ALASKA

NORTH TO OPPORTUNITY

MINERALS AND MINING IN ALASKA

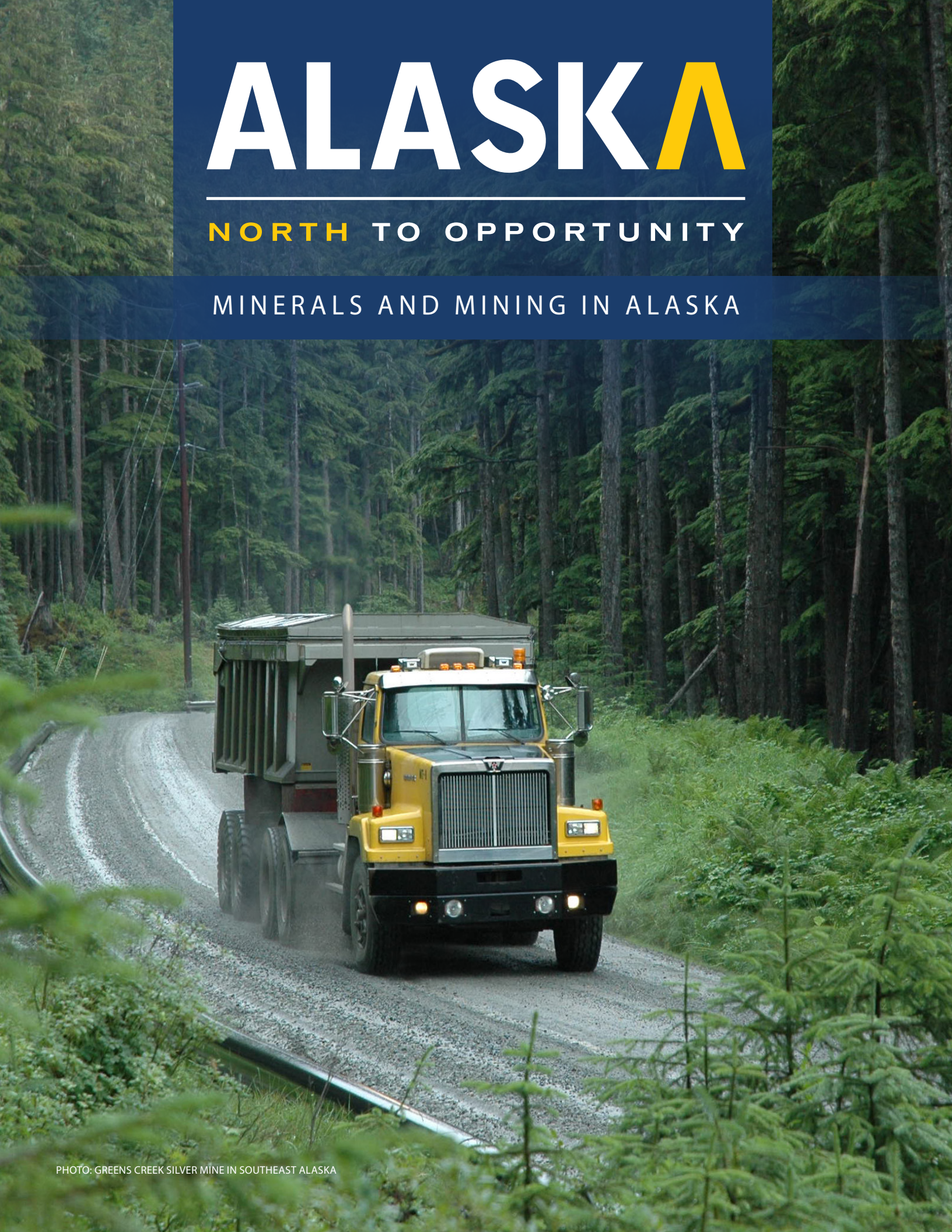


PHOTO: GREENS CREEK SILVER MINE IN SOUTHEAST ALASKA

WHY INVEST IN ALASKA?

- Extraordinary geological potential
- Substantial exploration opportunity
- Strategic global position in close proximity to international minerals markets
- A large and well-equipped core repository in Anchorage, providing access to the state's large collection of rocks and drill samples
- Opportunities for state-sponsored infrastructure development and coordinated permitting
- Geopolitically stable
- State constitution and government that emphasize resource development
- Clear land ownership
- In-state energy sources
- Competitive tax incentives and stable taxation structure
- Existing port and rail infrastructure to support global exports

DIVERSE MINERAL ENDOWMENT

Alaska is among the most prolific mineral regions of the world. Placer gold, copper, lode gold, and placer platinum were all early signs of Alaska's mineral wealth, and today the state is ranked as one of the top 15 locations in the world for known resources of important minerals.

