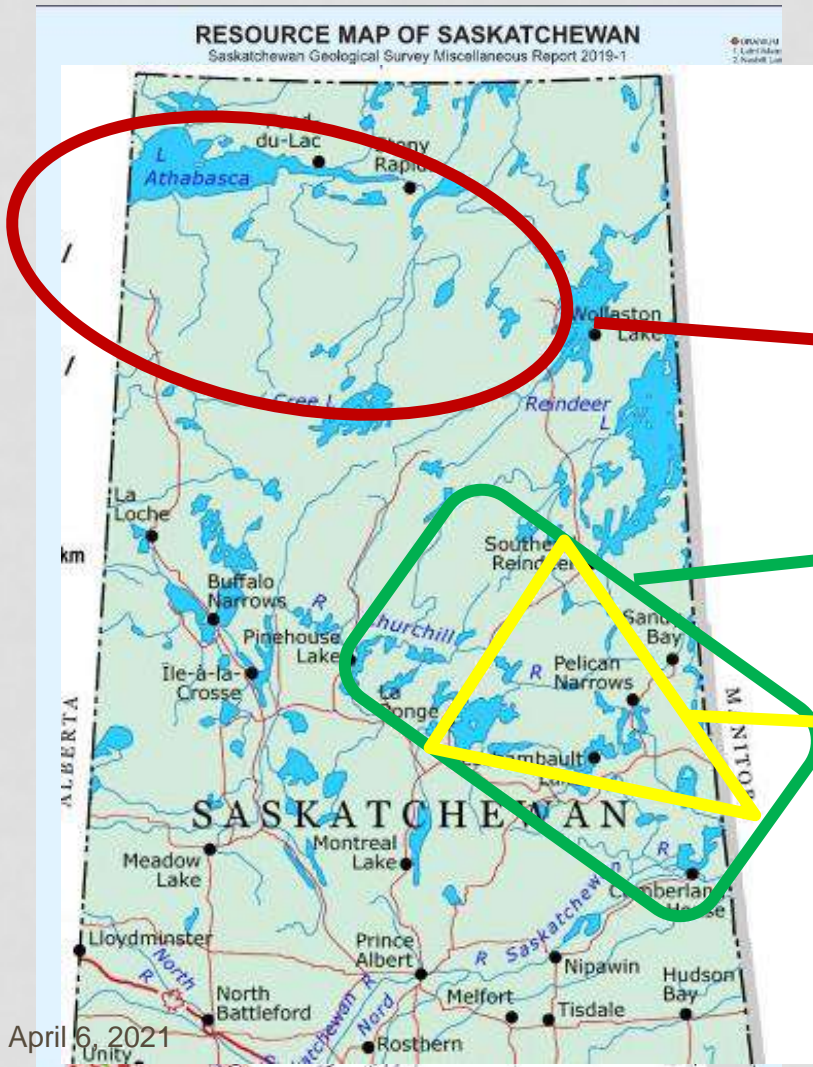
2020 listing of mines and mineral exploration properties



Mine Products



3. Mining All Over Saskatchewan



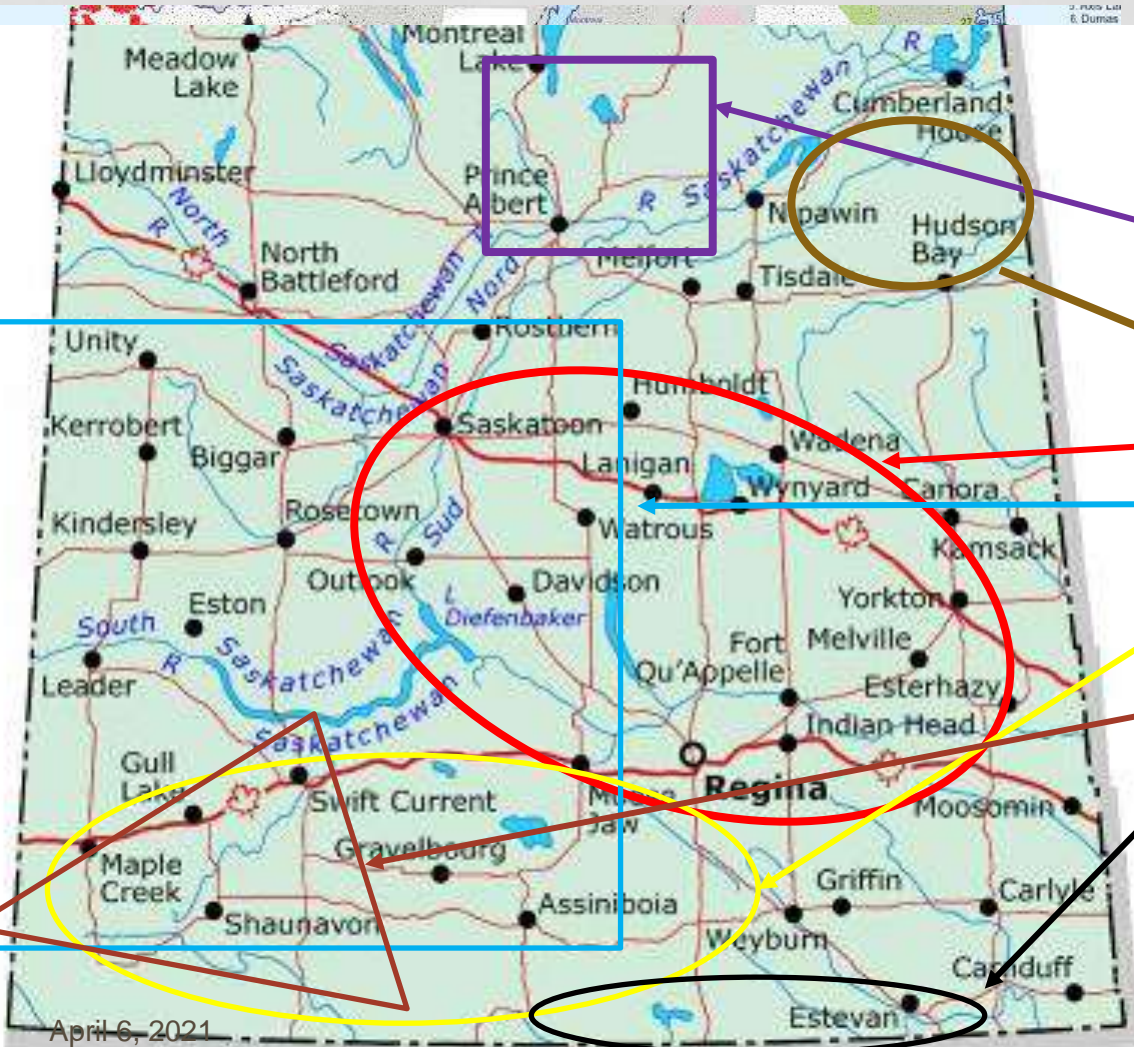
In the north

• Uranium

• Copper, Zinc, Nickel

• Gold

3. Mining All Over Saskatchewan



In the south

- Gemstones
- Diamonds
- Industrial Minerals
- Peat
- Potash
- Salt
- Clay
- Critical Minerals
- Helium
- Coal

Saskatchewan Mining Commodities 2021

Metals

uranium ← →
gold, copper, zinc

Energy

uranium
coal (lignite)

Minerals & Rocks

potash, salt,
sodium sulphate,
potassium sulphate,
bentonite, silica sand,
bentonite, limestone,
.....

Construction Materials

Gravel, sand, crushed
rock, rip rap

Sylvite the mineral used to
produce potash was proclaimed
Saskatchewan's Mineral Emblem
in 1996



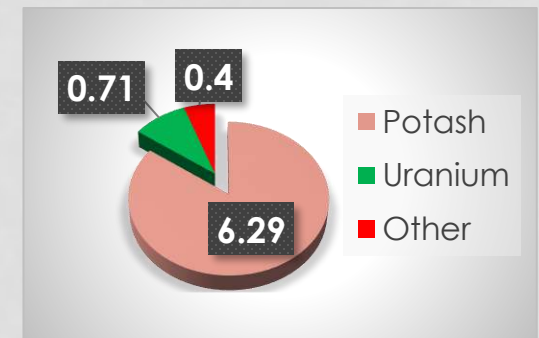
4. Mining Not Well Known

- Why?
 - Not generally taught in schools.
 - Many mines are in remote and rural areas.
 - Access to these industrial sites is restricted for safety reasons.
 - Mining is typically the safest heavy industry in Canada.
 - Mining products are often processed to a metal or mineral product before they reach the consumer.
 - Mining sector focuses on the job at hand.

Do you know the following highlights about the mining sector in Saskatchewan?

Saskatchewan Global Mining Leader

- World's 2nd largest potash producer (world's largest producing jurisdiction potash)
- World's 2nd largest uranium producer
- 15 potash, uranium and coal mines and numerous quarries and pits
- Annual value of mining ~\$7.4B (2019)



Q & A

Mining Opportunities Can Come with Concerns

US Lithium to mine for copper, nickel, cobalt in Canada's Saskatchewan

Canada Saskatchewan | February 26, 2017 16:11 AM [Back](#) [Home](#) [Battery](#) [Lithium](#) [Saskatchewan](#) [Saskatoon](#) [Africa](#) [Australia](#) [Canada](#) [China](#) [Europe](#) [Lithium](#) [Saskatchewan](#) [Saskatoon](#) [USA](#) [Africa](#) [Australia](#) [Canada](#) [China](#) [Europe](#) [Lithium](#) [Saskatchewan](#) [Saskatoon](#) [USA](#)

Shares in US Lithium (OTCMKTS:LITH) went ballistic Friday after the exploration firm announced it had acquired a copper, nickel, cobalt project in Canada's Saskatchewan.

