

Saskatchewan Exploration and Development Highlights 2018

Compiled by Staff of the Saskatchewan Ministry of Energy and Resources



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Saskatchewan Ministry of Energy and Resources (2018):
Saskatchewan Exploration and Development Highlights 2018;
Saskatchewan Geological Survey, Saskatchewan Ministry of
Energy and Resources, Miscellaneous Report 2018-2, 17p.

To use information from one of the tables, reference to the table should be made in the following form:

Saskatchewan Ministry of Energy and Resources (2018): Production totals for current gold mining operations and published Reserves/Resources for selected gold deposits in Saskatchewan; Table 3 *in* Saskatchewan Exploration and Development Highlights 2018, Saskatchewan Geological Survey, Saskatchewan Ministry of Energy and Resources, Miscellaneous Report 2018-2, p.9.

Cover photo courtesy of Star Diamond Corp.:

Photo shows a Trench Cutter Sampling Rig on Star Diamond Corp.'s Star-Orion South Kimberlite project in the Fort à la Corne diamond district east of Prince Albert, Saskatchewan. The Trench Cutter Sampling Rig consists of a Bauer BC 50 Cutter mounted on a Bauer MC 128 Duty-cycle Crane. The rig will be used to sample large volumes of kimberlite to depths of up to 250 metres below surface.

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1. GENERAL OVERVIEW

Over the past year Saskatchewan maintained its role as a global leader in potash and uranium production. Saskatchewan remains the world's largest potash producing jurisdiction, and second largest producer of primary uranium. The province set a record for volumes of potash produced and sold in 2017, and a number of other commodities, including gold, coal, base metals, sodium sulfate, salt and clays, were also mined. A wide diversity of geologic settings and mineral deposits, combined with a stable, mining-friendly regulatory environment, continue to attract attention from local juniors to international major mining companies as the province solidifies its reputation as a destination to do business.

2017 Mineral Sales = \$6.7 Cdn Billion

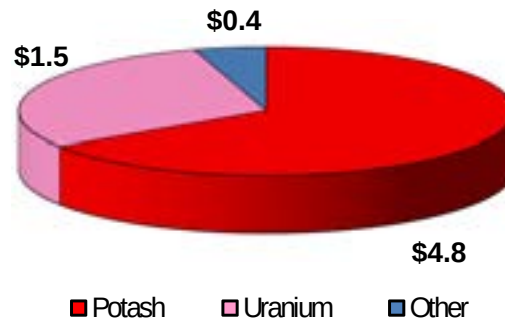


Figure 1: Value of Mineral Sales in Saskatchewan in 2017.

Saskatchewan's value of mineral sales in 2017, mostly from potash and uranium, was approximately \$6.7 billion (B) (Figure 1), up marginally from last year's \$6.4 B but still down from \$8.2 B in 2015 and \$7.3 B in 2014. The decrease can be primarily attributed to lower realized sales prices for potash and uranium.

In its annual survey of mining companies active in the province, the Ministry of Energy and Resources' Saskatchewan Geological Survey (SGS) determined that an estimated \$193.5 million (M) was planned for mineral exploration in 2018, an increase over the \$170 M spent in 2017 and on par with the \$199 M in 2016 (Table 1). Most of the 2018 expenditures were planned for uranium and potash projects, but the survey results also reflect a renewed interest in base and precious metals, as well as diamonds.

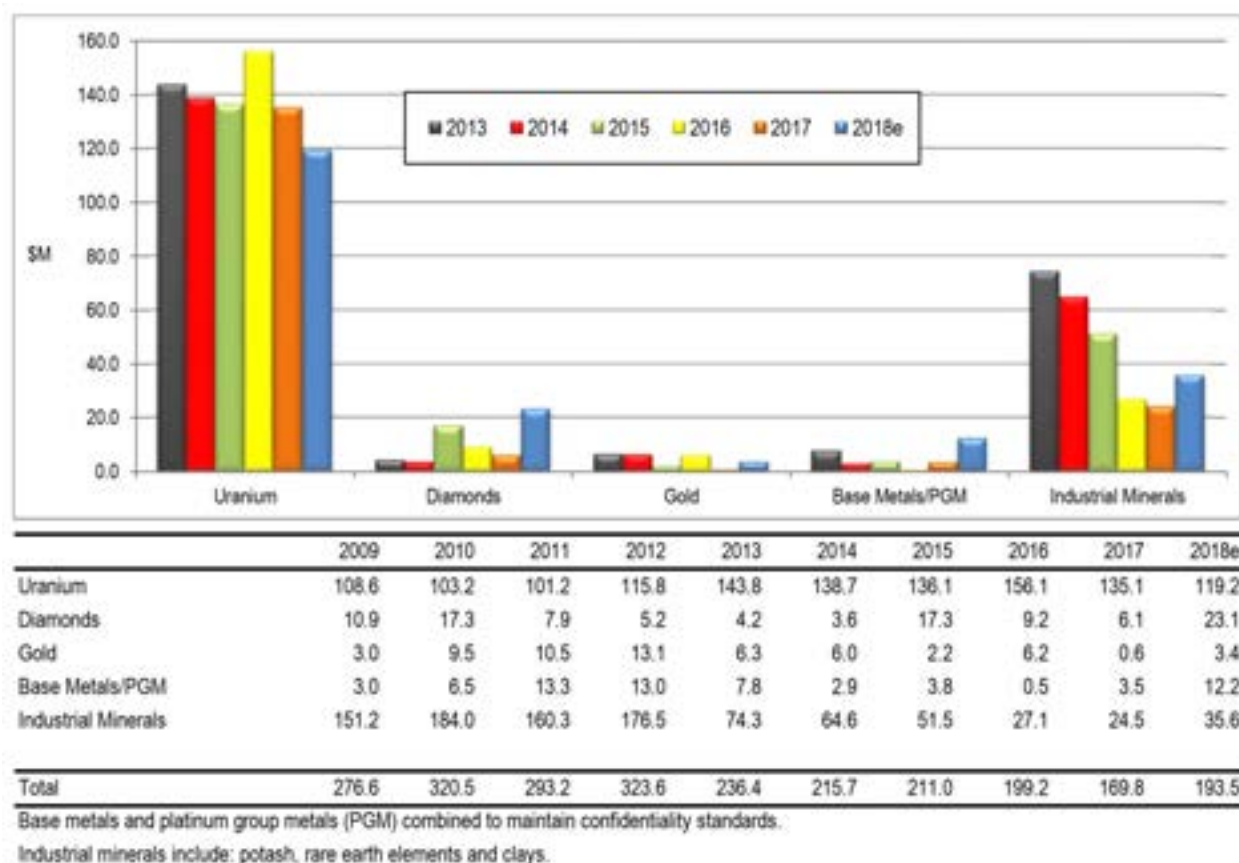
In a separate Canada-wide survey, Natural Resources Canada (NRCan) found that national expenditures for mineral exploration plus deposit appraisals was approximately \$2.00 B in 2017, down significantly from the \$4.23 B spent in 2011. NRCan estimates that Saskatchewan's portion of these expenditures will constitute approximately 7.4% in 2018, down from 9% in 2017 and 14% in 2016. The province's decreasing percentage of national expenditures is primarily a reflection of rising base and precious metal commodity prices, for which exploration is more robust in other jurisdictions. Despite the current lower prices for its principal commodities, Saskatchewan continues to be recognized as one of the most favourable jurisdictions in the world for investment in the mining sector. This was reflected in the 2017 *Survey of Mining Companies* by the Fraser Institute, a Canadian public policy think tank, in which, out of 91 jurisdictions, Saskatchewan ranked first in Canada and second in the world in its Investment Attractiveness Index. The index rates jurisdictions based on a combination of their geologic attractiveness and their Policy Perception Index, a composite measure of the effects of government policy on attitudes toward exploration investment.

In a similar vote of confidence, *The Mining Journal*, a global mining business magazine that has been in circulation since the mid 1800s, recently released its second annual *World Risk Report* for security of investments in resource capital. The survey compared 91 jurisdictions around the world and ranked Saskatchewan third globally in its Investment Risk Index. The index reflects hard risk factors such as mining codes, taxes and regulations,

infrastructure and energy security, along with public perception factors such as ease of doing business, political transparency and social stability.

