Mineral Overview of the PNWER Region: 
A secure source of Critical Minerals

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2018 Value of PNWER Mineral Production
$27.6 B

- 2018 Mineral production from the PNWER region was $27.6 B (metal & industrial minerals n/i US coal & construction materials s&g)
- PNWER = $6.8 B (8% of total USA mineral production – n/i coal)
- PNWER = $20.8 B (45% of total Canadian mineral production)
PNWER Mineral Markets & Trade

- U.S.A total primary mineral exports in 2018 est US $20.7 B (including $8.6 B met coal)
- Canada total primary mineral exports in 2017 C$97.5 B
- Key exports included aluminum, nickel, copper, gold, silver, uranium, met and thermal coal, potash, zinc, diamonds and iron ore
- Key “non-domestic” markets – China, India, South Korea, Japan, EU
- Rail transport and port facilities are key to mining success in PNWER Region.
  - Mining accounts for >50% of rail traffic revenues in Canada
  - PNWER region has strategic port facilities to Asia-Pacific gateway
- Key Mineral Port Facilities – Oregon, Washington, British Columbia, Alaska
Active Mines in the PNWER Region

- Potash
- Coal
- Gold
- Uranium
- Diamond
- Oil
- Misc (salts, etc)
<table>
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<tr>
<th>PNWER Region</th>
<th>Mineral Sales</th>
<th># Mines</th>
<th>Key Commodities</th>
<th>Comment</th>
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</thead>
</table>
| AK           | $3.44 B      | 6       | Gold, lead, zinc, silver, coal, sand and gravel (construction), | • Ranked 7 out of US  
               |              |         |                  | • 4.15% US Mineral Value  
               |              |         |                  | • Port facilities |
| AB           | $2.0 B       | 8       | coal            | • Coal thermal and met  
               |              |         |                  | • Ranked 7th in Canada |
| BC           | $9.7 B       | 20 (9 coal; 9 metal; 2 industrial) | Coal (met and thermal), Cu-Au-Ag-Mo, Pb, Zn | • Port facilities (potash, coal)  
               |              |         |                  | • Ranked #3 in Canada (value of sales)  
               |              |         |                  | • Largest copper and met coal producers in Canada |
| ID           | $0.208 B     | 2 metal | Silver, Lead, lime, phosphate rock, sand and gravel (construction), stone (crushed). | • Ranked 35th state in US  
               |              |         |                  | • 0.25% of US Mineral Value  
               |              |         |                  | • Diversity of mineral potential |
| MT           | $1.13 B      | 15 (6 coal) | Coal, Cement (portland), copper, palladium metal, platinum metal, sand and gravel (construction) | • Ranked 24th state in US  
               |              |         |                  | • 1.37% of US Mineral Value  
               |              |         |                  | • PGM, Diversity of minerals |
| NWT          | $2.1 B       | 3       | Diamonds        | • Also Ni-Co, REE deposits; past Au, Ag, Cu  
               |              |         |                  | • Ranked #6 in Canada (value of sales) |
| OR           | $0.53 B      |         | Cement (portland), diatomite, perlite (crude), sand and gravel (construction), stone (crushed). | • Ranked 36th state in US  
               |              |         |                  | • 0.64% of US Mineral Value  
               |              |         |                  | • Port facilities (potash, fly ash, coal) |
| SK           | $6.7 B       | 27      | Potash, uranium, coal, gold, sodium sulphate, salt | #1 world – potash  
               |              |         |                  | #2 world – uranium  
               |              |         |                  | 4th overall in Canada |
| WA           | $1.09 B      | <5      | zinc/germanium & lead, Cement (portland), diatomite, sand & gravel (construction), stone (crushed), | • Ranked 25th state in US  
               |              |         |                  | • 1.33% of US Mineral Value  
               |              |         |                  | • Port facilities (coal, potash) |
| YK           | $0.22 B      | 1 + >100 placer | Cu, Ag, Au | • Au dominant  
               |              |         |                  | • Ranked 11th in Canada |
2017 Major Metal Operations in the USA

MAJOR METALS OPERATIONS IN THE UNITED STATES

Source: NMA map compiled from USGS operations data
2017 Economic Impacts of Mining in US PNWER States (Direct, Indirect, Induced)

- **81,513 Jobs**
- **$13.1 B GDP**

Source: National Mining Association website
Canadian PNWER Region accounts for $20.7 B (44%) value of mineral production