DEMAND FOR LITHIUM AND COBALT HAS INCREASED SIGNIFICANTLY IN THE PAST TWO YEARS THANKS TO THE GROWING PRODUCTION OF ELECTRIC AND HYBRID CARS THAT USE THEM IN THEIR BATTERIES AND OTHER COMPONENTS.

The Gochagar Lake project, until now property of Di four claims covering 3,759 hectares located in north approximately 75 km north of the town of La Ronge said.

Other than copper, expected to be the best perform area is know for having semi-massive and massive & significantly elevated levels of cobalt, a vital compor the latest generation of lithium ion batteries.

Sask. mining company excited about new rare earth element processing plant in the province



Company hopes to process large northern Sask. deposit at Saskatoon facility

[Web Alert](#) - CBC News - Posted: Aug 25, 2020 12:38 PM CT | Last Updated: August 28, 2020



Saskatoon

Work resumes at Agrium's Vanscoy, Sask., potash mine after 2nd accident



Safety advocates believe the 2 incidents are indicative of a bigger problem in Saskatchewan

[Riley Laychuk](#) - CBC News - Posted: Aug 23, 2016 2:26 PM CT | Last Updated: August 24, 2016

Kennedy comments on Sask. mine accident

One of the U.S. capital's best-known politicians, Democratic Senator Ted Kennedy, is comparing the Esterhazy mine rescue with the recent fatal mine disasters in West Virginia – and he's saying the comparison doesn't make the U.S. look good.

After a plastic pipe caught fire sending thick smoke through the Esterhazy K2 mine, the Saskatchewan miners retreated to sealed underground rooms while they waited for emergency crews to put the fire out.

- FROM JAN. 30, 2006: [All 72 miners surface after Saskatchewan fire](#)

The miners had to wait for more than 28 hours before they were brought to the surface, but none of them was hurt.

In contrast, 14 coal miners died in mine accidents in West Virginia in January. Another two miners died in accidents last week.

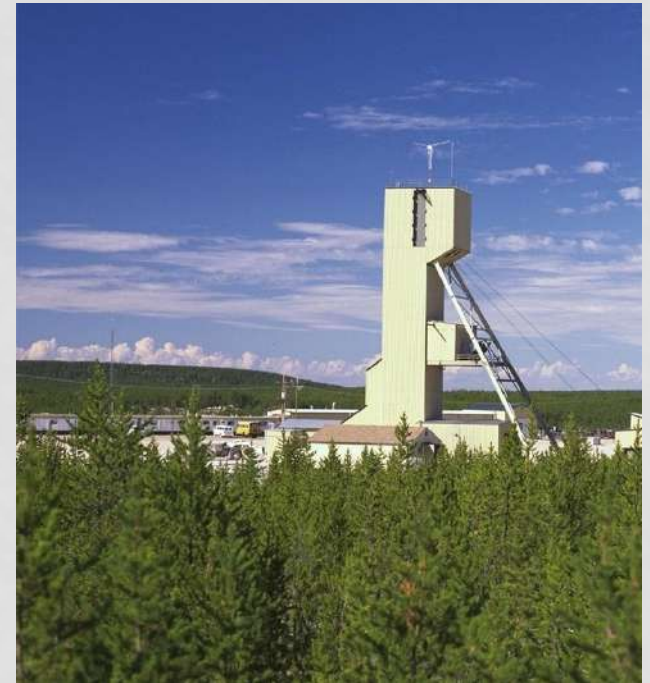


Saskatchewan miners head home after emerging from the K2 mine Jan. 30.

Ask questions and learn about mining if you get involved.

Key Source of Government Revenue (2017)

- Mining contributed almost \$1.8 billion in revenue to the Saskatchewan government
- \$22 million in social and community contributions
- Direct, indirect and induced mining employment = 30,500 jobs or
 - 6% of total employment
 - payroll of \$1.5 billion



Cigar Lake

SMA 2017 - <http://www.saskmining.ca/info/fact-sheets/fact-sheet-general-information.html>

Government Role in Exploration and Mining

Provincial and Territorial governments:

- Administer mineral claims & regulate exploration activities
- Generate maps and reports to support exploration
- Permit mine developments and mines
- Enforce safety regulations and assist with mine training
- Require reclamation plans and reclamation bonds for mines

Federal government:

- Administer mineral rights on reservations
- Can participate in environmental assessments of mine proposals
- Help administer underground exploration, mining, processing and shipping of uranium

Access to Land for Mineral Exploration

A mineral tenure is registered with government to obtain ownership for metals and some minerals.

No Mineral Tenures Allowed

- Indian reserves
- Parks and some special protected areas
- Temporary areas under study by government
- Crown reserves for potash and oil and gas
- Some private lands are excluded from claim acquisition

~13% of Saskatchewan land held under the mineral, potash, coal, quarry, and alkali disposition regulations (2020)

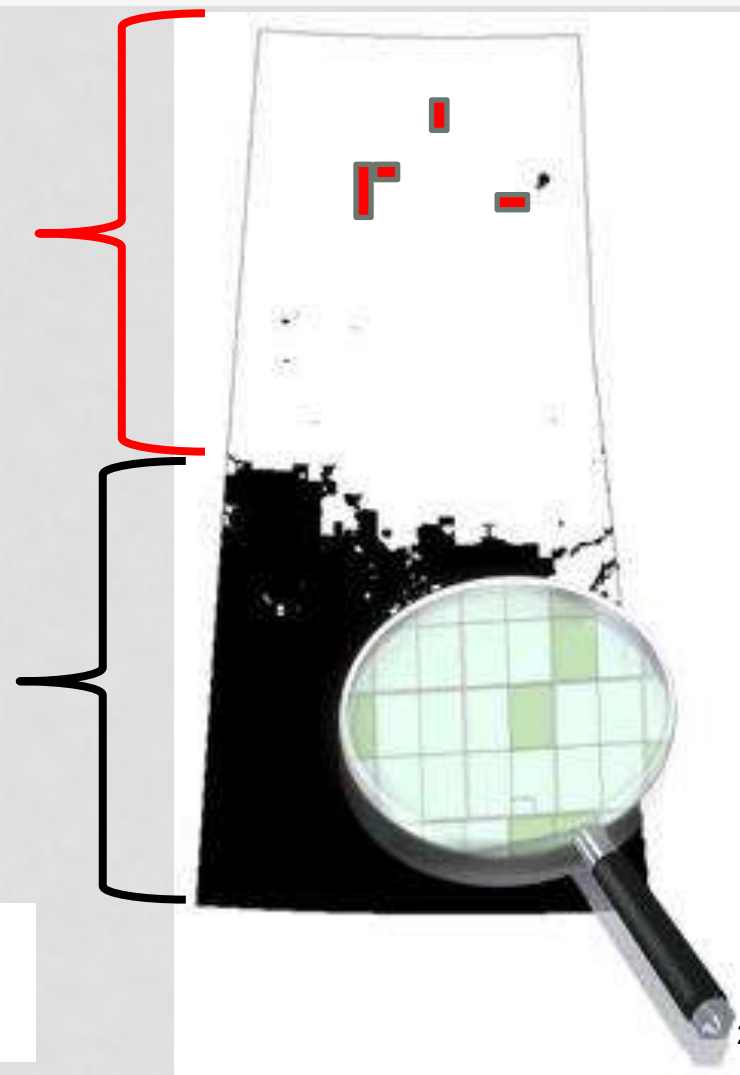
Mineral Administration Registry (MARS)

Northern Saskatchewan

- A digital grid created
- Uses unsurveyed legal subdivision (LSD) grid cells

Southern Saskatchewan

Surveyed township grid used to identify mineral parcels used for the administration of mineral titles.



Mineral Disposition Map Online

- Eliminates need and impact of staking claims
- Allows online access to all to determine where are mineral claims

The screenshot displays the 'Mineral Disposition Map Online' interface. At the top, the Government of Saskatchewan logo is on the left, and 'ENERGY AND RESOURCES' with user information 'Hello Craig (log out)' and 'Craig Zborowski' is on the right. A navigation bar contains 'HOME', 'MINERAL DISPOSITION MAP', 'ACCOUNT', and 'DISPOSITION'. Below this, a 'Disposition type' dropdown is set to 'Mineral Claim'. A 'Table of Contents' panel lists several layers with checkboxes: Boundaries and Features, Crown Holdings, Restrictions and Prohibitions, Manual Restrictions, Mineral Dispositions, and Mineral Disposition Grid. A 'Legend' section shows 'Free and Clear' (green), 'Restriction' (orange), and 'Prohibition' (red). The main map area shows a grid with various colored overlays and a scale of 1:8,000,000. A scale bar at the bottom indicates 0, 100, and 200 km. The interface includes navigation tools (pan, zoom, home, etc.) and a 'Map Tools' section. The 'XY Co-ordinates' field is empty. The Esri logo is in the bottom right corner.

Mineral Tenure Holder Rights and Requirements

- Subject to existing legislation, a claim holder has the exclusive rights to explore and prospect for the minerals in the mineral tenure area
 - Can convert any portion claim into a mining lease
 - Held for two years, initially, and thereafter from year to year subject to the required exploration spending
 - Devised to encourage exploration or free up land
- Apply for Coal, Quarrying and Alkali Mining dispositions separately
 - All these tenure systems differ

Sand & Gravel Rights

- Sand and gravel, when obtainable from the surface, are the properties of the surface owner: When a private person owns the surface (i.e. freehold surface) that person owns the sand and gravel.
- When the Crown owns the surface, The Quarrying Regulations 1957 are not applicable any longer and, depending of the location, these sand and gravel rights are administered either by the Ministry of Environment [Greg Hayes (306) 236 7685] or by the Ministry of Agriculture [Gordon Bue (306) 878 8813].

