Alaska Mineral Industry – 2015

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• All information is preliminary, incomplete, and subject to change:
  • Production data projected from Q3 reports
  • Exploration reports are based on press releases, websites, presentations, rumors, & black magic
• Forward Looking Statements are par for the course
• Minimal editorial or peer review of the content – may not meet editorial DGGS standards
2015 Alaska Minerals Overview

- Slightly lower metal production + falling prices
- Five major metal mines, one coal mine, ~ 150 small placer mines
- One coal mine
- Advanced exploration projects with diverse deposit types
- Exploration drought reflecting world-wide trends
2015 Alaska Production Forecast

- Production (metals)
  - 953,000 ounces Gold
    - 1% increase
  - 14,981,000 ounces Silver
    - 3% decrease
  - 147,000 tons Lead
    - 5% decrease
  - 679,200 tons Zinc
    - 5% decrease

- First Market Value
  $2.76 B U.S.
  - 10.7% decrease from 2014

$2.76 Billion First Market Value

Photo courtesy of Fairbanks Gold Mining, Inc.
2014 Alaska Development

Chuitna Coal – Moving forward on permits, water issues, Draft EIS expected 2015

Donlin Gold – Draft EIS released for public comment
2015 Alaska Exploration

- 7 Major Projects
- 6 Advanced Projects
- 14 drilling projects (down from 15 in 2014)
- 48 Hard Rock Exploration Permits (down from 54 in 2014)
- 1 Advanced Coal Project
- Estimated 17% decrease from 2014

$96.2 million – 2014
State-Owned Lands & Mining Claims

- Approximately **100 million acres of state lands** – Conveyed and Tentatively Approved Mineral & Surface Estate
- **36,379 Mining claims** – 2.9 million acres (excluding claims on selected lands)
DGGS & USGS Airborne Geophysical Surveys

Modern Airborne Geophysical Data

DGGS Helicopter EM and Mag (400 m line spacing)
- State Funded
- Federally Funded

DGGS Fixed-wing Mag
- Federally Funded
  - 500 m line spacing
- State Funded
  - 800 m line spacing

USGS Fixed-wing Mag
- Federally Funded
  - 800 m line spacing
  - 1600 m line spacing

New data 2015
DGGS & USGS Airborne Geophysical Surveys

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USGS Fixed-wing Mag
- Federally Funded 800 m line spacing
- Federally Funded 1600 m line spacing

29,000 sq miles = 9/10 of Ireland

New data 2015
Mineral Resource Information:

- **Geologic Map Index**: Published Geologic Maps
- **Alaska Geologic Data Index**: Unpublished geologic and mineral company data
- **Airborne GeophysWeb**: Publically available airborne geophysical surveys
- **WebGeochem**: Published geochemical data (coming soon) contains 59,000 samples.
- **Geologic Materials Center**: New facility, >280,000 feet of mineral core, 100’s prospects, online catalog
2015 Alaska Roads to Resources Projects

- **Ambler Mining District Access**
- **Tanana Road Access**
- **West Susitna Surface Access**
- **Reconnaissance Study**
- **Dalton Traffic Forecast Study**

**Projects**
- Polymetallic
- Gold
- Coal
- Porphyry (Cu-Au-Mo)
- Nickel, PGE
- Rare-Earth Elements
- Graphite
- Iron, PGE
- Trans-Border Transportation Task Force
- Gravina Mill Access Road

**Mines**

Road widening using B-70s to dump material, Dalton Highway 274-289, August 2011. Photo by Raquel Ream, Alaska DOT&PF

Taylor Highway to Eagle. Photo by Joanna Reed, Alaska DOT&PF

http://dot.alaska.gov/roadstoresources/index.shtml
Alaska Industrial Development and Export Authority

Delong Mountain Transportation System expansion study

Ambler Mining District access road

Evaluating LNG as a fuel source for future mining operations.

Gravina Island industrial complex study

Camp facilities financing evaluation for the Bokan Mountain project.