Alaska leads the nation in the production of zinc and silver, and is second in production of gold and lead. Alaska also boasts half of the nation's coal, and sizeable resources of copper, molybdenum, rare earth metals, and graphite. Alaska has over 7,400 documented prospects including tin, platinum group metals, uranium, nickel, and industrial minerals.

Since 1993, the State of Alaska has conducted detailed airborne geophysical surveys on over 38.4 million acres of potentially mineralized lands across the state. The data and maps are all publicly available from the Alaska Division of Geological & Geophysical Surveys. In 2011, the state initiated a multi-year, statewide assessment of Alaska's strategic minerals potential and has provided infrastructure partnerships and incentives for the development of known or highly prospective strategic minerals occurrences throughout Alaska.

PHOTO: HELICOPTER-SUPPORTED DRILL SITE AT POGO GOLD MINE IN INTERIOR ALASKA

PHOTO: GOLD NUGGETS AT DOME CREEK PLACER MINE

PHOTO: JESSIE, A TRUCK DRIVER AT FORT KNOX GOLD MINE

INCENTIVE TO EXPLORE

The Alaska Exploration Incentive Credit Program allows the deduction of up to $20 million of qualified costs from taxes and royalties over a 15-year period for new mines. Exploration credits are site-specific and continue to be earned up to receipt of the final operating permit.

INFRASTRUCTURE PARTNERSHIPS

The State of Alaska provides financing of minerals development and associated infrastructure through the Alaska Industrial Development and Export Authority (AIDEA). AIDEA has a 33-year history of supporting Alaska's mining industry, beginning with the development of the DeLong Mountain Transportation System, which includes a road and port facility that serves the Red Dog Mine in Northwest Alaska. AIDEA owns and operates the Skagway Ore Terminal, and assisted in the financing of the Seward Coal Loading Facility.

AIDEA has received legislative authority to issue bonds in support of mine development and processing in Alaska. AIDEA has also begun the federal permitting process for a 200-mile long road, which will provide access to the Ambler Mining District in Northwest Alaska. Currently, AIDEA is partnering with Graphite One Resources to explore the development of a large-flake graphite deposit at Graphite Creek in Western Alaska. The project would develop a mine and initial processing facility at the deposit, and an off-site advanced-materials graphite refinery facility. AIDEA can assist with the development of supporting infrastructure, such as site location services, roads, broadband connectivity, power, and port development.

CONSISTENT AND EFFECTIVE PERMITTING

Alaska supports a rigorous, but fair permitting process coordinated through the Alaska Department of Natural Resources Office of Project Management and Permitting (OPMP). OPMP facilitates the inter-agency Large Mine Permitting Team, which works cooperatively with large-mine applicants and operators, federal agencies, and the public. The coordinated process minimizes duplication and is often tailored to fit specific project needs.

"A coordinated permitting process between state and federal agencies helps minimize duplication, shortens the permitting process time, and applies a consistent and effective effort."

– Fraser Institute,
Survey of Mining Companies 2014

ALASKA'S MINING INDUSTRY

The state's minerals remain largely undeveloped, with more than 190 million acres of land open to exploration and investment.