Life Cycle of Mining

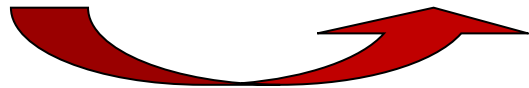
Prospecting & Early Exploration



Mine Closure & Reclamation



Indigenous Business Opportunities



Mineral Exploration



Mine Development



Mining

Mineral Exploration Path



Prospecting



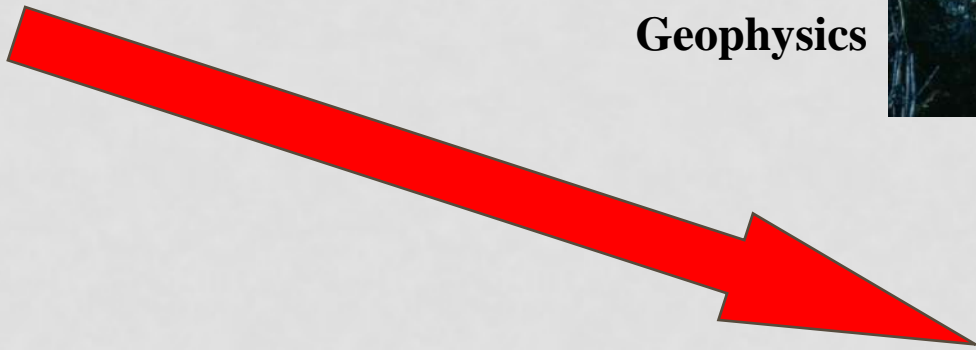
Geochemistry



Geophysics



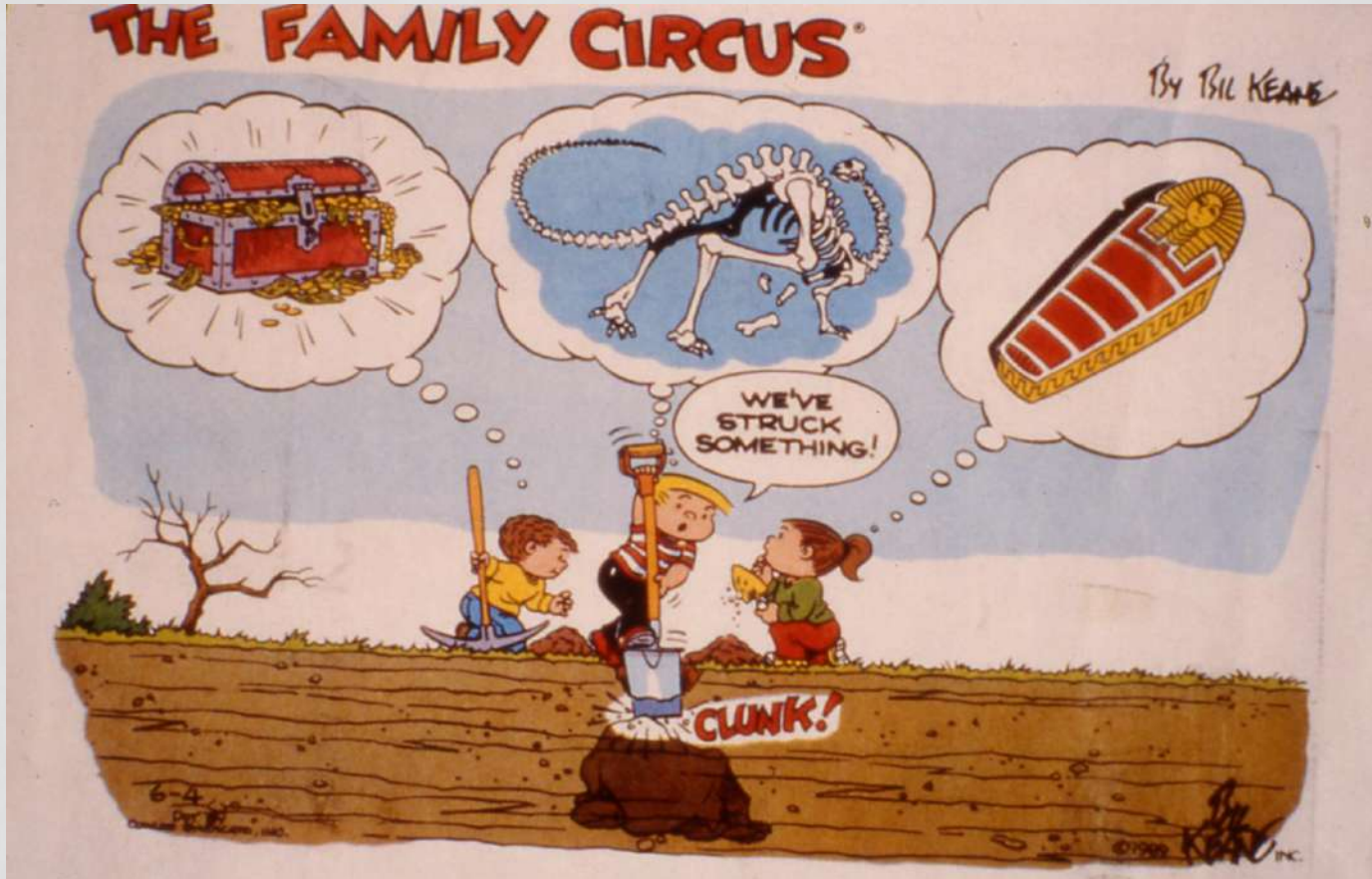
Drilling





Early
Exploration

Mineral Exploration: Searching for a Hidden Resource





Early
Exploration

Prospectors



- Make discoveries of many metal and industrial minerals
- Often work alone spending own \$
- Hike through the bush, walk new logging roads, follow creek beds, etc.
- Use tools like a rock hammer, GPS locator, gold pan, grub hoe,
- Hope to find a property to sell to a company



Early
Exploration

Small Companies ("junior companies")

- Several to tens of full time employees
- Often a single office (Toronto, Vancouver)
- Shares trade for cents to dollars
- Many do not own a mine
- Many exist for less than five to ten years





Early
Exploration

Collecting Till and/or Silt Samples



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Early
Exploration

Rock Sampling and Stripping Rock Outcrops



from Tom Lewis



<http://www.eagleplains.com/projects/wollaston>



Early
Exploration

Geological Mapping





Early
Exploration

Geophysical Surveys





Early
Exploration

Early Exploration Jobs

- Prospector
- Line Cutters
- Samplers (soil, etc.)
- Geophysical Crew
- Geologist
- Drillers
- Kitchen Helper
- Cook
- Camp Expediter
- Jack of All Trades
- Camp Set-Up





Advanced
Exploration

Drilling – Key to Many Discoveries





Advanced
Exploration

Geologist Logging (Describing) Drill Core





Early
Exploration

Changing Commodity Prices Influence Exploration & Mining



Advanced
Exploration

- Uranium price low, may be starting to recover
- Small Modular Reactors (“SMRs”) may result in a paradigm shift in nuclear demand
- Some exploration companies optimistic about rise in uranium prices