At the end of October 2018, active mineral dispositions in Saskatchewan (issued pursuant to *The Mineral Tenure Registry Regulations*) totalled 5.61 M hectares (ha), down slightly from the 5.74 M ha held at the same time one year ago. Total active potash dispositions (comprising permits and leases issued pursuant to *The Subsurface Mineral Tenure Regulations*) fell to 95 dispositions totalling 2.44 M ha, down from 110 dispositions, totalling ~2.89 M ha one year ago. In total, nearly 8.2 M ha of land is currently held in Saskatchewan under the mineral, potash, coal, quarry, and alkali disposition regulations.

Table 1 – Mineral exploration expenditures in Saskatchewan. Data in the histogram compare actual historical expenditures to estimates (e) for 2018, compiled from the annual survey of exploration expenditures by the Ministry of Energy and Resource's Saskatchewan Geological Survey. Tabulated data are from the same survey. All values are in millions of Canadian dollars (\$M).



In the spring of 2017, the Ministry of the Economy completed an initiative to digitize all publicly available mineral assessment files. As a result of this large scanning project, clients now have digital access to over 11,000 historical work assessment reports from across the province. The response from industry has been quite positive, with downloads from the Saskatchewan Mineral Assessment Database (SMAD) increasing dramatically over the past year.

The Mineral Development Strategy, announced in the *Speech from the Throne 2017*, was implemented to support diversification of Saskatchewan's mineral sector by encouraging exploration for precious metals, base metals and diamonds. Three main initiatives have been introduced as part of the Strategy to date. Acquisition of new airborne geophysical survey data was completed in the Creighton/Flin Flon area in the spring of 2018, with release of the data in late September through the [Natural Resources Canada Geophysical Data Repository](#). Focused geoscience

studies, conducted by the Saskatchewan Geological Survey in collaboration with federal and provincial counterparts, have also commenced and are ongoing in the areas in and around the new geophysical surveys. Additionally, a new mineral exploration incentive, the 'Targeted Mineral Exploration Incentive' (TMEI: <http://www.saskatchewan.ca/mineral-exploration-incentive>), was made available starting in October 2018, to support drilling in a defined area of high potential for base metals, precious metals and diamonds. The TMEI offers successful applicants a 25% rebate on eligible drilling costs to a maximum of \$50,000 per year, on a prorated basis.

Saskatchewan remained the world's second most prolific primary-uranium-producing jurisdiction in 2017, contributing approximately 22% of the global supply. Uranium production in 2017 from Saskatchewan's two active operations totalled 34.1 M pounds (lb) tri-uranium octoxide (U_3O_8). The majority, 18 M lb U_3O_8 , came from the Cigar Lake mine–McClellan Lake mill. Production from the McArthur River mine–Key Lake mill totalled 16.1 M lb U_3O_8 . Total production for 2018 is forecast to be 18.2 M lb U_3O_8 , of which 18 M lb will be from Cigar Lake–McClellan Lake and only 0.2 M lb from McArthur River–Key Lake, which has suspended production indefinitely until market conditions improve. Robust exploration programs are ongoing in the eastern and southwestern parts of the Athabasca Basin, where companies are anticipated to spend over \$119 M in 2018 on a variety of uranium projects.

SSR Mining Inc. (SSR) achieved a fourth consecutive year of record production at the Seabee mining operation, which included the Seabee and Santoy underground mines, producing 83,998 Troy ounces of gold in 2017. Through the first three quarters of 2018, the company continued to have strong production and are on track for another record year. A number of junior companies are also advancing gold projects in the Seabee region as well as other parts of the province. Approximately \$3.4 M will be spent on gold exploration projects in 2018.

A small amount of base metals was produced from the Saskatchewan portion of the 777 mine (North zone) at Flin Flon. Exploration activity and evaluation of existing base metal deposits increased in both 2017 and 2018. Foran Mining Corporation (Foran) and Murchison Minerals Ltd. continued evaluation of the McIlvenna Bay and Brabant–McKenzie projects, respectively, while a number of other juniors undertook grassroots exploration. Approximately \$12 M was anticipated to be spent on base and platinum group metal projects in Saskatchewan in 2018, a significant increase from the \$3.5 M spent in 2017.

The most advanced diamond play in Saskatchewan continues to be the Star-Orion South Kimberlite project, which has been subject to about half a billion dollars worth of exploration and evaluation over the years. Star Diamond Corp. (formerly Shore Gold Inc.) and joint venture partner Rio Tinto Exploration Canada Inc. (RTEC) are undertaking a new program of grade and diamond evaluation on the project, which recently received provincial environmental approvals. The partners are also re-evaluating some of the lesser known pipes in the Fort à la Corne region, while assessing potential for new targets. Under this partnership agreement, RTEC has the option to earn up to a 60% interest in the project by investing approximately \$70 M over the next 7.5 years. North Arrow Minerals Inc. is continuing work on its Pikoo project, while a number of other companies are undertaking grassroots diamond exploration.

In 2017, Saskatchewan produced a record 20.3 M tonnes (t) potassium chloride (KCl) with a sales value of \$4.8 B, compared to 17.9 Mt KCl valued at \$4.2 B in 2016. Potash sales volumes surpassed record levels throughout 2017, while average potash sales prices showed modest gains. Shipments thus far in 2018 are on pace to exceed record sales levels once again. The landscape of the potash production industry in Saskatchewan saw significant changes over the past year. The merger between Potash Corporation of Saskatchewan (PotashCorp) and Agrium Inc. (Agrium) to form Nutrien Ltd. created a global fertilizer giant, while Mosaic executed a significant acquisition of Vale Fertilizantes. Saskatchewan also welcomed its first new potash mine in nearly 50 years as K+S Potash Canada Inc. commissioned the Bethune mine in May of 2017. A number of other companies, both major and junior, are continuing to advance potash projects through the feasibility stages as they search for development capital.

2. INTRODUCTION

This report is a review of current activity only. The publication *Geology, and Mineral and Petroleum Resources of Saskatchewan* (Saskatchewan Geological Survey, 2003) provides a more comprehensive summary of the economic geology of the province, including historical reserve and production data. For up-to-date information on all Saskatchewan mineral occurrences, refer to the Saskatchewan Mining and Petroleum GeoAtlas (<https://gisappl.saskatchewan.ca/GeoAtlas>) and the Saskatchewan Mineral Deposits Index (<http://applications.saskatchewan.ca/mineral-deposit-index>)

All information contained in this document is from publicly available sources. Exploration expenditure forecasts are compiled from an annual survey conducted by geologists of the Saskatchewan Geological Survey, Saskatchewan Ministry of Energy and Resources. Actual annual expenditures for previous years are from the same survey. Grade, tonnage, reserve, and resource data reported herein are from a variety of public sources including published reports, public records, corporate websites, securities filings, and Saskatchewan Mining Association facts sheets. These data may not necessarily conform to the current CIM and NI 43-101 standards required by Canadian securities regulators for publicly reporting companies. Although the contained information has been carefully compiled, the Saskatchewan Ministry of Energy and Resources and the Government of Saskatchewan do not accept liability for any errors, omissions or inaccuracies that may be included in, or derived from, this report. Nor does the Saskatchewan Ministry of Energy and Resources and the Government of Saskatchewan recommend or endorse any of the projects described in this document.

This document is an attempt to capture relevant information current as of October 9, 2018. Information released after this date may, or may not, be present in the document. Only active exploration and development projects are included. Due to the current rapid pace of exploration, it is inevitable that significant new activities have occurred since printing.

Tables 2 and 3 contain data on the current mineable reserves and geologic resources for the active uranium and gold properties in the province, respectively. The last page of this document is a colour map, showing the locations of properties discussed herein. The map also outlines the general mineral and hydrocarbon potential of the province, and shows the lithotectonic elements of the Canadian Shield in northern Saskatchewan.

3. THE ENERGY AND MINERALS SECTOR

The energy and mineral extraction sectors are critical components of the Saskatchewan economy, accounting for 21.3% of the provincial Gross Domestic Product (GDP) (\$61 B) in 2017 (Figure 2). The natural resource sector's share of the provincial GDP has increased in importance over the last 10 years, becoming the largest contributor to the provincial GDP. Increased production levels have allowed energy and mineral extraction's share of GDP to stay steady in the face of decreasing prices.

The oil and gas industry in Saskatchewan is the largest contributor among primary industries to the provincial GDP, at an estimated 15.1%. In 2017, the oil and gas industry in Saskatchewan accounted for approximately 36,000 direct and indirect jobs, \$4.2 B in capital investment, and over \$700 M in provincial revenues.