Mines
- Polymetallic
- Gold
- Coal
- Porphyry (Cu-Au-Mo)
- Nickel, PGE
- Rare-Earth Elements
- Graphite
- Iron, PGE

Projects

$6.5 million expansion to the Skagway Ore Terminal

http://www.aidea.org

http://www.aidea.org/Portals/0/AIDEA%20Documents/AIDEA_DMTS.pdf

http://www.aidea.org/Programs/ProjectDevelopment/SkagwayOreTerminal.aspx

http://www.aidea.org
The Large Mine Permitting Team is responsible for coordinating the permitting activities for large mine projects in the state, in accordance with state law.

http://dnr.alaska.gov/mlw/mining/largemine/
Permits and licenses are required by as many as 12 State and Federal agencies to conduct exploration or mining activities in the State of Alaska. To assist the mining industry navigate this complex permitting process, the State designed the Application for Permits to Mine in Alaska (APMA).

http://dnr.alaska.gov/mlw/mining/placer.cfm

APMA Permits 2015:
- 618 permits received
- 48 Hardrock Exploration
- 402 Placer Mines
- 168 Suction Dredge
  - 126 for Nome!
2015 Alaska Gold Production – 953,000 ounces

Pogo (vein):
- ~340,000 oz Au – steady
- 3 millionth ounce 2nd qtr
- 1.8 M oz Au Reserve (Dec 2014)
- 2.7 M oz Au Resource

http://www.smm.co.jp/E/csr/environment/pogo/

Kensington (vein):
- ~ 121,000 oz Au – 2 % increase
- 630 K oz Au Reserve (Dec 2014)
- 953 K oz Au Resource
- SAG pebble reject XRT sorting pilot plant

http://www.coeur.com

Fort Knox (intrusion host):
- ~ 404,000 oz Au – 3% increase
- 2.4 M oz Reserve (Dec 2014)
- 1.6 M oz Resource

http://www.kinross.com

Nixon Fork (skarn):
- In caretaker status since 2013

http://dnr.alaska.gov/mlw/mining/largemine/nixonfork/

Statewide Placer Gold:
- ~ 30,000 oz Au from
- ≤ 150 operations (decrease)
2015 Gold Exploration / Development – Southwest

Donlin (intrusion related):
- Draft EIS Public Comment period through April
- 33.8 M oz Au Reserve
- 1.1 M ounce per year projected production
- NOVAGOLD & Barrick Gold partnership

http://www.donlingold.com

Terra (intrusion related):
- Resource: 168,000 oz Au & 318,000 oz Ag
- Continued bulk sample program with onsite mill

http://westmountaingold.com

Credit WestMountain Gold LTD


Credit WestMountain Gold LTD

CREATING Value Through Discovery

http://westmountaingold.com
**2015 Gold Exploration – Western Region**

**Fairhaven** (orogenic gold & polymetallic):
- Helicopter support, 6 holes, 3100 feet.
- Quartz vein associated mineralization
- 3 holes with >10 gpt Au intervals
- NANA Regional Corp – AMA Convention 2015

![Map of Alaska showing Fairhaven area](image-url)
2015 Gold Exploration – Eastern Interior

Fort Knox (intrusion host):
- Resource expansion to west
- Drilling ongoing year-round
- Replacing Reserves & Resources

http://www.kinross.com

Photo courtesy of Fairbanks Gold Mining, Inc.
Pogo (vein):
- $15 million budget
- North zone drifting
- North zone definition
- East Deep definition
- South Pogo & 4021 surface exploration

http://www.smm.co.jp/E/csr/environment/pogo/
2015 Gold Exploration Southeast Alaska

Kensington (orogenic gold vein):
- Definition of richer parts of Kensington with some intercepts > 10 feet of > 1 oz/ton gold
- Resource expansion in higher grade Jualin inferred resource 289,000 tons @ 0.619 oz/ton
- Commenced Jualin decline in 2nd qtr, 750 feet of advance by 3rd qtr.
- Expect underground Jualin drilling to commence in 2016

http://www.coeur.com

Kensington
Jualin

Legend
- Roads
- Claims Boundary
- Shear Zones
- Mineralized Structures
- Important Projects

http://www.coeur.com/investor-relations/presentations/2014/10/23/silver-summit#.VFKgzcl5Al8
2015 Gold Exploration Alaska Peninsula

Unga (epithermal Au-Ag):
- ≥100,000 oz Au historic production
- 700,000 oz Au (unclassified resource) Ag:Au 4:1 (ARDF PM064,079)
- 4900-foot, 8-hole drill program

http://www.redstargold.com


http://www.redstargold.com/i/maps/Apilo-Sitka.jpg

Livengood (intrusion related):
- 2013 Feasibility Study
  - $1,500/oz Au basis
  - 10 M oz Au Reserve (P&P)
    - @ 0.02 oz/ton
  - $1,474/oz Au cost
  - 20 M oz Au Total Resource