PRODUCING MINES' 2016 MINERAL PRODUCTION

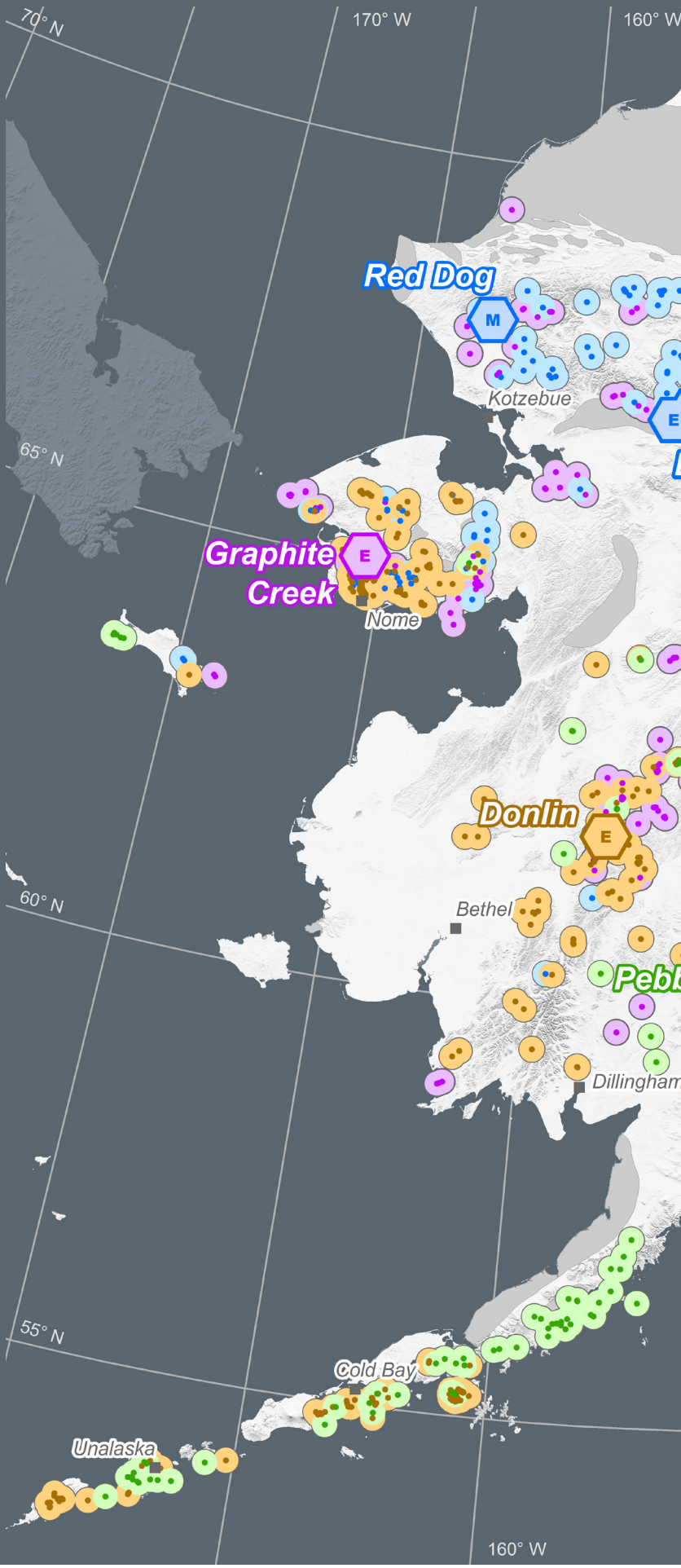
- RED DOG MINE: This is the largest zinc mine in the world. 2016 production was 642,647 tons of zinc and 134,813 tons of lead.
- GREENS CREEK MINE: 2016 production of 9.25 million ounces of silver, 54,168 ounces of gold, 20,478 tons of lead, and 57,729 tons of zinc.
- POGO MINE: 2016 production of 269,342 ounces of gold.
- FORT KNOX MINE: 2016 production of 409,845 ounces of gold.
- USIBELLI COAL MINE: 2016 production of 972,000 tons. Of this, 75,000 tons were exported to Japan.
- KENSINGTON MINE: 2016 production of 124,331 ounces of gold.