Saskatchewan produced 177.2 M barrels of crude oil in 2017, making it the fifth largest producer of crude oil in North

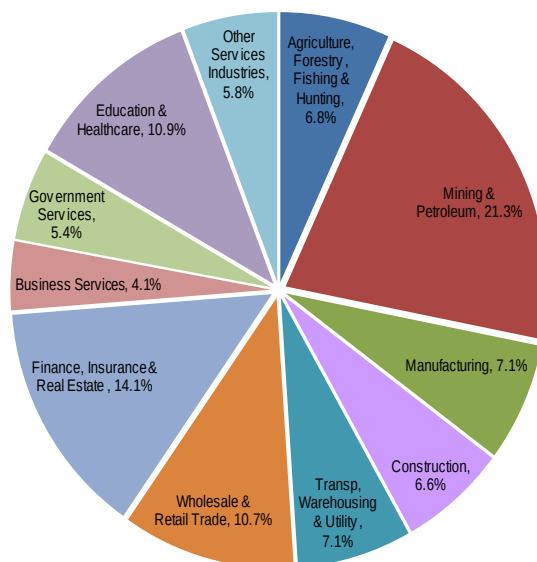


Figure 2 – 2017 percentage of Real GDP by sector (CANSIM Table 379-0030, Statistics Canada, 2017).

America, behind only Texas, Alberta, North Dakota and Alaska. A total of 2529 oil wells were drilled in 2017, of which 2184 were horizontal.

Saskatchewan is the third largest producer of natural gas in Canada, behind Alberta and British Columbia. In 2017 Saskatchewan produced 188.2 billion cubic feet of natural gas.

The majority of Saskatchewan mineral production in 2017 included metallic mineral production of uranium and gold, and industrial mineral production of potash, silica sand, salt and sodium sulfate, bentonite, clay and coal. The value of non-renewable resource production in 2017 totalled about \$16 B (Figure 3).

The mines of the Athabasca Basin in northern Saskatchewan and the Prairie Evaporite Formation in central Saskatchewan continue to be among the world's most important suppliers of uranium and potash, respectively. In 2017, Saskatchewan produced 100% of Canada's uranium from two operations, and accounted for 22% of world output. The province also produced all of Canada's potash from 11 facilities, accounting for nearly a third of world production. Market fundamentals indicate strong future demand for both commodities. The Saskatchewan potash and uranium sectors have responded by investing billions of dollars in expansions. Although there have been challenges in the uranium sector, production of both uranium and potash is expected to increase over the next 10 years.

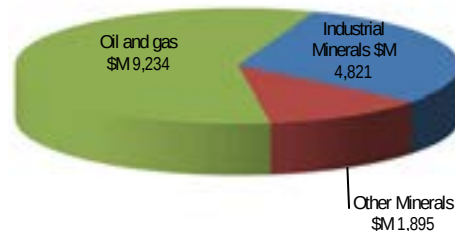


Figure 3 - Value of non-renewable resources (\$M, Saskatchewan Ministry of Energy and Resources).

The energy and minerals sectors have increased prosperity in Saskatchewan by creating high-paying direct and indirect jobs (over 30,000 in mineral production and 36,000 in oil and gas) and contributing over \$1.1 B in provincial revenues in 2017. These sectors will continue to make significant contributions to the Saskatchewan economy for many generations.

4. URANIUM

OPERATIONS AND MAJOR DEPOSITS

According to the World Nuclear Association, Saskatchewan was responsible for about 22% of the world's uranium production in 2017. Production, which totalled 34.1 million pounds (Mlb) U_3O_8 , came from two operations. The majority, 18 Mlb U_3O_8 , came from the Cigar Lake (operator Cameco Corporation (Cameco))–McClellan Lake (operator Orano Canada Inc. (Orano)) operation (Table 2). Production from the McArthur River–Key Lake operation (operator Cameco) totalled 16.1 Mlb U_3O_8 (Table 2). Total production for 2018 is forecast to be 18.2 Mlb U_3O_8 , of which 18 Mlb will be from the Cigar Lake–McClellan Lake operation, and only 0.2 Mlb from the McArthur River–Key Lake operation (Table 2), which has been placed in care and maintenance.

The Cigar Lake mine produced 18.0 Mlb U_3O_8 in 2017, fully achieving the annual licensed production. Full production is also expected in 2018. Reserves at Cigar Lake are 197.9 Mlb U_3O_8 with an average grade of 14.91% (Table 2), making it the world's highest-grade producing uranium mine. Total production at the mine since inception in 2014 is 46.9 Mlb U_3O_8 .

The Cigar Lake mine uses a fully contained production system in which the ore is mined, processed underground and pumped 500 m to surface as a slurry without any worker exposed to the radioactive material. The slurry is further blended and thickened at surface and pumped into haul trucks (average grade is 15% U_3O_8). This ore is hauled 69 km to Orano's McClellan Lake mill. Orano's initial operational license for the mill was renewed in June 2017 for a

further 10 years, expiring June 30, 2027. Current licensed capacity is 24 M lb U₃O₈ annually. Based on current Reserves and production forecasts, the mine life at Cigar Lake extrapolates to 2028.

Table 2 – Published NI 43-101-compliant Reserves and Resources for uranium deposits in Saskatchewan.

Owner(s) ¹	Property/Deposit	Reserves (M lb U ₃ O ₈)	Grade (% U ₃ O ₈)	Production ² (M lb U ₃ O ₈)	
RESERVES³				2017	2018 (e)
Orano Canada Inc. (70%) – Denison Mines Corp. (22.5%) – OURD (Canada) Co. Ltd. (7.5%)	McClean Lake ore stockpile	0.74	0.38	–	–
Cameco Corporation (69.805%) – Orano Canada Inc. (30.195%)	McArthur River	359.1	9.63	16.1	0.2
Cameco Corporation (83%) – Orano Canada Inc. (17%)	Key Lake	0.7	0.52	–	–
Cameco Corporation (50.025%) – Orano Canada Inc. (37.1%) – Idemitsu Uranium Exploration Canada (7.875%) – TEPCO Resources Inc. (5%)	Cigar Lake	197.9	14.91	18.0	18.0
Denison Mines Corp. (90%) – JCU Exploration (Canada) Co., Ltd. (10%)	Gryphon deposit	49.7	1.8	–	–
	Phoenix deposit	59.7	19.1	–	–
RESOURCES³		Measured & Indicated (M lb U ₃ O ₈)	Grade (% U ₃ O ₈)	Inferred (M lb U ₃ O ₈)	Grade (% U ₃ O ₈)
Orano Canada Inc. (70%) – Denison Mines Corp. (22.5%) – OURD (Canada) Co. Ltd. (7.5%)	Caribou	2.8	2.6	–	–
	McClean North	12.4	2.8	0.1	0.79
	Sue D	2.8	1.1	0.2	0.39
	Sue E	–	–	7.3	0.69
Orano Canada Inc. (69.16%) – Denison Mines Corp. (25.17%) – OURD (Canada) Co. Ltd. (5.67%)	Midwest Main	39.9	4.0	11.5	0.66
	Midwest A	10.8	0.87	6.7	5.8
Orano Canada Inc. (50.9%) – UEX Corporation (49.1%)	Anne	24.8	1.99	2.6	0.88
	Colette	5.7	0.79	7.8	0.72
	Kianna	34.8	1.53	16.9	1.36
	58B	2.4	0.77	0.9	0.51
Cameco Corporation (78.2%) – Orano Canada Inc. (21.8%)	Fox Lake	–	–	68.1	7.99
Cameco Corporation (50.025%) – Orano Canada Inc. (37.1%) – Idemitsu Uranium Exploration Canada (7.875%) – TEPCO Resources Inc. (5%)	Cigar Lake	98.2	14.48	23.7	5.97
Cameco Corporation (100%)	Eagle Point	38.6	0.95	33.7	0.62
Cameco Corporation (69.805%) – Orano Canada Inc. (30.195%)	McArthur River	7.0	3.01	8.5	5.01
Cameco Corporation (69.9%) – JCU Exploration (Canada) Co., Ltd. (30.1%)	Millennium	75.9	2.39	29.0	3.19
Cameco Corporation (57.446%) – Orano Resources Canada Inc. (23.087%) – JCU Exploration (Canada) Co., Ltd. (19.467%)	Tamarack	17.9	4.42	1.0	1.02
Denison Mines Corp. (65.45%) – Korea Waterbury Uranium Limited Partnership (34.55%)	J Zone	12.8	2.00	–	–
Denison Mines Corp. (90%) – JCU Exploration (Canada) Co., Ltd. (10%)	Gryphon deposit	61.9 ⁴	1.71	1.9	1.18
	Phoenix deposit	70.2 ⁴	19.13	1.1	5.80
Fission Uranium Corp. (100%)	Triple R	87.8	1.82	52.9	1.80
NexGen Energy Ltd. (100%)	Arrow	179.5	6.88	122.1	1.30
Rio Tinto PLC ⁵ (100%)	Roughrider	17.2	1.98	40.7	11.5
Skyharbour Resources Ltd. ⁶ (100%)	Fraser Lakes Zone B	–	–	6.96	0.03
UEX Corporation (100%)	Horseshoe	22.9	0.20	1.05	0.17
	Raven	12.2	0.11	1.67	0.09
	West Bear	1.6	0.91	–	–