**Yukon:** $217 M (Au, Ag, Au); #11

**NWT:** $2.1 B (diamonds); #6

**BC:** $9.7 B (met. coal, Au, Cu); #3

**AB:** $2.0 (thermal & met. coal); #7

**SK:** $6.7 B (potash, U, Au, thermal coal, salt, sodium sulphate); #4

Source: NRCan website
## 2018 Fraser Institute ranking of PNWER Jurisdictions

Out of 83 international jurisdictions in Canada, USA, Australia, Oceania, Africa, Argentina, Latin America, Asia, Europe

<table>
<thead>
<tr>
<th>PNWER Jurisdiction</th>
<th>Policy Perception</th>
<th>Mineral Potential</th>
<th>Investment Attractiveness</th>
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<tbody>
<tr>
<td>Alberta</td>
<td>14</td>
<td>74</td>
<td>51</td>
</tr>
<tr>
<td>Yukon</td>
<td>24</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>*1</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Alaska</td>
<td>26</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Northwest Territories</td>
<td>42</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>British Columbia</td>
<td>44</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td>Idaho</td>
<td>13</td>
<td>21</td>
<td>16</td>
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<tr>
<td>Montana</td>
<td>35</td>
<td>28</td>
<td>31</td>
</tr>
<tr>
<td>Washington</td>
<td>40</td>
<td>78</td>
<td>71</td>
</tr>
<tr>
<td>Oregon</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
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</tbody>
</table>
British Columbia

- $9.7 B - 2018 value of mineral production
- 3rd in Canada
- Met Coal ($>5B); metallics ($3.76 B) 20.6% of Canadian production
- 20 coal and metal mines; 2 industrial mineral mining operations (coal, Cu, Au, Ag, Zn, Mo, Pb, silica)
- $1.5 B in capital expenditures invested by companies in 2017
- $859 M in revenues to Governments in 2017 (n/i Corporate Taxes)
- >10,000 direct employees in 2017
- Key mineral port facilities (Vancouver, Ridley, Neptune, Westshore – Met and therm coal, potash)
- $290.9 M mineral exploration expenditures forecast in 2018
Alberta

- $2 B - 2018 value of mineral production
- 4.3% share of Canadian production
- 7th in Canada
- 6 thermal and 2 met coal mining operations
- $39.7 M in mineral exploration in 2018
- landlocked
- $6.7 B - 2018 value of mineral production
- 14.3% share of Canadian production
- #4 in Canada
- #1 in world for potash (33%) *
- #2 in world for uranium (17%) *
- 27 mining operations (potash, uranium, coal, gold, salt, clay, sodium sulphate);
- Deposits of graphite, helium, chromite, PGE, REE*
- $165.1 M in mineral exploration in 2018
- landlocked
SASKATCHEWAN - CANADIAN & GLOBAL LEADER IN MINING - 2018

#1 Canadian Mineral Investment Attraction
#3 Global

#1 Potash Producer Global (32%)

#2 Uranium Producer Global (13%)

#4 Value of Mineral Product $6.7B (ON, QB, BC)

#1 Industrial Employer of Indigenous people

#4 Canadian Expln $247 (ON, QB, BC)

Leading Client of Rail and Vessel Transport (Value & Volume)
SK NATURAL ADVANTAGE

• >23 SK mine facilities

• Geology is SK Advantage – world class deposits
  ✓ Potash
  ✓ Uranium
  ✓ Diamonds
  Potential for REE, Chromite

• Skilled & Trained Labour Force

• Strong supply chain

• Government Policy (sometimes)
SK MINING BY THE NUMBERS

Employment & Payroll

12,400
SK mining operations directly employ more than 12,400 individuals.

21%
21% of SK mine employees are Indigenous.

$1.4B
SK mining operations paid a total of $1.4 billion to employees in 2017.

= > 30,000 employees
& >$2.5 B payroll

For every direct job in the SK industry, there are at least two jobs in the mining supply and service sector.
SK MINING BY THE NUMBERS

Business Support – SK Procurement

In 2017 SK mining companies purchased $2.9B (58%) of their total goods and services from Saskatchewan suppliers.

In 2017 Saskatchewan mining operations purchased $649 million of goods and services from Indigenous-owned businesses.

= $5 B Total
SK MINING BY THE NUMBERS

Contributions to Governments & Communities (annual)

In 2017 SK mining companies contributed $1.8 billion in provincial, federal and municipal taxes, creating government revenue for health care, education and infrastructure development.

In 2018 SK mining operations made over $22 million in social and community contributions.