US\$28.15 per lb. U_3O_8
Feb. 27, 2021

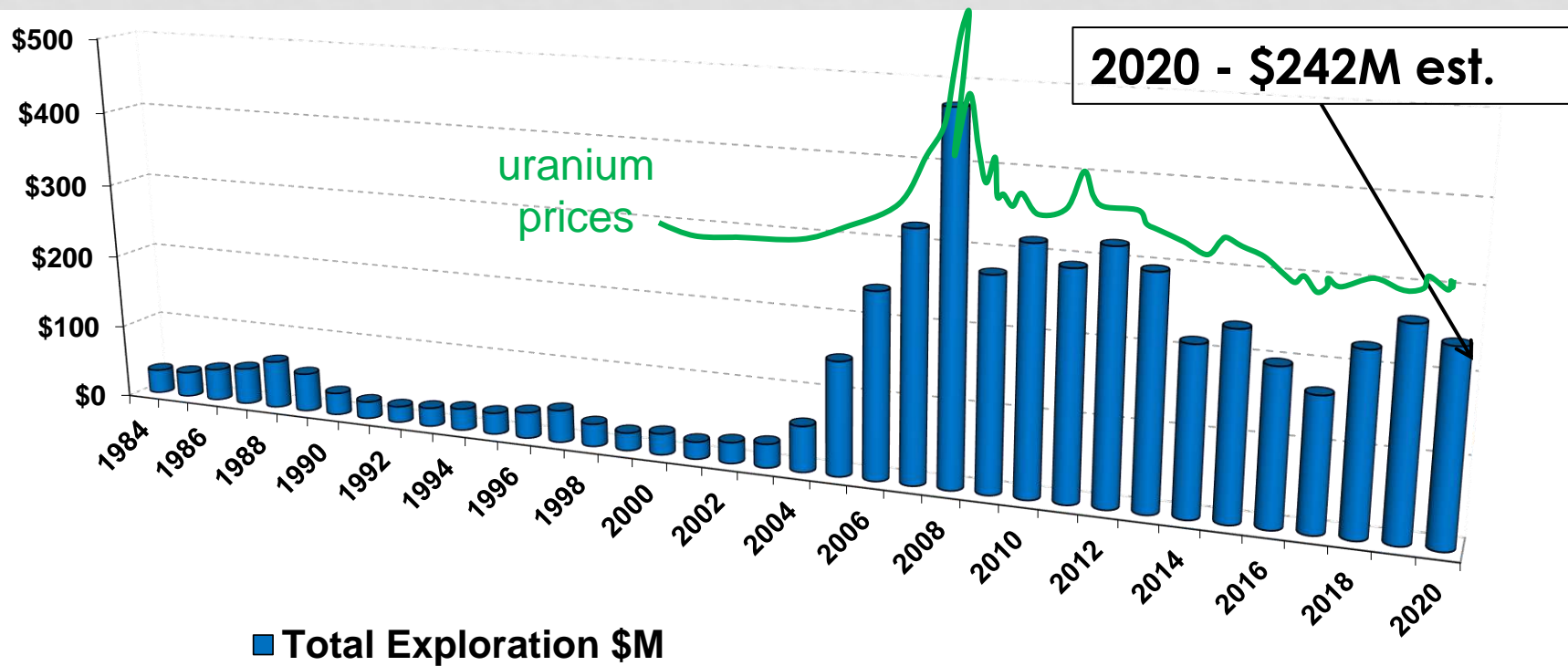


Early Exploration

Saskatchewan Mineral Exploration Expenditures



Advanced Exploration



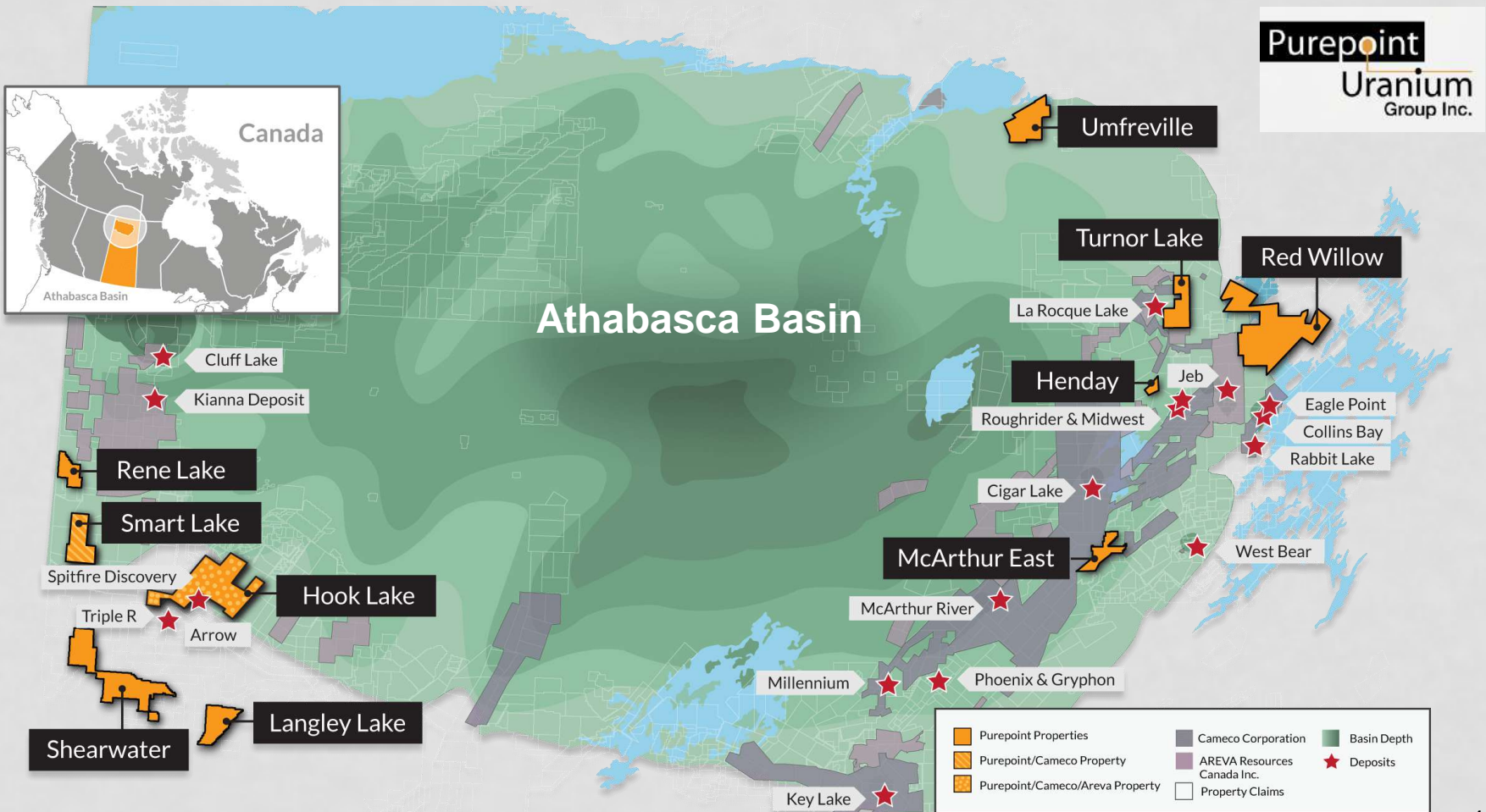


Early
Exploration

Current Uranium Exploration Programs



Advanced
Exploration





Early Exploration

Gold Exploration Company Website



Advanced Exploration

News Projects Investor Info Corporate Profile

Taiga Gold Corp

CSE:TGC
0.17
-0.01 (-5.56%)
View full quote »

Gold-Focused Mineral Exploration in Saskatchewan

Latest News

Taiga Gold Corp. (TGC:CSE) is a mineral exploration company focussing on gold and operating in vicinity of SSR Mining's Seabee Gold Operation located in eastern Saskatchewan.

Taiga Gold Properties

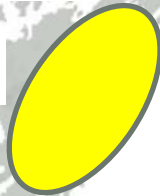


Advanced
Exploration



LaRonge
Gold Belt

LaRonge



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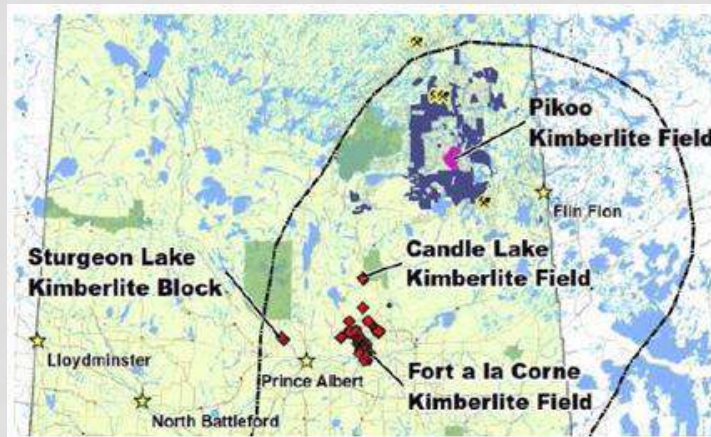
Flin Flon



Advanced
Exploration

Pikoo Property North Arrow Minerals

- Found diamond indicator minerals
- Started staking rush
- Discovered diamonds in 2015
- Found ten kimberlites drilled, five contained diamonds
- Currently focusing on other properties in Canada



The black outline is the North Sask Craton boundary





Advanced
Exploration

Team Drilling



- A partnership started in 2008 between a team of drilling professionals and Athabasca Basin Development.
- Training and using Indigenous drillers and staff.



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ATHABASCA BASIN NEWS

By Sponsored Content

Team Drilling Runs Diamond Training Course



Advanced
Exploration

Indigenous Entrepreneurs: An Example



Louis Mercredi was working for an exploration company completing a geophysical survey



The exploration company was planning to drill and needed boxes for drill core



Louis built core boxes and sold them to the company



Early
Exploration

Environmental Studies



Advanced
Exploration

- **Environmental sampling and monitoring start on the property**
- **Major focus on studying surface water, fish and wildlife for baseline data**





Advanced
Exploration

Medium Sized Exploration Camps Northern Saskatchewan





Advanced
Exploration

Advanced Exploration Jobs

All those for early exploration plus:

- Earth-Moving Operator
- Unqualified mechanic
- Unqualified carpenter
- Unqualified electrician
- Environmental Monitor
- Truck Driver
- Accommodation Janitor
- Accommodation Housekeeper
- Security/Camp



Large exploration camp

<http://resourceworld.com/index.php/fission-uranium-expands-high-grade-mineralization-east-and-west-of-triple-r-deposit/>

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Early
Exploration

Exploration Project Characteristics



Advanced
Exploration

Require government permits

Early

- Generally 5 to 50 people in the field
- Junior companies and sometimes larger companies
- \$50,000 to millions of dollars spent annually
- Often summer field programs and sometimes winter drilling
- Opportunity to provide exploration services and derive community benefits
- Generally limited environmental impacts

Advanced

- Generally tens to hundreds of people in the field
- Junior companies and larger companies
- Up to hundreds of millions dollars spent over years
- Field programs for multiple years and often year round
- Significant opportunities to provide exploration services and sign benefit agreements
- Usually have more significant environmental impacts



Early
Exploration

Native Exploration Services



Advanced
Exploration

- **Native Exploration Services (1984 to present)**
 - line cutting, staking, mineral exploration, geological and geophysical surveys and use of explosives
 - training in the field of basic mineral exploration methodologies (prospecting and sampling)
 - Major employer for Oujé-Bougoumou Cree Nation



Sam Bosun, President

- Working with mining and exploration companies in the Chibougamau region for nearly 50 years
- Director of mining and exploration companies