Notes:

1. Operator listed first. Deposits in the Reserves and Resources sections are sorted based on percentage ownership, then alphabetically by deposit name.
2. 2017 and 2018 production figures and estimates are from company releases; e, estimated.
3. Total Reserves (Proven and Probable) are reported. Measured and Indicated Resources have been combined and are reported separately from Inferred Resources. Both Reserves and Resources reflect the U₃O₈ content of the ore body. Reserve and Resource data are from company releases.
4. Indicated Mineral Resources for Gryphon and Phoenix deposits are inclusive of Reserves.
5. Originally published by Hathor Exploration in 2010.
6. Originally published by JNR Resources in 2012.

The McArthur River mine produced 16.1 M lb U_3O_8 in 2017, for a total production of over 325 M lb U_3O_8 since opening in 1999. The mine has a Reserve of 359.1 M lb U_3O_8 at a grade of 9.63% (Table 2). Although the grade of the deposit remains extraordinary, grades of the Reserve peaked at an astonishing 24.6% U_3O_8 at the end of 2005. Based on current Reserves and production forecasts, the mine life at McArthur River has been extended to 2038. Production is anticipated to be 0.2 M lb U_3O_8 in 2018 due to a suspension in production. Weak uranium prices have forced the mine and mill into a state of safe care and maintenance.

Ore from McArthur River is processed underground and then blended and thickened to produce a slurry with an average grade of 15% U_3O_8 . The slurry is pumped to surface and into transport containers before being hauled to the Key Lake mill, some 80 km to the southwest. The mill is licensed to produce 25 M lb U_3O_8 annually. Tailings capacity at Key Lake has been expanded over the past several years and it is now sufficient to mill all known Reserves and Resources at McArthur River with space remaining.

Production at the Eagle Point mine was suspended in June 2016 due to challenging uranium market conditions. The entire mining and milling operation remained under care and maintenance during 2018, with 120 employees maintaining the facilities.

NexGen Energy Ltd.'s (NexGen) Arrow deposit lies in the Patterson Lake corridor. NexGen has been exploring deep into the mineralized structures and has encountered uranium intersections at depths below 900 m, all in basement rocks. NexGen announced a maiden Inferred Resource estimate in March 2016 and since that time has worked to increase the confidence of its model. A second Resource estimate, released in March 2017, converted much of the original 201.9 M lb of contained U_3O_8 into the Indicated Resource category. The new estimate contains 179.5 M lb U_3O_8 in 1.18 Mt of ore, equating to a grade of 6.88%. A further 122.1 M lb U_3O_8 is in an Inferred Resource comprising 4.25 Mt of rock grading 1.30%. NexGen followed up its Resource estimate with a preliminary economic assessment (PEA). The model suggests that a low-cost, conventional long-stope mining process could support a mine life of 15 years with an on-site mill. Rather than an open-pit tailings facility, NexGen envisions back-filling the mine workings with tailings reduced to paste and treated with a cement additive, resulting in a significant decrease in the project's surface footprint. NexGen is now working toward completion of a prefeasibility study for the deposit.

Fission Uranium Corp. (Fission) has continued exploration and expansion of the Triple R deposit in the southwestern Athabasca Basin since publishing a maiden Resource estimate and a PEA for the project in 2015. In February 2018, an updated Resource estimate for the Triple R deposit, which now includes the R1515W, R840W, R00E, R780E and R1620E zones, contains 140.61 M lb U_3O_8 , with 87.76 M lb U_3O_8 in the Indicated Mineral Resource category (based on 2 186 000 t of ore at an average grade of 1.82% U_3O_8) and 52.85 M lb U_3O_8 in the Inferred Mineral Resource category (based on 1 331 000 t of ore at an average grade of 1.80% U_3O_8). The high-grade, R780E zone represents almost half of the Resource, containing 48.246 M lb U_3O_8 grading 18.39%, and 14.710 M lb U_3O_8 grading 20.85% in the Indicated and Inferred categories, respectively. Altogether, the defined areas of mineralization now have a strike length of over three kilometres. Fission envisions mining the Triple R deposit via an open pit. To achieve this, a dike would be built around the mining area in Patterson Lake and the pit area drained. The deposit would be extracted over a 14-year period and milled at the site. Fission is in the midst of a prefeasibility study for the deposit.

Denison Mines Corp. (Denison) has continued work on the Wheeler River property southwest of the McArthur River mine. Denison is in the process of further increasing its ownership by acquiring the remainder of Cameco's 26.7% interest, bringing Denison's total share to 90%. Should JCU Exploration (Canada) Co., Ltd. exercise its right of first refusal, Denison's ownership will decrease to 86.84%. The property contains two defined uranium deposits. The original discovery, Phoenix, lies about 400 m below surface at the basal Athabasca unconformity. The deposit has a Reserve of 59.7 M lb U_3O_8 grading 19.1%, the highest grade of any deposit currently defined in Saskatchewan, and in the world. Resources (inclusive of Reserves) are 70.2 M lb U_3O_8 in the Indicated category and 1.1 M lb U_3O_8 in the Inferred category. The second defined uranium deposit, called Gryphon, is 3 km northwest of Phoenix. It is hosted by basement rocks nearly 200 m below the Athabasca unconformity. The Reserve at this deposit is 49.7 M lb U_3O_8 at a grade of 1.8%. Resources (inclusive of Reserves) are 61.9 M lb U_3O_8 in the Indicated category and 1.9 M lb U_3O_8 in

the Inferred category. Exploration drilling has also intersected mineralization at the basal Athabasca unconformity (~540 m depth) up to 1 km northeast of Gryphon along strike.

Denison released an updated Resource estimate for their Midwest property following improvements to datasets and deposit modelling completed by the project operator Orano. The Resource estimate, completed by SRK Consulting, includes the Midwest Main and Midwest A deposits. The Midwest Main deposit now contains 39.94 M lb U₃O₈ grading 4.00% in the Indicated Resource category, with a further 11.5 M lb U₃O₈ grading 0.66% in the Inferred category. Midwest A contains 10.84 M lb U₃O₈ grading 0.87% and 6.72 M lb U₃O₈ grading 5.81% in the Indicated and Inferred categories, respectively.

EXPLORATION OVERVIEW

The decision by Cameco to cease production at both the Rabbit Lake and McArthur–Key Lake operations came after many years of challenging uranium prices. In spite of this pressure, uranium remains the backbone of Saskatchewan's mineral exploration industry, with actual expenditures of \$135.1 M in 2017 (79.5% of the province's total expenditures). Estimated expenditures in 2018 of \$119.2 M demonstrate the exploration attractiveness of Saskatchewan's Athabasca Basin. These expenditures include the major exploration programs by NexGen and Fission in the Patterson Lake area that are detailed above but, in addition, both Denison and Purepoint Uranium Group Inc. (Purepoint) have undertaken or are undertaking exploration in 2018, to the northeast of the Arrow deposit in the Patterson Lake corridor, along the southern margin of the Athabasca Basin. Purepoint continues follow-up drilling at the Spitfire zone and at other regional targets, and Denison completed drilling of regional targets at the Hook-Carter project (joint venture partner ALX Uranium Corp. holds 20% of the project).