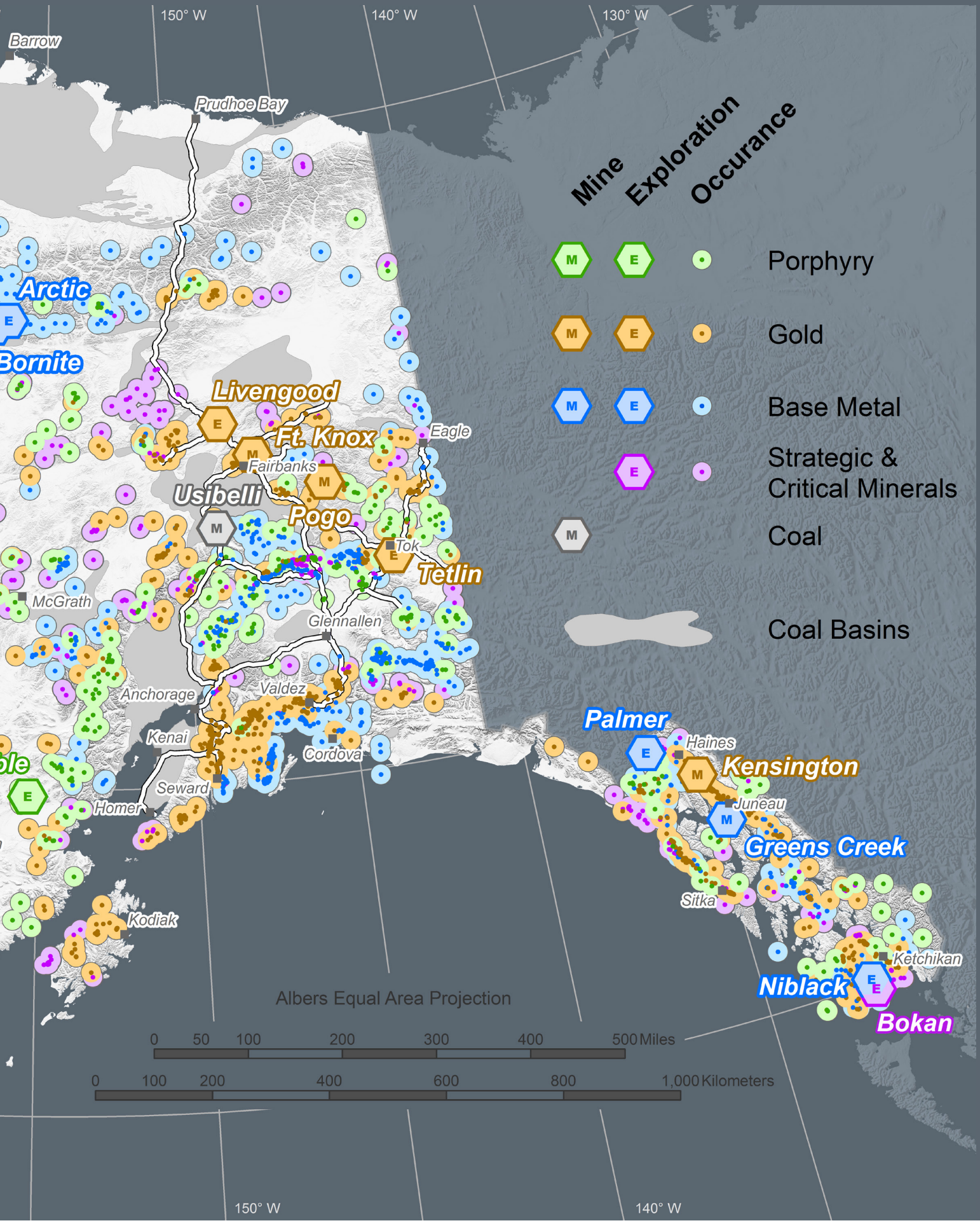
In 2016, approximately 150 small placer mines produced an estimated 82,591 ounces of gold.

MINERALS EXPLORATION AND DEVELOPMENT

$3.3 billion has been spent on minerals exploration in Alaska since 1981. Advanced exploration and development projects include:

- PEBBLE: 81.8 billion pounds of copper, 107.9 million ounces of gold, 5.58 billion pounds molybdenum, 514 million ounces silver, and about 900,000 ounces palladium.
- BOKAN MOUNTAIN: Enriched in yttrium, dysprosium, and critical, heavy rare earth elements; 77.5 million pounds total rare earth oxides.
- DONLIN GOLD: 33.8 million ounce gold reserve within a 45 million ounce gold resource.
- LIVENGOOD: 20.1 million ounce gold resource.
- NIBLACK: 9.9 million tons polymetallic (copper, gold, silver, and zinc) resource.
- ARCTIC: 125 million pounds copper, 152 million pounds zinc, 24 million pounds lead, 2.5 million ounce silver, and 29,000 ounce gold resource.
- BORNITE: 6.4 billion pound copper resource.
- GRAPHITE CREEK: 9.9 million ton graphite resource.
- PALMER: 8.1 million tons grading 1.41 percent copper, 5.25 percent zinc, 31.7 grams of silver per ton, 0.32 grams of gold per ton.
- PEAK (TETLIN): More than 920,337 ounces of gold, with significant copper.