Skookum Jim Award
PDAC 2015



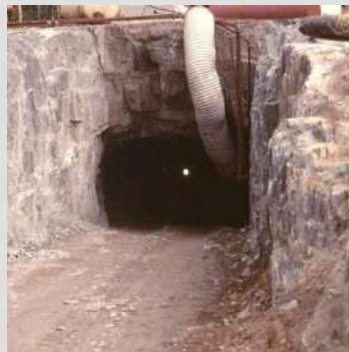
Mining Cycle

Mineral Industry Sequence

Prospecting / Early Exploration



Mineral Exploration



Mine Development

Mine Development Path



Environmental Assessments



Bulk Sampling

- Government permits
- Economic feasibility studies
- Raise funds

Evaluation of Potential Value

Factors that determine if a resource is economical include:

- Type of mineral
- Market price of the minerals and metals
- Location, accessibility, size and value of the resource
- Access to infrastructure: roads, airstrips
- Distance from markets and supply points
- Regulatory regime: taxes, royalty taxes
- Environmentally safe and socially responsible mining
- Availability of a qualified work force



Mine
Development

Senior Companies



Mine
Production

- In existence for decades or more, although name may have changed
- Hundreds to tens of thousands of full time employees
- Multiple offices
- Producing mines and sometimes smelters, refineries, or power plants
- Stocks trade for tens of dollars





Mine
Development

Fort à la Corne Diamond Project

- Spending on diamond exploration projects in Saskatchewan in 2020 is anticipated to be \$105.2 M
 - Primarily focused on the Fort à la Corne kimberlites at the Star-Orion South diamond project, about 65 kilometres east of Prince Albert



STAR
DIAMOND
CORPORATION

April 6, 2021

http://stardiamondcorp.com/_resources/presentations/corporate-presentation.pdf



Mine
Development

Site Preparation – Often Contractors

POINTS ATHABASCA



K+S Potash Construction camp,
Points Athabaska website, 2016



Jansen project, BHP, 2015



Mine
Development

Erect Structures, Deliver Trailers

BHP – Jansen Project

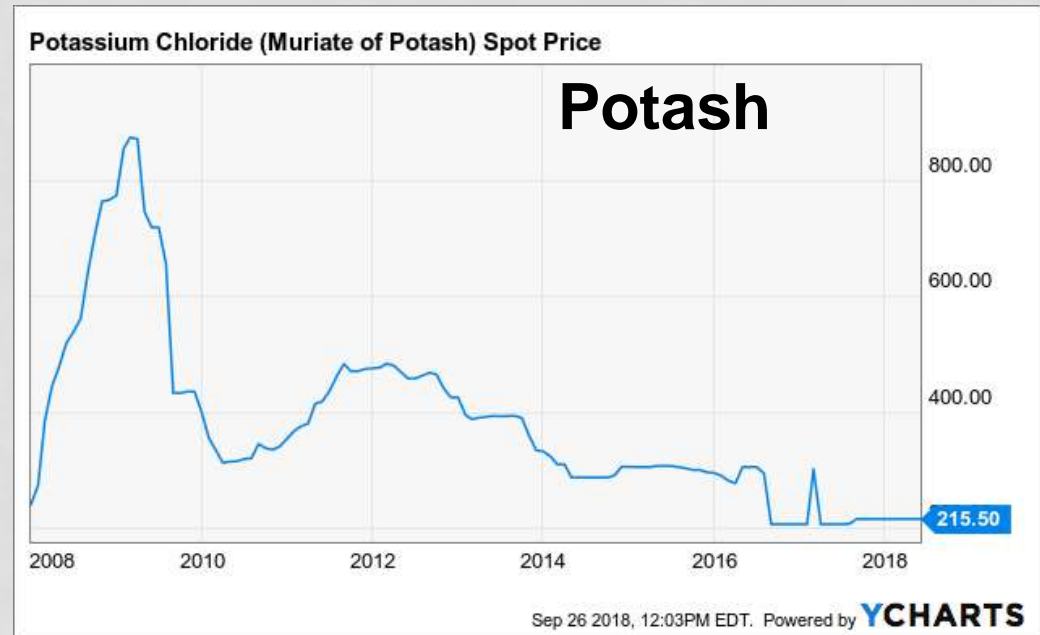




Mine
Development

Changing Commodity Prices Influence Mine Development

- Potash price very low
- Slow down on developing new mines
- Can see consolidation of ownership
- Reduced production of potash and possibly employee layoffs
- Ultimately can see temporary closure of mines



\$202.50 per tonne
Jan. 31, 2021



Mine
Development

Proposed Potash Mines 2020

COMPANY	PROJECT	CAPITAL COST Est.	TIMELINE
BHP	Jansen	>\$12 B	2022-2023?
Western Potash	Milestone	\$3.3 B	?
Vale	Kronau	>\$3.0 B	On hold
Encanto	Muskowekwan	\$2.9 B	On hold
Karnalyte Resources	Wynard	\$2.6 B	On hold



Mine
Development

Jansen Potash Underground Mine Development

- 2015 - BHP developing the world's largest potash mine
 - Targeting 8 million tonnes per year for a 70-year mine life
 - BHP's only sizeable greenfield project in 2015
 - *"the world will require greenfield potash supply after 2020"*
- 2020 - Citing challenges, including a COVID-19 response plan
 - BHP Billiton's recently approved an additional \$272 M in funding for the completion of the shafts and the installation of essential surface infrastructure and utilities
 - Upon shaft completions estimated expenditures of over US\$3 B

www.bloomberg.com/news/articles/2015-09-22/potash-pessimism-clouds-prospects-for-bhp-s-jansen-project Sept. 21, 2015

Saskatchewan Exploration and Development Highlights 2020

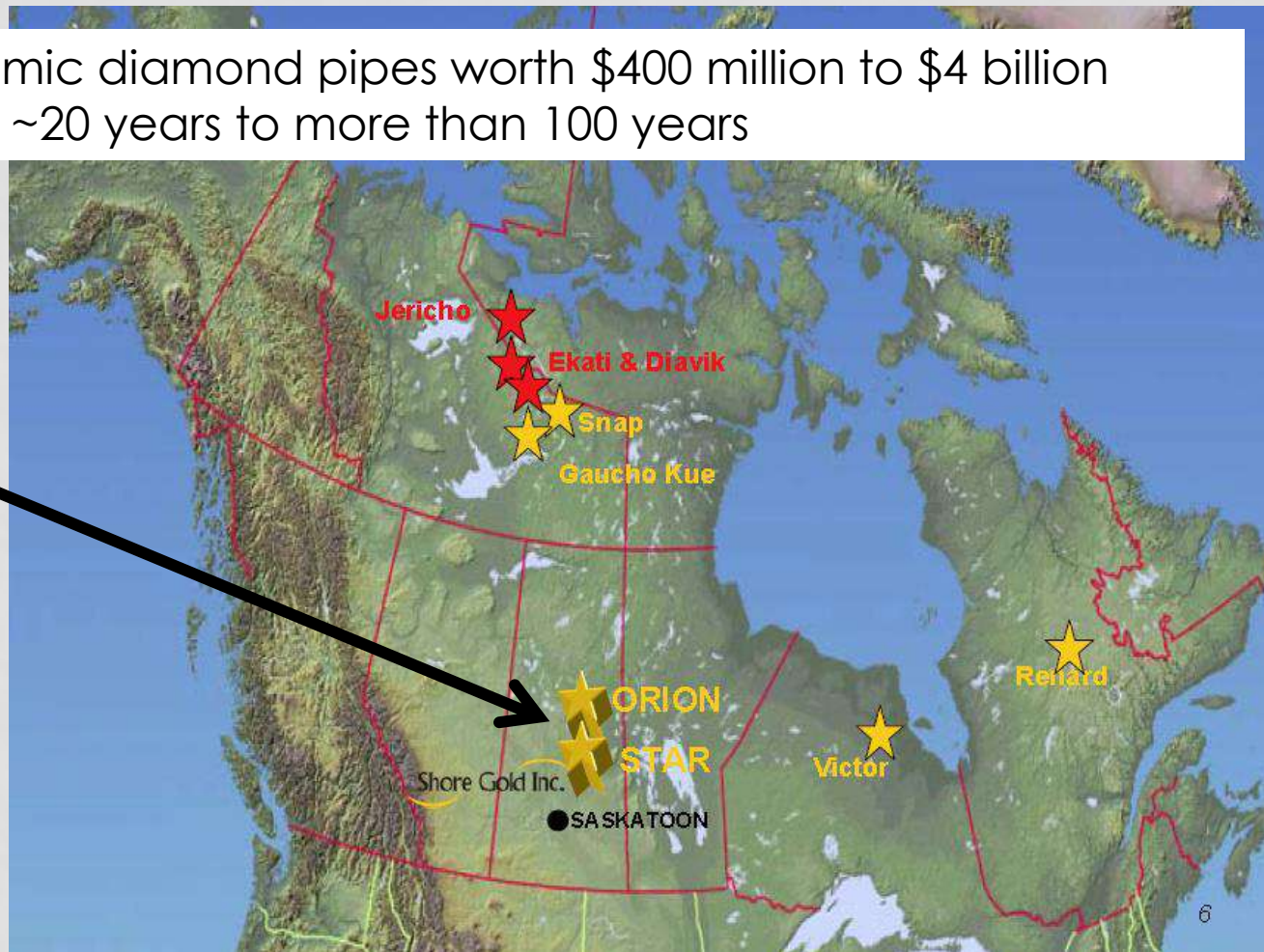


BHP picture

Diamonds

Selected Canadian Deposits

- Most economic diamond pipes worth \$400 million to \$4 billion
- Operate for ~20 years to more than 100 years