In the eastern Athabasca Basin, Denison has discovered new mineralization on its Waterbury project (joint venture partner Korea Waterbury Uranium Limited Partnership holds 34.55% interest). This new area of mineralization is called the Huskie zone and is 1.5 km northeast of the J zone (Table 2), which is also part of the Waterbury project, and 6 km northeast of the Midwest deposit. The Huskie zone is 245 to 400 m below surface and between 40 and 245 m below the basal unconformity of the Athabasca Basin. The best drill intersections grade 9.1% and 4.5% U₃O₈ over 3.7 and 6.0 m, respectively. About 35 km to the north-northwest, IsoEnergy Limited (Iso) has been exploring at the Larocque East property, which it acquired from Cameco in 2018. Iso has tested areas of historical mineralization on the property and intersected 8.5 m grading 1.26% U₃O₈ straddling the basal Athabasca unconformity. In the southeast Athabasca Basin, Skyharbour Resources Ltd. (Skyharbour) has been exploring at the Moore uranium project, with the company now holding 100% interest in the project after satisfying the terms agreed to with former owner Denison. The Moore uranium project hosts the Maverick zone, which locally contains grades over 20% U₃O₈. Skyharbour plans to continue drilling at the project to test the Maverick corridor, which has not been tested along half its length.

5. GOLD

SSR Mining Inc.'s (SSRM) Seabee gold operation, comprising the Seabee and Santoy underground mines, remained Saskatchewan's sole gold producer over the past year. The operation continued its trend of strong production levels over recent years, setting a new annual production record in 2017 of 83,998 ounces (oz) of gold from 330 415 t of ore grading 8.25 grams per tonne (g/t) gold. This strong performance has carried over to the current year, with production of 75,130 oz through the first three quarters of 2018. This includes third quarter production of 27,831 oz, representing an all-time quarterly production record for the operation. After 27 years and over one million oz of produced gold, the original Seabee mine was decommissioned in early 2018. As such, all current production from the Seabee operation is from the Santoy underground mine.

Gold exploration took place at several locales around Saskatchewan over the past year, and it is estimated that gold expenditures for 2018 will be approximately \$3.4 M.

Table 3 – Production totals for current gold mining operations and published Reserves/Resources for selected gold deposits in Saskatchewan.

Ownership	Years Operated	Mine/Deposit	Ore Milled (t)		Au Grade (g/t)	Au Grade (Troy oz/ton)	Total Au Production (Troy oz)
PRODUCTION (recent operations)							
SSR Mining Inc. (100%)	1991 to present	Seabee gold operation ¹	6 133 532		7.97	0.233	1,446,590
Golden Band Resources Ltd. (100%)	2011 to 2014	La Ronge gold project ²	323 491		8.55	0.250	77,118
Ownership	Effective Date (dd/mm/yr)	Mine/Deposit	Tonnes of Ore	Cut Off (g/t)	Au Grade (g/t)	Au Grade (Troy oz/ton)	In Situ Au (Troy oz)
RESERVES (Proven + Probable)							
SSR Mining Inc. (100%)	31/12/17	Seabee operation	1 370 000	3.68	9.88	0.288	440,000
Fortune Bay Corp. (100%)	06/10/11	Box	16 502 247	0.72	1.51	0.044	800,000
Fortune Bay Corp. (100%)	06/10/11	Athona	5 830 798	0.72	1.17	0.034	220,000
RESOURCES (Measured + Indicated)							
SSR Mining Inc. (100%)	31/12/17	Amisk Gold	30 150 000	0.40	0.850	0.025	830,000
SSR Mining Inc. (100%)	31/12/17	Seabee operation ³	1 970 000	3.29	10.74	0.314	680,000
SSR Mining Inc. (100%)	31/12/16	Porky West	101 000	3.26	3.57	0.104	12,000
Golden Band Resources Ltd. (100%)	19/03/13	Roy Lloyd	155 383	5.00	12.60	0.368	62,947
Golden Band Resources Ltd. (100%)	30/04/12	Golden Heart	492 800	4.00	6.60	0.193	104,800
Golden Band Resources Ltd. (100%)	30/04/12	Komis	191 740	4.00	7.85	0.229	48,398
Golden Band Resources Ltd. (100%)	30/04/12	Memorial	288 400	1.00	2.83	0.083	26,220
Golden Band Resources Ltd. (100%)	30/04/12	Tower East	5 019 080	1.00	1.86	0.054	299,835
MAS Gold Corp. (51%) – Golden Band Resources Ltd. (49%)	01/06/16	Greywacke Lake (North deposit)	255 500	5.00	9.92	0.290	81,500
Wescan Goldfields Inc. (100%)	04/02/10	Jojay	420 000	2.00	3.70	0.108	50,000
Comstock Metals Ltd. (100%)	27/09/16	Preview SW	2 607 900	0.50	1.89	0.055	158,300
RESOURCES (Inferred)							
Silver Standard Resources Inc. (100%)	31/03/11	Amisk Gold	28 653 000	0.40	0.640	0.019	590,000
Silver Standard Resources Inc. (100%)	31/12/17	Seabee operation	2 260 000	3.29	9.29	0.271	670,000
Silver Standard Resources Inc. (100%)	30/11/14	Porky West	175 000	3.26	5.48	0.160	31,000
Golden Band Resources Ltd. (100%)	19/03/13	Roy Lloyd	91 888	5.00	10.78	0.315	31,843
Golden Band Resources Ltd. (100%)	30/04/12	Golden Heart	10 500	4.00	4.95	0.145	1,672
Golden Band Resources Ltd. (100%)	30/04/12	Komis	10 746	4.00	7.91	0.231	2,731
Golden Band Resources Ltd. (100%)	30/04/12	Memorial	90 900	1.00	2.49	0.073	7,272
Golden Band Resources Ltd. (100%)	30/04/12	Tower East	902 020	1.00	1.52	0.044	43,965
MAS Gold Corp. (51%) – Golden Band Resources Ltd. (49%)	01/06/16	Greywacke Lake (North zone)	59 130	5.00	7.42	0.217	14,100
Wescan Goldfields Inc. (100%)	04/02/10	Jojay	630 000	2.00	4.30	0.126	87,000
Comstock Metals Ltd. (100%)	27/09/16	Preview SW	5 697 100	0.50	1.48	0.043	270,800

Notes: Data in this table are intended to reflect NI 43-101–compliant standards, but do not all necessarily conform to the current legal definition of reserves and resources as defined by CIM.

¹ All values are approximate; includes production from the Seabee mine, Santoy mining complex and the Porky West and Santoy 7 bulk samples.

² Operation suspended in 2014; values are approximate; includes production from the Roy Lloyd, EP, and Komis mines.

³ Mineral Reserves are included in Mineral Resources.

The majority of recent exploration work was done by SSRM in and around the area of the Seabee operation. For 2018, plans for exploration included 45 000 m of underground drilling and 20 000 m of surface drilling, with the objective of increasing and converting Mineral Resources near the Santoy mine into Mineral Reserves. Underground drilling focused on several targets, including Santoy Gap, Santoy 8A zone and Santoy Gap hanging wall zone, whereas surface drilling focused on areas close to the Santoy mine area, including the CRJ and Santoy 3 zones. SSRM, along with option partner Eagle Plains Resources Ltd. (Eagle Plains), also undertook surface drilling on the Fisher property, located to the south of the Santoy mine along the southern extension of the Santoy shear zone. This followed surface-based exploration activity on the property in 2017, which generated several gold-in-soil anomalies and identification of visible gold mineralization in two areas.

Eagle Plains, with joint venture partner Roughrider Exploration Ltd., also commenced gold exploration on its Olson project, located 120 km east of La Ronge. Work at Olson consisted of soil geochemical sampling, rock sampling, prospecting and geological mapping. Taiga Gold Corp. (Taiga), a recent spinoff company of Eagle Plains, was active on its Orchid project in the Santoy mine area. Work conducted this year on the property included a 500-line-kilometre, high-resolution airborne (drone) magnetic survey, as well as geological mapping, prospecting and soil sampling. Taiga also conducted early-stage exploration work at its SAM project, located just west of Flin Flon, that included geological mapping, prospecting, rock sampling and soil geochemical surveys.

Gold exploration in the Flin Flon area was also undertaken by Searchlight Resources Inc. (Searchlight; formerly Canyon Copper Corp.) at its Bootleg Lake project, which includes the past-producing Rio and Newcor gold mines. Searchlight conducted a 97.7-line-kilometre drone aeromagnetic survey targeting priority areas on the property, followed by a drilling program comprising 1446 m in four holes. Searchlight has also entered into a consulting agreement to develop a plan to establish access to the historic Rio mine workings.