$1.8 B  >$22 M
Yukon

- $0.217 B - 2018 value of mineral production
- 0.5% Canadian production
- Metallics (Au)
- 1 mining operations (Zn, Pb, Cu, Ag, Au) + >100 placer gold operations
- $172.3 M in mineral exploration in 2018
- Port access
Northwest Territories

- $2.11 B - 2018 value of mineral production
- 4.5% of Canadian production
- 6th in Canada
- 3 diamond mines
- $81.3 M in mineral exploration in 2018
- Landlocked
Alaska

- $>3.4$ B - 2018 value of nonfuel mineral production
- $4.15\%$ U.S total;
- $7^{th}$ in U.S.A
- 6 Mines - Gold, zinc, silver, lead, sand and gravel, coal principal minerals
- 5 producing metal mines, including one of the world’s largest Zn mine (Red Dog), 1 coal mine
- $135$ Min mineral exploration in 2018
- $170$ M on mine construction and capital investment in 2018
- 6 Advanced exploration including REE & Graphite
- Key mineral port facility (Zn, Pb, coal, precious metals) – Skagway, Delong Mountain Terminal, Seward
- 9200 direct and indirect mining jobs in 2018
- $715$ M direct and indirect payroll in 2018
- $183$ M in state & local government revenue via rents, royalties, fees and taxes in 2018
- $358$ M in payment to Alaska Native Corporations in 2018
Washington

- $1.09 B - 2018 value of nonfuel mineral production
- 25th in U. S. A.
- Zinc, germanium, lead, s & g, crushed stone, portland cement, diatomite
- <5 mines
- Key port facilities - coal, potash (Port of Vancouver, Kalama, Longview, Seattle, Tacoma)
Oregon

- $0.53 B - 2018 value of mineral production
- 0.64% of U.S. total
- 36th in U.S.A
- Crushed stone, s & g, portland cement, diatomite, perlite, pumice, zeolites
- 0 metal mines
- Key mineral port facilities – Port of Portland (potash, fly ash); Coos Bay, Morrow (coal?);
Idaho

- $0.21 B - 2018 value of mineral production
- 0.25% of U.S. total
- 35th in U.S.A
- Silver, molybdenum, phosphate, s & g, gemstones, gold, crushed and dimension stone, zeolites
- 2 metal mines, 1 phosphate (?)
- Landlocked
Montana

- $1.13 B - 2018 value of nonfuel and coal mineral production
- 1.37% U. S. total (non-fuel)
- 24th in U.S. A (non-fuel)
- Coal, copper, palladium, molybdenum, platinum, gold, talc, silver, gemstone, dimension stone, iodine, sulfur, tungsten
- 15 mines (6 coal)
- Landlocked
### Listing of “Critical Minerals”

- US is heavily reliant on imports of certain mineral commodities vital to the Nation’s security and economic prosperity.
- Designated as “Critical” based on the measure of a country’s concentration of production and the USGS net import reliance metric.
- Published as Executive Order 13817, February 16, 2018, by the Secretary of the Interior in the **Federal Register** (83 FR 7065).
- “Critical minerals” list consists of **35** minerals or mineral matter groups.

<table>
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<tbody>
<tr>
<td>Aluminum (bauxite), antimony, arsenic, barite, beryllium, bismuth, cesium, chromium, cobalt, fluorspar, gallium, germanium, graphite (natural), hafnium, helium, indium, lithium, magnesium, manganese, niobium, platinum group metals, potash, the rare earth elements group, rhenium, rubidium, scandium, strontium, tantalum, tellurium, tin, titanium, tungsten, uranium, vanadium, and zirconium.</td>
</tr>
</tbody>
</table>

Source: Dept. of Interior, Office of the Secretary USA
Critical Minerals in the PNWER Region

- Antimony
- Barite
- Beryllium
- Cobalt
- Fluorite
- Gallium
- Germanium
- Graphite
- Indium
- Lithium
- Manganese
- Niobium and Tantalum
- Platinum-Group Elements
- Rare-Earth Elements
- Rhenium
- Tellurium
- Tin
- Titanium
- Vanadium
- Zirconium and Hafnium
- Multiple critical minerals

Potash and Uranium markers are also shown.
Conclusions

- Mining and mining-related industries (ports, rail) are a vital part of the economy of all jurisdictions within the PNWER Region.
- The PNWER Region is host to a number of “critical mineral” mines, deposits and showings.
- The PNWER jurisdictions are well-positioned to provide input into the US-Canada joint action plan on critical minerals, including ensuring future competitiveness of the region’s minerals industries, and in developing secure and reliable supply chains.
Key References 2018
National/Federal/State Province/Territory

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