Golden Summit (intrusion related):
- NI 43-101 Resource: 6.52 M oz Au (total) @ 0.018 oz/ton
- 0.59 M oz in Oxide zone
- PEA Commenced March 2014

Photo credit: http://www.ithmines.com/resources/presentations/ITH_Presentation.pdf
Credit Shane Lasley

http://www.ithmines.com
http://www.freegoldventures.com
2015 Alaska Zinc, Lead & Silver Production

Red Dog – SedEx Zn-Pb-Ag:
- 615,000 tonnes Zn (Q1-3)  2% decrease
- 96,700 tonnes Pb (Q1-3)  4% increase
- Total Reserve: 52.8 M tonnes @ 16.5% Zn, 4.3% Pb, 80.0 g/T Ag (Dec. 2014)
- 63% of payroll to NANA shareholders

Greens Creek – VMS Ag-Zn-Pb-Au:
- $ 3.75/ oz Ag cash cost
- 5.88 M oz Ag (Q1-3) 10% decrease
- 43.4 K oz Au (Q1-3) steady
- 2233 tons per day
- P&P Reserve 7.7 M tons @ 12.2 oz/t Ag, 0.1 oz/ton Au, 8.3 % Zn, 3.1 % Pb (Dec 2014)

Credit: Teck Resources Limited / www.teck.com
Credit: Hecla Mining Company / http://www.hecla-mining.com

Photo provided by Teck Alaska Inc.

Credit : Teck Resources Limited / www.teck.com

Credit: Hecla Mining Company
2014 Polymetallic Exploration – Arctic Alaska

Arctic VMS – Cu-Zn-Pb-Ag-Au:  
- Open Pit PEA: 125 M lbs Cu, 152 M lbs Zn, 24 M lbs Pb, 2.5 M oz Ag & 29,000 oz Au

Red Dog – Zn-Pb-Ag:  
- Mine site exploration  
- District focus on Paalaq, Anarraaq

www.teck.com

Lik – Zn-Pb-Ag

www.teck.com

Bornite – Cu-(Ag-Co):  
- March 2014 NI 43-101 Resource:  
  - 334 M lbs Cu In-Pit Indicated  
  - 109.6 M lbs Cu In-Pit Inferred  
  - 5.6 B lbs Cu Below-Pit Inferred

www.novacopper.com

Upper Kobuk Mineral Project Prospects

Major Deposit  
Historical Resource Estimate  
Other Prospects
Ambient Sequence  
Alterite Sequence

Operating Mine  
Exploration Project  
Prospect

www.novacopper.com

www.teck.com
Arctic VMS 2015 10,200-foot drill program:
• 12 infill holes to upgrade inferred to indicated resource.
• 2 geotechnical holes

2013 PEA: 12 year open pit, 210 M lbs Cu Eq annually
• Indicated & Inferred resource: 27.2 M tonnes @ 3.25% Cu, 4.37% Zn, 0.74% Pb, 51.8 ppm Ag, 0.70 ppm Au
2015 Polymetallic Exploration – South-central

Caribou Dome
sediment-hosted – Cu(-Ag-Co)
• Re-sampling historic core
• IP Geophysical survey
• 28-hole, 14,000-foot exploration drill program

http://www.coventryres.com/caribou-dome-copper-project
2015

Polymetallic Exploration – Southeast

Palmer – Zn-Cu-Pb-Au-Ag

- Dowa Metals JV – JOGMEC funding – expanded land
- Expanded Inferred Resource: 8.96 M tons @ 1.4% Cu, 1.3% Pb, 5.3% Zn, 0.039 oz/t Au, 0.59 oz/t Ag
- 25,400-foot 10 hole drill program
- Down-dip extensions of southwall, new prospects

http://constantinemetals.com/projects/palmer
2015 Polymetallic Exploration – Southeast

Greens Creek VMS-Sedex – Ag-Zn-Pb-Au
- Budgeted 170,000 feet underground drilling (infill and step-out) for five separate zones
- Budgeted 10,000 feet surface drilling @ Killer Creek
- 30 miles unexplored mine contact

http://www.hecla-mining.com/
**2015 Porphyry Cu-Au-Mo Resources**

**Pebble:**
- 2014 resource (M&I+I):
  - 12 B tons ore
  - 81.8 B lbs Cu,
  - 5.8 B lbs Mo &
  - 107.9 M oz Au

**Pyramid:**
- Inferred resource:
  - 1,338 M lbs Cu
  - 74 M lbs Mo &
  - 488,000 oz Au

**Whistler:**
- Indicated & Inferred resource:
  - 769 M lbs Cu
  - 3.13 M oz Au
  - 13.2 M oz Ag

**Tetlin – Skarn (porphyry related):**
- Peak Zone Resource: 9.8 M tonnes containing 1.1 M oz Au eq (Ind+Inf)

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http://www.fullmetalminerals.com/properties/pyramid