In the La Ronge area, Comstock Metals Ltd. completed metallurgical test work on sample materials from its Preview southwest deposit. Results of this testing indicated no significant metallurgical issues related to gold recovery, and better defined the potential processing options for the project.

6. BASE METALS

Trade tensions between China and the U.S., coupled with rising inventories and weaker consumption in China, have recently negatively affected the long-term recovery of base metal prices (Figure 4). The price of cobalt, for example, which had more than tripled by March 2018 from a low of US\$12 per pound (lb) to more than US\$40/lb, eased back to the same level it was a year ago.

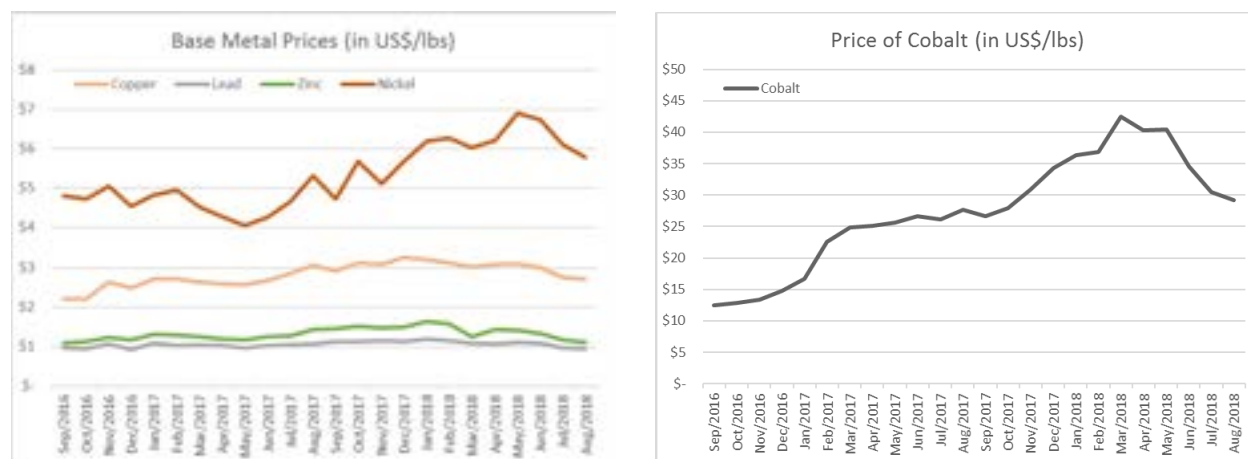


Figure 4 – Base metal and cobalt spot prices (chart data sources: www.kitcometals.com; www.uxc.com).

Despite this short term setback, most analysts suggest that the demand for nickel and cobalt will grow in the coming years as a result of the phasing out of the combustion engine and the transitioning to cleaner and greener electric vehicles. Demand for copper, zinc and lead is also forecast to increase or remain constant.

This optimism on the part of market analysts is reflected in anticipated base metal exploration expenditures for Saskatchewan, which are forecast to be just over \$12 M for 2018, up four-fold from last year's actual expenditures of \$3.5 M (Table 1). The two projects that have seen the most consistent exploration activity over recent years are Foran Mining Corporation's (Foran) McIlvenna Bay project and Murchison Minerals Ltd.'s (Murchison) Brabant-McKenzie project. A new project is CoEX Metals Corporation's (CoEX is a subsidiary company of UEX Corporation) West Bear Co-Ni prospect, located in the eastern Athabasca Basin. There is minor exploration activity on several other base metal exploration projects located throughout the province.

Foran's wholly-owned Zn-Cu McIlvenna Bay deposit, which is 60 km west-southwest of Flin Flon, is a volcanogenic massive sulfide deposit hosted by the *circa* 1880 to 1860 Ma Hanson Lake volcanic assemblage. The deposit, a 25 Mt resource, consists of several distinct zones of mineralization, including two massive to semi-massive sulfide lenses (Main Lens and Lens 3), as well as the underlying copper stockwork mineralization. The Main Lens is comprised of the zinc-rich Zone 2 and the copper-zinc-bearing Upper West Zone. In addition to zinc and copper, the deposit also contains appreciable amounts of silver and gold. The results of a preliminary economic assessment, released in 2014, were positive and had considered a 5000 t/day underground mine and concentrator with a 14-year mine life.

In the fall of 2017, Foran entered into a technical service agreement with Glencore Canada Corporation to advance the McIlvenna Bay deposit to the feasibility stage. Subsequent infill-drill programs saw the completion of 28 diamond-drill holes (15 215 m) in the winter, and the summer 2018 program was planned to include 33 holes (12 000 m). The second part of the drill program focused on the deeper portions of the deposit (down-plunge at depths ranging from 500 to 1000 vertical metres) and intersections were encountered with better than expected copper-gold and zinc values. In addition, the drilling also confirmed the presence of high-grade zinc and elevated precious metals grades 200 m above the currently defined resource. Some of the intersections from the winter drill program were reported to include 14.35% Zn over 4.48 m and 13.20% Zn over 5.26 m. Intersections of the copper stockwork zone included 16 m of continuous mineralization, consisting of 3.65% Cu and 2.26% Zn. In addition to resource definition, the drill programs also aimed to provide metallurgical and geotechnical information, which will be used in the McIlvenna Bay feasibility study. Exploration drilling also continued at Target A, 1.5 km southeast of McIlvenna Bay, where 11 m of 8 to 10% net-textured pyrrhotite were encountered at a downhole depth of 1385 m.

Murchison's wholly-owned Zn-Cu-Pb-Ag Brabant-McKenzie project is 175 km northeast of La Ronge. The deposit is in the Kiseeynew Domain, where it is hosted by a sequence of psammopelitic to pelitic migmatized metasedimentary rocks and intercalated amphibolite and calc-silicate rocks. The deposit is generally interpreted to have originated as a pelitic-mafic volcanogenic massive sulfide deposit that has experienced some remobilization during later metamorphism.

Murchison commenced a winter diamond-drilling program at the end of March 2018 on four drill targets (Brabant-McKenzie deposit, Anomaly C, Anomaly D, and TOM2) for a total of 12 431 m in 25 holes. In an effort to upgrade an existing resource estimate, the majority of the drillholes (19 holes totalling 9004 m) were focused on the Brabant-McKenzie deposit. Mineralization was intersected in all of the drillholes. In September of 2018, Murchison released an updated NI 43-101 Mineral Resource estimate, with Indicated Resources upgraded to 2.1 Mt grading 7.08% Zn, 0.69% Cu, 0.49% Pb and 39.6 g/t Ag (the previous assessment was for 1.5 Mt grading 7.46% Zn, 0.70% Cu) and Inferred Resources of 7.6 Mt grading 4.45% Zn, 0.57% Cu, 0.19% Pb and 18.4 g/t Ag (the previous assessment was for 4.5 Mt grading 5.99% Zn and 0.62% Cu).

As a result of the increase in cobalt prices, UEX Uranium announced in November of 2017 that it would re-evaluate the West Bear Co-Ni prospect, located immediately east of the West Bear uranium deposit in the eastern Athabasca Basin. As a result of the initial 2002-2005 UEX drill programs, cobalt-nickel mineralization (uranium free) at the West

Bear prospect was described to cover an area at least 175 m long, extending down-dip at least 75 m and ranging between 15 to 55 m in vertical depth. In January of 2018, CoEX Metals Corporation (CoEx) was formed as a wholly-owned subsidiary of UEX Corporation in order to commence a winter drill program to expand the known extents of the cobalt-nickel mineralization. The program saw the completion of 41 drillholes (totalling 4457 m) and one of the best intersections of the program included a composite assay grade of 2.00% Co and 1.26% Ni over a 10.5 m core length between 46.0 m and 56.5 m. In July of 2018, the company announced an Inferred Resource estimate for the West Bear Co-Ni deposit of 390 000 t grading 0.37% Co and 0.22% Ni, which equates to 3,172,000 pounds of cobalt and 1,928,000 pounds of nickel.