Mine
Development

Millennium Mine Development



- 2008?: Cameco feasibility study to build a mine positive
 - Underground development planned for 2013-17
- 2009: Started Environmental Assessment Process
 - Federal and provincial governments
- 2012: Cameco paid C\$150 million to Areva Resources
 - Purchased their 28% share of the project
- 2014: Halted project to wait for higher uranium prices





Mine
Development

Millennium Mine Development Environmental Assessment

Timelines associated with the EA Process to date

Activity	Date
Submission of project proposal by proponent	August 2009
Commission hearing on PSGSD	August 2010
Draft EIS submitted by Cameco	July 6, 2012
Federal/Provincial comments provided to Cameco	September 7, 2012
Revised EIS submitted by Cameco	July 23, 2013
Acceptance of final revised EIS by the CNSC for the purpose of developing the EA report	July 2013
<u>Ministerial Decision</u> to continue project as a designated project under CEAA 2012	October 7, 2013
<u>Public and Aboriginal review</u> of draft EA report	October 17, 2013 to November 18, 2013
<u>Notice of adjournment of public hearing and EA on hold</u> (at Cameco's request due to current economic conditions)	May 15, 2014



Mine
Development

English River First Nation Millennium Project Agreement

The Canadian Press · May 31, 2013

- Collaborative agreement with the English River First Nation
 - 1,000 people who live on seven small reserves; another 400 people live off-reserve
 - Dropped a lawsuit over land near the proposed Millennium project
- \$600M to flow to the First Nation over 10 years
 - contracts with band-owned businesses
 - wages to band members, who are expected to work at the mines and on community development projects



Mine
Development

Economic Development Stepping Stone



Mine
Production



- SDC is the economic development corporation for the northern village of Ile-a-la-Crosse
 - invests in regional and community businesses across multiple sectors with the emphasis on creating employment
- Started a 100% owned subsidiary construction company in 2002 as a mine site service provider
 - heavy equipment operators, construction labour, road building and airport maintenance
- Transitioned into community services
 - contracts with Saskatchewan Highways to rebuild and pave the access road and streets for the Ile a la Crosse village



Metal Mine Marathon

Mineral Industry Sequence

Prospecting / Early Exploration

1,000 properties
staked



hundreds of mineral
exploration
properties



Mineral Exploration



Several mine
development
projects

Mine Development

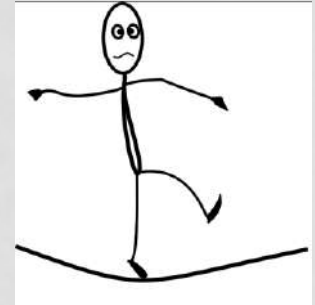


Results in one or
more
metal mines



Mining

characteristics of
working in high risk
environments →

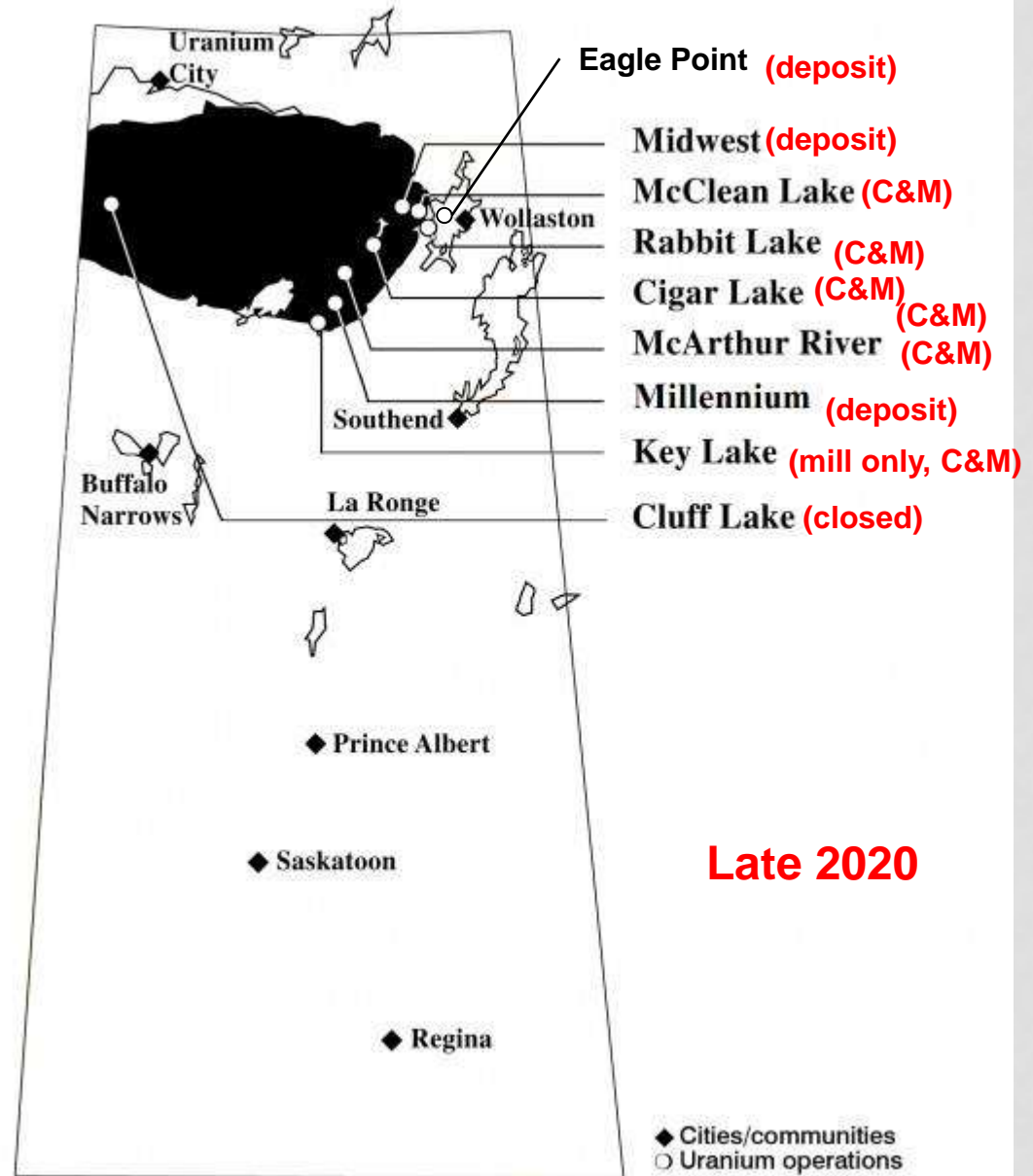




Mine
Production

Uranium Mines

- Three mines on care & maintenance (C&M)
 - Cigar Lake mine – McLean Lake mill
 - Eagle Point mine – Rabbit Lake mill
 - McArthur River mine - Key Lake mill
- impact of COVID-19 and low uranium prices
- 2 major companies
 - Cameco Corporation and Orano Canada





Mine
Production

Cigar Lake Mine

C&M

- 660 km north of Saskatoon
- At peak of construction employed about 500 workers, while production requires about 250 people
- Processing taking place at the McClean Lake mill, 69 kilometres away
- Cameco (50%), Orano (37%), Idemitsu (8%), Tepco (5%)





Mine
Production

McClean Lake Plant Processes Cigar Lake Ore

C&M

- Has processed 6 ore bodies including McLean Lake from 1997-2006
- In 2014 started processing Cigar Lake ore
- Access to the property is by all weather gravel road from La Ronge to the McClean Lake mine site, about 35 km east of Points North Landing.
- Owned by Orano (70%), Dennison (22.5%), Ourd (7.5%)



Photo //words.usask.ca/news/



Mine
Production

Eagle Point Mine Supplies Rabbit Lake Mill

C&M



Accessed by ramp

Driving a drift



<https://www.cameco.com/businesses/uranium-operations/canada/rabbit-lake>

April 6, 2021



Mine
Production

Rabbit Lake Plant Cameco Corporation

C&M

- Mined five deposits
- First Canadian mine to offer a seven-days-in/seven-days-out commuter system of staffing
- Production hiatus from 1998 to 2002 due to depressed uranium prices
- Now just a mill operation
- Longest operating uranium operation (1974 to present)
- ~650 Cameco employees and contractors, 50% of the workforce are residents of Saskatchewan's North (2014)





Mine
Production

McArthur River Mine Site ^{C&M}

Cameco (70%) & Orano Resources (30%)

- The property is located 620 air kilometres north of Saskatoon and 80 kilometres northeast of the Key Lake mill (Cameco 83%, Orano 17%)
- Mining operations began in 2000, world's largest producer in 2015
- ~490 Cameco employees and about 425 permanent and project-related contractors, 50% residents of Saskatchewan's North (2014)



photos from www.mining.com and
www.reuters.com March 2016



Mine
Production

Key Lake Mill for McArthur River Mine

C&M

- Production 1990 to 2002 from Deilmen and Gaerther mines
- Revitalized in 1999 for McArthur River ore