http://www.pebblepartnership.com/geology.html#section-deposit


http://brazilresources.com/projects/whistler/

http://www.fullmetalminerals.com/properties/pyramid

http://www.fullmetalminerals.com/properties/pyramid

http://www.fullmetalminerals.com/properties/pyramid

0  250  500
Kilometers

**Exploration Project Prospect**

Credit: http://www.fullmetalminerals.com/
2015 Porphyry Cu-Au-Mo Exploration

Tetlin – Skarn (porphyry related):
- $8.8 M two phase program
- 45,264 feet – 61 holes
- Intercepts >5 m w/ >15 g/T Au +Ag +Cu

http://www.contangoore.com -- North of 60 Mining News

Shorty Creek:
- 20 historic holes
- 9800-foot drill program
- 91.4 m of 0.71 % Cu eq.

www.freegoldventures.com

http://www.freegoldventures.com/i/maps/111615FVL_MAP1.jpg

http://www.contangoore.com
2015 Porphyry Cu-Au-Mo Exploration

**Alaska Peninsula:**
- **$2 M 2015 Drill Program**
- **7900 feet – 8 holes**
- **Dry (Bee Creek)**
- **91 m w/ 0.19 % Cu QSP alt’n**
- **Mallard Duck Bay**

**Copper Joe:**
- **10 Ma Porphyry System**

**Dry (Bee) Creek**
**Mallard Duck Bay**

**Northway**

**Kawiskag**

http://www.fullmetalminerals.com/properties/pyramid
Graphite Creek – Graphite:
- Updated NI 43-101 Resource
- 19.8 M tons @ 6.3% Cg Indicated
- 170.2 M tons @ 5.7 % Cg Inferred
- Total resource of 9.9 M tonnes graphite
- 4.5 km of 18 km strike is drilled

Bokan – Dotson Ridge – REE:
- Bankable feasibility study in progress
- Updated Resource 5.28 M tons Indicated, & 1.16 Mtons Inferred.
- 77.5 M lbs TREO (HREE enriched)

www.graphiteoneresources.com

Credit: Graphite One Resources Inc.

Credit: Ucore Rare Metals Inc. http://ucore.com

http://graphiteoneresources.com/_resources/maps/indicatedresourcesgraphite.jpg
2015 Alaska Coal Highlights

Usibelli Coal Mine:
• 2015 Production 1.4 million tons (producing since 1943)
• 15% Japan export
• Reserves ca 750 million tons
• Regional electrical generation

Chuitna Coal Project:
• Proven reserves 300 million tons (LMU-1)
• Draft EIS – 2016 public review

Credit: http://www.usibelli.com/Coal-Leases.php

Credit: http://www.chuitnacoalproject.com/background.html

Coal Mine
Coal Project*
Coal Field
Coal Basin

* Does not include coalbed methane or in situ coal gasification projects
Reclamation – Success in Northern Regions

Nugget Creek Placer Mine - Fairbanks

Pre-Reclamation 2009

Four years later 2015

Usibelli Coal Mine - Healy

July 2003

Poker Flats - 11 Years Later

September 2014
Available Lode Prospects

Alaska Resource Data File (ARDF)
- 3,323 lode prospects total statewide
- 795 ARDF lode prospects are on state-owned land
- **459 ARDF prospects on state-owned lands are not staked**

DGGS MP 142 – Mineral Resources Map
- 307 lode prospects, projects & mines statewide
- 104 lode prospects, projects & mines on state-owned land
- **33 lode prospects on state-owned lands are not staked**
DGGS Mission:
Determine the potential of Alaskan land for production of metals, minerals, fuels, and geothermal resources, the locations and supplies of groundwater and construction material, and the potential geologic hazards to buildings, roads, bridges, and other installations and structures (AS 41.08.020).

The Annual Mineral Industry Report:
The department shall conduct a continuing survey of the mineral resources and mining operations of the state and shall disseminate information regarding them to assist prospectors and miners, safeguard the lives and health of miners, protect investors in the mining industry, and foster and promote the best interests of the mining, mineral, and related industries of the state (AS 27.05.050).