Durango Resources Inc. reported anomalous Ag, Co, Ni, Pb, Zn, Cu and Re assays from grab and channel samples collected on their Dianna Lake Ag-Cu-Co property, northwest of Uranium City. The company also completed approximately 7 km of magnetic/gradient and 1 km of VLF geophysics in the immediate area of the historical workings.

Coordinated press releases by Transition Metals and Forum Uranium Corp. announced that Forum has optioned a 100% interest in the Janice Lake sedimentary copper property, located east of Highrock Lake in the Wollaston Domain, in close proximity to several of Forum's core uranium exploration projects. An additional 15 331 hectares of claims were staked subsequently, to cover over 30 km of the prospective copper trend in the Janice Lake area, increasing the size of the Janice Lake property to more than 190 square kilometres. A short drilling program was started in September, and the best intersection was reported to be 19 m of 1% Cu.

Ironside Resources Inc. has entered into a letter of intent with Edge Geological Consulting to acquire the 13 248 ha Watts Lake Zn-(Pb)-(Cu) project, located 65 km northwest of La Ronge. The property was staked by Ross McElroy for Edge Geological Consulting.

Eagle Plains Resources Ltd. has acquired a block of claims (2470 ha) that covers the majority of the historic Knife Lake Cu-Zn-Au-Ag-Co volcanogenic massive sulfide deposit, centred 74 km north of Pelican Narrows.

7. RARE EARTH ELEMENTS

During the summer and fall of 2018, Appia Energy Corp. conducted an extensive exploration program that included overburden stripping and trenching at seven mineralized zones on their Alces Lake property in northern Saskatchewan. Total rare earth element oxide (TREO) concentrations exceeding 2 wt. % were obtained from 11 of the 22 channel sampling lines (1.00 to 5.13 m long intervals) collected in the Charles zone. TREO concentrations up to 14.90 wt. %, including 2.5 wt. % Nd_2O_3 and 310 ppm Dy_2O_3 , were obtained over 5.13 m. Channel samples collected from 20 of the 35 lines (1.11 to 4.75 m long intervals) cut at the Wilson zone assayed >4.6 wt. % TREO and up to 14.5 wt. % TREO, including 2.52 wt. % Nd_2O_3 and 330 ppm Dy_2O_3 .

Completion of 15 diamond-drill holes in zones Charles, Ivan and Wilson in August and September showed that the monazite-rich mineralization exposed at surface continues to depths of 5 to 10 m and appears to be open at depth. Three new monazite occurrences were discovered between 8 and 15 m below the surface as a result of drilling at the Charles and Ivan zones.

In early September, the company announced that it had expanded its claim holdings in the area by 12 816 hectares, to include the Oldman River monazite occurrence 6.6 km south-southwest of the Alces Lake monazite occurrences. Up to 20% monazite has been reported to occur locally in biotite-rich segregations associated with white pegmatite at this latter location.

8. DIAMONDS

In 2017, actual expenditures for diamond exploration projects were approximately \$6.1 M. Spending in 2018 is anticipated to be \$23.1 M and focused on the Star-Orion South project about 65 km east of Prince Albert, and on grassroots activity in the Deschambault Lake area about 290 km northeast of Prince Albert.

Over the past year, Shore Gold Inc. (Shore) changed its name to Star Diamond Corp. (Star Diamond). In early 2018, Star Diamond and Rio Tinto Exploration Canada Inc. (RTEC) conducted HQ drilling (10 holes) on the Star Kimberlite and geotechnical investigations on the overburden. A total of 1210 m of kimberlite were intersected in 10 holes. Star Diamond also completed a preliminary economic assessment (PEA) on the Star and Orion South kimberlites, estimating that 66 million carats of diamonds could be recovered in a surface mine over a 38-year project life (*i.e.*, 4 years of pre-stripping and 34 years of processing). The PEA model is based on developing two open pits (one each at the Star and Orion South kimberlites) with one processing plant. In September 2018, RTEC established an on-site 90-person camp, on-site communications and security facilities, and started upgrading forest access roads. RTEC also completed a Cutter Soil Mixing drill program, aimed at stabilizing the overburden, which consists of unconsolidated sand, and is poised to begin bulk sample drilling of a proposed 10 holes on the Star Kimberlite, using a Trench Cutter Sampling Rig, in the spring of 2019. The Trench Cutter Sampling Rig (see cover photo) is designed to sample large volumes of kimberlite (*i.e.*, up to 100 tonnes of sample for each 10 metres drilled) to depths of up to 250 m below the surface, and its cutter head is designed to excavate kimberlite fragments up to 80 mm in diameter. Before winterizing the Trench Cutter Sampling Rig, RTEC drilled one hole up to 37.1 m depth. In the fall of 2018, RTEC also began a brownfields exploration program, which included completion of an airborne survey collecting gravity gradiometer, magnetics and LiDAR over approximately 60 other kimberlite bodies adjacent to Star and Orion South, and commencement of an HQ drilling program, consisting of 11 holes and some 3300 m of drilling on five of these kimberlite bodies. In October 2018, the Saskatchewan Ministry of Environment approved Star Diamond's Star-Orion South project. Construction of the bulk sample processing plant is anticipated to start in late November 2018.

In other news, in the Deschambault Lake area, in late 2017, North Arrow Minerals Inc. (North Arrow) continued work on its Pikoo diamond project. The company collected till samples in order to better define some of its kimberlite indicator mineral trains. In the western Athabasca Basin, CanAlaska Uranium Ltd. (CanAlaska), in early 2018, acquired four new claim groups, with the intent of exploring magnetic features identified from airborne surveys. CanAlaska anticipates drilling up to 10 targets in the first quarter of 2019.

9. POTASH

POTASH PRODUCTION

In 2017, Saskatchewan solidified its role as the world's leading potash jurisdiction by producing a record 20.3 Mt potassium chloride (KCl). The past couple of years have brought significant changes to the Saskatchewan potash production landscape, from the opening of the province's first new potash mine in nearly 50 years, to the merger of two North American fertilizer giants, as well as other large-scale acquisitions. In the spring of 2017, K+S Potash Canada Inc. commissioned the Bethune solution mine, the province's first new potash operation in decades. The \$4.1 B operation was expected to reach 2 Mt production capacity by the end of 2017. At the start of 2018, Potash Corporation of Saskatchewan and Agrium Inc. finalized a business combination, billed as a merger of equals, which created Nutrien Ltd., one of the world's largest crop nutrient providers, worth an estimated US\$36 B, with 1,500 farm retail centres and nearly 20,000 employees in 14 countries. In January, The Mosaic Company (Mosaic) announced it had completed an acquisition of Vale Fertilizantes, effectively doubling the size of the company's global workforce. The acquisition included four fertilizer production facilities, five phosphate mines and a potash mine in Brazil. Mosaic also acquired control of the Kronau solution mining project southeast of Regina.

The record 20.3 Mt KCl produced in the province in 2017 had an estimated sales value of \$4.8 B, compared to 17.9 Mt KCl valued at \$4.2 B in 2016, and 18.2 Mt KCl valued at \$6.1 B in 2015. Sales volumes thus far in 2018 have remained robust and are expected to meet or exceed the record levels of 2017, while the average realized sales price for muriate of potash has shown continued modest growth.

Table 4 – Potash production by mine site (as reported in company public disclosures). All values reported in million metric tonnes.

Company	Mine Site	2013		2014		2015		2016		2017	
		Name Plate Capacity	Production	Name Plate Capacity	Production	Name Plate Capacity	Production	Name Plate Capacity	Production	Name Plate Capacity	Production
Nutrien	Lanigan	3.828	2.240	3.800	1.680	3.800	1.830	3.800	2.030	3.800	1.820
	Rocanville	3.044	1.990	3.000	2.490	3.000	2.480	3.000	2.720	6.500	4.860
	Allan	1.885	1.180	4.000	2.470	4.000	2.380	4.000	2.380	4.000	1.830
	Cory	1.361	1.490	3.000	1.180	3.000	1.510	3.000	1.240	3.000	0.990
	Patience Lake	1.033	0.270	0.300	0.300	0.300	0.260	0.300	0.230	0.300	0.300
	Vanscoy	2.050	1.700	2.050	1.058	2.050	1.967	3.024	2.200	3.024	2.400
Mosaic	Esterhazy	5.300	4.000	6.300	4.000	6.300	4.300	6.300	4.200	6.300	4.300
	Belle Plaine	2.800	2.100	2.800	2.200	2.800	2.100	2.800	2.400	3.900	2.700
	Colonsay	1.800	1.100	2.500	1.400	2.600	1.400	2.600	0.500	2.600	1.100
Total Sask Production		23.10	16.07	27.75	16.78	27.85	18.23	28.82	17.90	33.42	20.30

EXPLORATION AND DEVELOPMENT PROJECTS

It is estimated that just over \$1 B has been spent on potash exploration and development projects across Saskatchewan in the past decade. It's anticipated that approximately \$34 M will be spent in 2018 on a number of projects that range from exploration to pre-development.