Photos from www.miningandexploration.ca and www.cameco.com



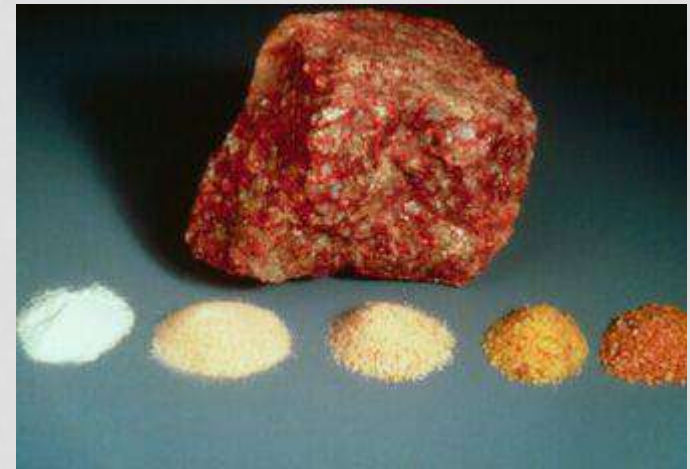
Mine
Production

Saskatchewan Potash +/- Salt Producers

- 8 underground and 3 solution mines
- Operate for decades (often > 40 years)
- Hundreds of workers
 - Cory mine ~500 people in 2012
- On average two or more spinoff jobs for every onsite employee/contractor



April 6, 2021



<http://www.aitc.sk.ca/saskschools/sask/potash.html>



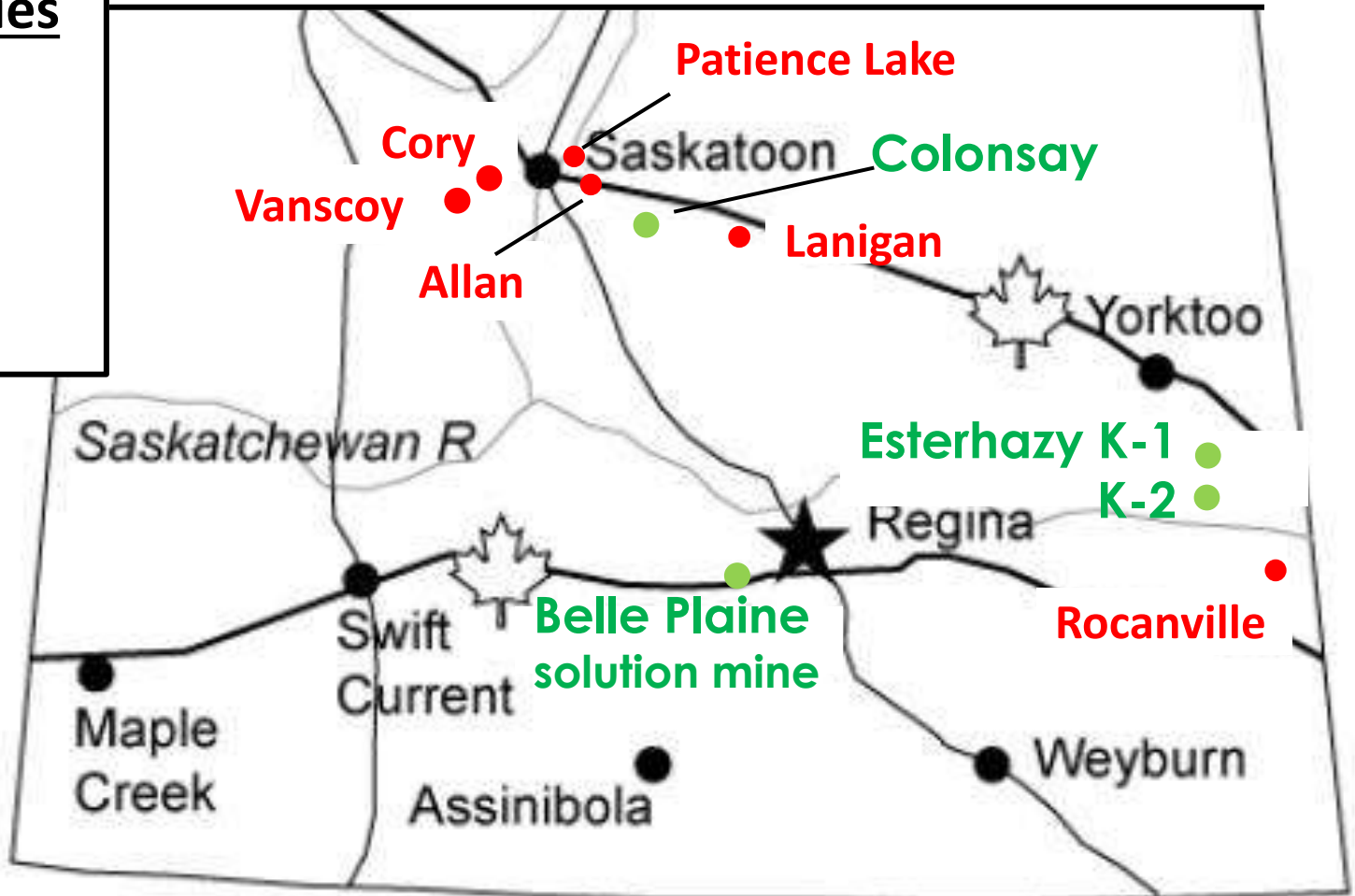
Mine
Production

Potash Mines in Saskatchewan 2021

Companies

Nutrien
(6 mine)

Mosaic
(4 mines)





Mine
Production

Aerial View of Potash Plant for Underground Mine



<http://acceleratingscience.com/mining/potash-a-look-at-the-worlds-most-popular-fertilizer/>

April 6, 2021



Mine
Production

Bethune Mine (Legacy Potash Project)

- K+S Potash Canada developed it near Moose Jaw
 - First new solution mine in Saskatchewan in ~ 40 years
- Construction began June 2012;
- Created more than 300 construction jobs
- Capital cost of >C\$3.25bn
- Production started in 2017
 - Reached 80% of planned annual production in 2019
- Estimated mine life of >55 years





Mine
Production

Saskatchewan Potash Producers

- 2 solution mines
- All workers on surface
- Used to mine at greater depths



<http://www.thecanadianencyclopedia.ca/en/article/potash/>

photo by Bill Brooks

April 6, 2021



- 75% owned by Athabasca Basin Development
- an industry-leading contracting firm that produces quality and safe work while delivering an Aboriginal workforce
 - *“We are also proud to be a transitional employer, and we are well known as an excellent resource for long-term Aboriginal employees. For example, in the last three years our clients have hired over 100 employees from our projects for long-term positions. We view this as not just one, but over 100 success stories”*





Mine
Production

Salt Production

- Huge salt resources in Saskatchewan
 - Massive halite beds, subsurface brines and saline springs
- Two solution mines where salt is the principal product
 - Unity (Compass Minerals), Erco (Erco Worldwide)
- Salt* is produced as a by-product at potash mines



Ice Road Trucking

- Expensive to fly supplies into remote northern mines in the spring, summer, and fall months
- Mines use winter roads to get in non-perishable supplies to save costs when the mills are in operation
- Roads include sections on lakes (30 inches of blue ice)



80,000 lb. truck and trailer on
Brabant Lake ice road

April 6, 2021



Measuring ice thickness using a radar system



**Kitsaki Management
Limited Partnership**



**Trimac Transportation
Services Limited**



**Waterfound Development
Limited Partnership**



**PETER BALLANTYNE
GROUP OF COMPANIES**
Peter Ballantyne Group of
Companies



**Buffalo Narrows Economic
Development Corporation**



**Cumberland House
Development Corporation**



**Des Nedhe Development
Corporation**



**MONTREAL LAKE
BUSINESS VENTURES LP**
**Montreal Lake Development
Corporation**



**Sakitawak Development
Corporation**



**Clearwater River
Development Corporation**



Expanded into Manitoba & Ontario

- Business built serving Saskatchewan uranium mining industry
- Slow down of the uranium mining industry and Cameco suspended operations at all but one mine
- The New Gold mine in northwestern Ontario was under construction
- NRT formed a limited partnership with the Big Grassy River First Nation from Morison, Ontario
 - Big Grassy Logistics Limited Partnership (BGL)
- BGL landed a contract hauling lime from Faulkner, Manitoba to the New Gold mine
- Later, they added van loads, other chemicals, explosive emulsions, and propane to that list.
- As spring 2020 there were six NRT trucks and ten trailers stationed at the Manitoba terminal



Mine
Production

Gold Mines



Global News April 1, 2015

- Santoy mine and Seabee mill only active gold operation in Saskatchewan
 - Owned by SSR Mining Inc. & Alacer Gold
 - record gold production in 2019, totaling 112,137 ounces worth ~\$200M at today's gold price
- Gold mining dates back to the 1930s with the opening of the Box and Prince Albert mines in the La Ronge belt
- ~2 M oz Au produced since 1986 from 7 gold mines located in or near the La Ronge Gold Belt



Seabee mill site



Mine
Production

Coal Mines

- Near Estevan and Coronach
- Poplar River and Estevan coal mines
- Production ~10 Mt annually
- Provides ~60% of the province's electrical power at two coal-burning power stations





Mine
Production

Sand and Gravel Operation Saskatoon





Mine
Production

Sand and Gravel Valuable

- In 2001, the province produced about 11,700,000 tonnes, valued at almost **\$45 million** ranking it #3 in value after uranium and potash
 - circa 2000 there were 19 companies, with 183 employees
- Used mainly in road construction, but also as aggregate component of asphalt and concrete, ground fill, **backfill in mines**, ice control on roads, railway ballast, mortar sand
- Sand and gravel belongs to the property owner, when obtainable from the surface
- On Crown land sand and gravel rights administered by government (MoE, MoA)

Location

Location

Location



Mine
Production

Alkali Lakes

- Southern Saskatchewan has many alkaline lakes with sodium and magnesium sulphate deposits at the edges
- Lakes are “mined” by pumping the water into smaller ponds and allowing it to evaporate to form crystals
- Salt crystals are processed in the plant to become the dried sodium sulphate
- Transported to customers by truck and by rail



Saskatchewan
world's leader in natural sodium sulphate

Sodium Sulphate Plant Chaplin, Saskatchewan





Mine
Production

Peat Production

- Saskatchewan`s major peatlands cover a 200 km wide belt crossing the centre of the province
 - Found in lowlands with widespread peatlands
- Premier Horticulture Inc. is the province`s sole producer of sphagnum peat
 - Currently accessing bogs 40 kms from plant
 - Production by milling and vacuum harvesting
 - Drying is mostly solar
 - Trucked to the Carrot River processing plant
- Shipping nearly 2 million bales each year throughout North America and Asia (2014)
 - Approximately 70 people are employees



Peat bog



Vacuum Harvester

Saskatchewan Mining Reclamation Ministry of Environment

Mining and Mineral Exploration

- There are many types of mines found throughout the province. To protect the environment and human health, mining activities are regulated under *The Mineral Industry Environmental Protection Regulations, 1996* administered by the Ministry of Environment.