In April, BHP Billiton Canada Inc. (BHP) announced that the shaft sinking at the Jansen site had reached the target Prairie Evaporite Formation, 924 m below ground level. BHP vice-president of Potash Operations, Giles Hellyer, noted in an August 2018 interview with *The Northern Miner* that although the company remains confident in the long-term fundamentals of the potash market, there was no solid timeline for a board decision on the massive underground mining project. He also noted the company may be receptive to taking on a partner to mitigate the financial risk of the project. BHP has already invested nearly US\$4 B into the project, working on shafts and associated infrastructure. Should the mine proceed in its currently planned form, it would represent one of the single largest corporate investments in the province's history.

Yancoal Canada Resources Co. Ltd. (Yancoal) continues to move forward with its Southey solution mining project, about 60 km north of Regina. Yancoal has received provincial approval of its Environmental Impact Assessment and completed a full feasibility study. The company is now awaiting a final investment decision by Yancoal's Board of Directors on the 2.8 Mt per year solution mine project.

Western Potash Corp. (Western) announced in May that its board had approved a three-phase development plan for the company's Milestone potash solution mining project. The initial phase of the pilot operation would be capable of producing 146 000 tonnes of granular KCl product annually. The company plans to utilize a selective horizontal solution mining approach, with crystal pond recovery techniques. If the pilot operation is successful, phases II and III could be implemented, adding an additional 1.4 Mt of capacity each. Western has a signed letter of intent with a Chinese policy bank for a \$60 M credit to finance phase I, which the company believes will be completed by early 2019.

CanPacific Potash (CanPacific), a Saskatoon-based joint venture between North Atlantic Potash Inc. (a subsidiary of JSC Acron) and Rio Tinto Potash Management Inc. (a subsidiary of Rio Tinto plc.), has continued to advance its Albany solution mining project southeast of Regina. CanPacific has completed exploration work, submitted an Environmental Impact Statement to the Saskatchewan Ministry of Environment, and is engaging with local stakeholders and members of the public. The company is proposing to build a 3 Mt per year solution mine near the town of Sedley, with construction slated to start in 2020 and initial production anticipated in 2024.

Encanto Potash Corp. (Encanto) signed an agreement with GEM Investments America, LLC and GEM Yield LLC SCS, which could provide \$100 M in funding over the next three years. Encanto is working in partnership with the Muskowekwan First Nation in an attempt to build the province's first mine entirely on treaty land. The partners are exploring options for funding via Indigenous Services Canada and other federal avenues.

Other companies such as Karnalyte Resources Inc. (Wynyard project), Gensource Potash Corp. (Vanguard project) and Canada Golden Fortune Potash Corp. (Broadview project) continue to evaluate the feasibility of their projects while exploring options for financing.

10. INDUSTRIAL MINERALS

Although exploration for industrial mineral deposit types in 2018 was quiet, there was significant production. There are four current salt operations, three as by-product from potash production and one primary producer. K+S Windsor Salt Ltd. produces by-product salt at Belle Plaine in south-central Saskatchewan. Compass Minerals Canada Corp. mines primary salt at the Unity solution operation in west-central Saskatchewan. NSC Minerals produces by-product salt at Rocanville and Vanscoy. ERCO Worldwide processes value-added chlorine-alkali chemicals from salt at its Saskatoon operation.

Saskatchewan Mining and Minerals Inc.'s long-standing operation at Chaplin in south-central Saskatchewan remains the only primary sodium sulfate producer in the province. Sodium sulfate is used in a variety of products, including detergents, textiles and carpet deodorizers. In addition, Compass Minerals Wynyard Inc. produces value-added potassium sulfate, which is mainly used in specialty fertilizers, at a plant near Wynyard in east-central Saskatchewan.

Westmoreland Coal Company (Westmoreland) acquired the Boundary Dam, Bienfait, and Poplar River coal mines in southern Saskatchewan in 2014 from Prairie Mines & Royalty Ltd. Since acquiring the Saskatchewan operations, Westmoreland has signed new, long-term supply agreements with Crown Corporation SaskPower and announced it was amalgamating the Bienfait and Boundary Dam mines of southeastern Saskatchewan into one operation, named the Estevan mine.

Saskatchewan also produced a number of industrial mineral commodities that have varied uses. Canadian Clay Products Inc. excavates and processes bentonite at an operation near Wilcox, about 41 km south of Regina. Colored Shale Products Inc. mines clinker, a stony product formed from naturally coal-fired clay, from quarries near Willow Bunch, roughly 190 km southwest of Regina, on an 'as-needed' basis for use as landscaping material. Plainsman Clays Ltd. excavates kaolin clay from two quarries located near the hamlet of Ravenscrag in the Frenchman River valley in the far southwest corner of the province. The kaolin is excavated in the summer and is mainly sold to the stoneware and pottery markets. Cindercrete Products Ltd. operates a clay quarry just northeast of Saskatoon. Premier Tech Horticulture Ltd. excavates horticultural peat from bogs in the Carrot River region of east-central Saskatchewan and processes it at a plant near the town. They are developing the new Smokey Ridge Bog that lies 21 km northeast of the town of Hudson Bay. Two other companies, Berger Peat Moss Ltd. and Sunterra Horticulture Inc., are also actively exploring for horticultural peat in the central part of the province. Wapa Bay Resources produces leonardite on a campaign basis from a small quarry near Wapawekka Lake in northern Saskatchewan. Leonardite is used as an organic soil additive and fertilizer. Weil Group Resources, LLC opened a helium processing plant near Mankota in southwest Saskatchewan in August 2016, with planned production of 40 million cubic feet (cu. ft.) of helium per year. Since 2013, North American Helium has acquired helium rights to 1.2 million acres (485 600 hectares) in southwest Saskatchewan. At their Battle Creek project in the extreme southwest corner of the province, they drilled three successful holes in the first six months of the year in previously untested targets. To date they have raised \$35 M and have plans to begin to build a production plant in the fourth quarter of this year. The plant will produce at least 50 million cu. ft. of helium per year after coming on line in the first quarter of 2020.

11. LAND USE ISSUES

The Ministry of Energy and Resources (ER) participates in a variety of land use processes in the province. Principal among these at present are the species-at-risk program and the Representative Areas Network (RAN) program.

The Federal Government, through Environment and Climate Change Canada, directs the species-at-risk processes through the *Species-At-Risk Act*. The Ministry of Environment (ENV) is the lead ministry for the province. The development of range plans for woodland caribou in the central (Boreal Plain) and northern (Boreal Shield) parts of the province are the principal activities at present. The goal of the range plans is to develop approaches that will ensure the long-term sustainability, and hopefully see an improvement, in the caribou populations. A draft range plan for the Boreal Plain Central area was released in October 2017, and the final plan is nearing completion. The development of the Boreal Plain West draft range plan is nearing completion and is expected to be released for public comment early in 2019.

The RAN program is the protected areas program for the province, which is led by the Ministry of Environment. After a few years of limited activity there has recently been a renewed emphasis on completing the goal of 12% representation of the lands and waters of the province. Current representation is about 8%, which includes provincial and federal parks, ecological reserves, and other highly managed lands. There are 11 ecoregions in the province that require representation. Shortfalls occur in certain ecoregions in the south and in much of the north. ENV is moving ahead with designations on two sites in the Nisbet Provincial Forest near Prince Albert that had been approved through a land-use planning process and an industry review. A number of proposed sites, mainly in the north, have been through ER-led industry review and approval processes and have had long-standing Crown Reserves put in place. ENV-led public consultations will be planned for some of these site proposals.

12. REFERENCE

Saskatchewan Geological Survey (2003): Geology, and mineral and petroleum resources of Saskatchewan; Saskatchewan Industry and Resources, Miscellaneous Report 2003-7, 173p.

RESOURCE MAP OF SASKATCHEWAN

Exploration and Development Highlights 2018 Edition