Permits

- **Application to Construct, Install, Alter, or Extend a Pollutant Control Facility**
- **Application for Approval of Decommissioning Plan and Fund**
Decommissioning plans and funds, a requirement for all operating pollutant control facilities, must be approved by the Minister and have a requirement to be reviewed at least every five years.
- **Application to Operate a Pollutant Control Facility**
- **Application to Decommission and Reclaim a Pollutant Control Facility**
- **Application to Temporarily Close a Pollutant Control Facility**
- **Application for Release from Decommissioning and Reclamation Requirements**



Mine Closure
Reclamation

Contact Lake Gold Mine



before



site cleared and contoured



closed and revegetated

- Returned to the Crown following rehabilitation by Cameco
- First decommissioned and reclaimed mine site in Saskatchewan (2009)



Mine Closure
Reclamation

Coal Mine – Reclamation



Surface Coal mine in Saskatchewan, Canada
Image Credit: Joel M Galloway, USGS

April 6, 2021

Farmland



Ponds and Small Lakes



Pam Schwann, SMA



Mine Closure
Reclamation

Abandoned Mine Sites

Gunnar and Lorado – mined in 1950s – early 1960s

- Canada and Saskatchewan governments are responsible for the cleanup.
- The Saskatchewan Research Council holds the decommissioning licence for the two sites.
 - Federal and provincial government staff regularly inspect these facilities until fully decommissioned





Mine Closure
Reclamation

Closed and Decommissioned Uranium Mine Sites

Cluff Lake 1980-2002 – AREVA Resources Canada Inc.

- In 2013 decommissioning of the site infrastructure completed
- Site monitored four times per year



1998



1999



2006



2008



2011

Cameco website, Areva photos

Beaverlodge 1952-1982 - Cameco Corporation

- Active decommissioning completed in 1985. Since then, the site has been in a monitoring and maintenance phase.

<http://nuclearsafety.gc.ca/eng/waste/uranium-mines-and-millswaste/index.cfm#Saskatchewan>

Learn Your **ABC's** of Mining for Economic Development

Three important ones are:

FR = financial risk key factor for mining projects

S = safe heavy industry (highly regulated in Canada)

T = time to find/permit/build a major mine

FR. Financial Risk

Key Factor for Mining Projects

- Mineral exploration and mine development require investors to support projects
- Investors can choose to move their investments if:
 - the commodity prices tumble
 - new mines start producing and the demand for that commodity drops
 - mine processing is more costly than anticipated
 - government changes to the business or regulatory environment make the project no longer economic at that time
 - etc.



S. Safe Operations at Mines

- The mining industry is one of Saskatchewan's safest
 - lower lost time frequency rating than health or government workers
- Over 19 years the industry averaged less than one lost time accident (LTA) for every 200,000 hours worked
 - equivalent to an individual working 100 years before he has a LTA
- The time loss claims for mining workers:
 - open pit is 1.27%
 - underground hard rock is 1.05%
 - underground soft rock (potash) is 0.80%
 - compared to 2.5% for all industry classes



W = World Leader in Mining Best Practices



Accountable:

- Assessments are conducted at the mining facility level – the only program to do this for the mining sector. This informs local communities on how a nearby mine is faring.

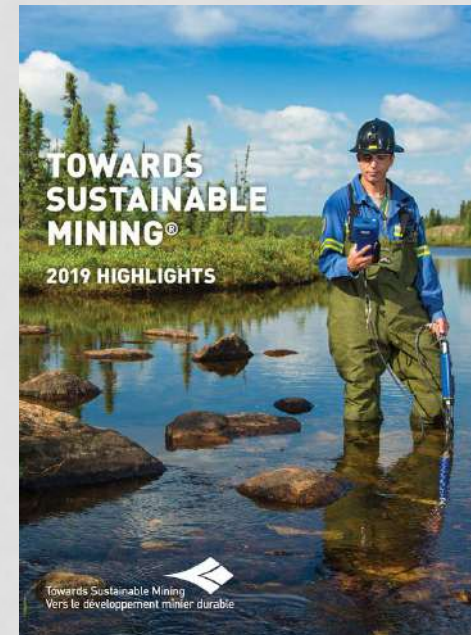
Transparent:

- Mining companies publicly report their facilities' performance against a suite of indicators on the MAC website. Results are externally verified every three years.

Credible:

- TSM is overseen by an independent Community of Interest (COI) Advisory Panel. This multi-interest group helps mining companies and communities of interest foster dialogue, improve the industry's performance and shape the TSM initiative for continual improvement.

TSM

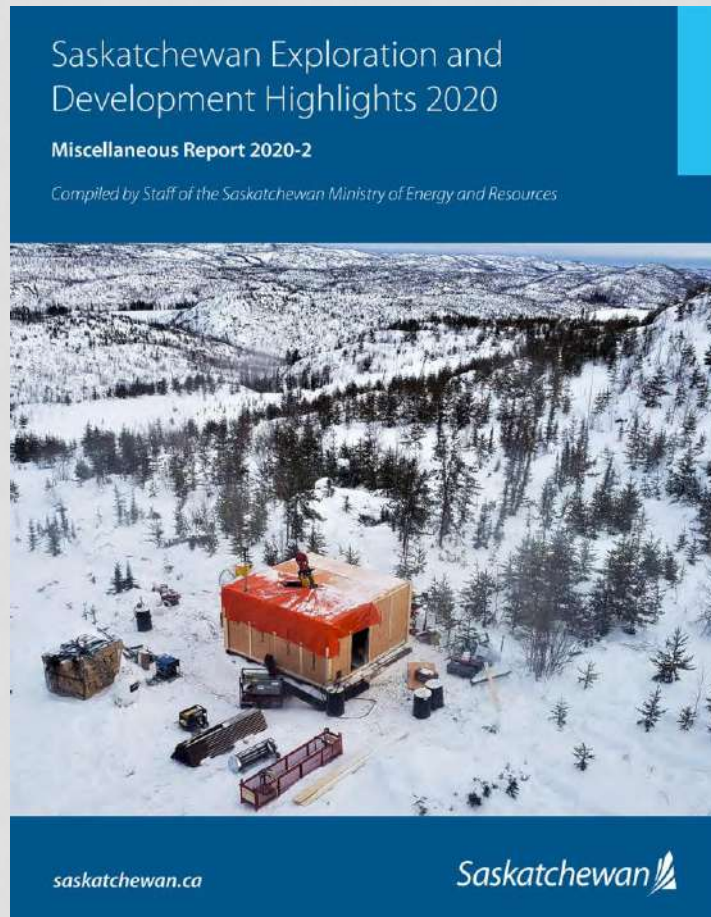


W = World Leader in Mining Best Practices



Adopted by eight other countries – Argentina, Australia, Botswana, Brazil, Finland, Norway, the Philippines and Spain.

Saskatchewan Mineral Exploration & Mining Review



- Summarizes exploration, mine development and mining activities of companies
 - Published annually by Saskatchewan Geological Survey of
 - More descriptive and less promotional than most online info summarizing mining activities
- Staff of Saskatchewan Geological Survey of Saskatchewan are a good source of advice and expertise

Available on line

Mining Information Sources

Saskatchewan

Mineral Exploration and Mining - <https://www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/mineral-exploration-and-mining>

Saskatchewan Geological Survey - <https://www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/mineral-exploration-and-mining/saskatchewan-geological-survey>

Targeted Mineral Exploration Incentive - <https://www.saskatchewan.ca/business/investment-and-economic-development/business-incentives-and-tax-credits/targeted-mineral-exploration-incentive>

Saskatchewan Mining Association - <http://saskmining.ca/>

Manitoba-Saskatchewan Prospectors and Developers Association - <https://northernprospector.ca/manitoba-saskatchewan-prospectors-and-developers-association/>

National

<https://www.nrcan.gc.ca/our-natural-resources/indigenous-natural-resources/indigenous-participation-mining/indigenous-participation-mining-information-products/7817>

Interactive map of Indigenous mining agreements

Guide to exploration and mining for Aboriginal communities

Mining essentials: training for Aboriginal Peoples

Partnership agreements

Other useful links

The Atlas of Canada - Minerals and Mining - <https://atlas.gc.ca/mins/en/index.html>

Minerals and metals facts <https://www.nrcan.gc.ca/our-natural-resources/minerals-mining/minerals-metals-facts/20507>

Minerals and mining publications <https://www.nrcan.gc.ca/maps-tools-and-publications/publications/minerals-mining-publications/18733>

Mining Association of Canada - <https://mining.ca/>

Prospectors and Developers Association - <https://www.pdac.ca>

Mining Industry Human Resources Council - <https://mihr.ca/>