150° W
140° W
130° W
Barrow
Prudhoe Bay
Mine
Exploration
Occurance
Porphyry
Gold
Base Metal
Strategic & Critical Minerals
Coal
Coal Basins
Arctic
Bornite
Livengood
Ft. Knox
Eagle
Fairbanks
Usibelli
Pogo
Tok
Tetlin
McGrath
Glennallen
Anchorage
Valdez
Kenai
Cordova
Seward
Homer
Kodiak
Palmer
Haines
Kensington
Juneau
Greens Creek
Sitka
Ketchikan
Niblack
Bokan
Albers Equal Area Projection
0 50 100 200 300 400 500 Miles
0 100 200 400 600 800 1,000 Kilometers
150° W
140° W

UNIVERSITY OF ALASKA FAIRBANKS MINERAL INDUSTRY RESEARCH LABORATORY

The Mineral Industry Research Laboratory (MIRL) was established at the University of Alaska Fairbanks in 1963 by the Alaska State Legislature. MIRL performs basic and applied research that supports development, production, processing, refining, and transportation related to mineral and energy resources of Alaska and elsewhere. Major topical areas include beneficiation and hydrometallurgy of ores, geotechnical engineering (including frozen ground), mine ventilation, systems engineering, mineral economics, and computational intelligence for mine operations. Whether you are a government agency looking for answers to mining related questions, or a mining company seeking insight, MIRL can offer its support.

GEOLOGIC MATERIALS CENTER

Alaska's inventory of mineral and petroleum cores, as well as hundreds of thousands of surface samples and thin sections are housed at the Department of Natural Resources Geologic Materials Center in Anchorage. This facility also accepts core donations, and distributes the state's 2-D and 3-D seismic surveys. Core is available for inspection and sampling in this 100,000 square-foot state-of-the-art facility. This provides a secure location for storage and sampling of drill material, and is open year-round.

AN EDUCATED WORKFORCE

The majority of the large operating mines in Alaska boast more than 70 percent Alaska resident hire rates. Some notable Alaska minerals training and educational programs include:

- The University of Alaska offers undergraduate, graduate, and doctoral programs with emphases in earth science, geology, engineering, minerals and mining, operations, permitting, exploration, and development.
- The University of Alaska Southeast Center for Mine Training provides world-class workforce training in occupational fields, with a special emphasis on growing the Alaska workforce for underground hard-rock mining.
- University of Alaska programs include the Mine and Petroleum Training Service (MAPTS), Delta Mine Training Center, MSHA Certifications, and Mine Simulator. The MAPTS Training Center is a partnership with Canada's Yukon College Centre for Northern Innovation in Mining.
- The State of Alaska operates job centers across the state to connect employers to job seekers and also partners with employers, educational institutions and training providers to invest in Alaska workers.

PHOTO: EXPLORATION BY MILLROCK RESOURCES

PHOTO: FORT KNOX GOLD MINE

PHOTO: EXPLORATION BY MILLROCK RESOURCES

KEY CONTACTS

Alaska Department of Natural Resources

DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

Provides digital geological, geophysical, geochemical, and elevation datasets, maps, and databases

3354 COLLEGE ROAD

FAIRBANKS, AK 99709

907-451-5000

DGGS.ALASKA.GOV

DIVISION OF MINING, LAND AND WATER

Oversees mining (regulations, permitting, claim records), land titles, dam safety, and water resources

550 W. 7TH AVE., SUITE 1070

ANCHORAGE, AK 99501

907-269-8600

DNR.ALASKA.GOV/MLW

GEOLOGIC MATERIALS CENTER

Repository that archives, indexes, and makes geologic materials and related data available for public inspection

3651 PENLAND PARKWAY

ANCHORAGE, AK 99508

907-696-0079

DGGS.ALASKA.GOV/GMC/INDEX.PHP

OFFICE OF PROJECT MANAGEMENT AND PERMITTING

Coordinates and provides a single point of contact to ensure timely development of large-scale projects

550 W. 7TH AVE., SUITE 1260

ANCHORAGE, AK 99501

907-269-8690

DNR.ALASKA.GOV/COMMIS/OPMP

Alaska Department of Commerce, Community, and Economic Development

DIVISION OF ECONOMIC DEVELOPMENT

Provides business assistance, financing, promotion, and public policy to promote growth and diversification of Alaska's economy

333 WILLOUGHBY AVE., 9TH FLOOR

JUNEAU, AK 99801

907-465-2510

COMMERCE.ALASKA.GOV/WEB/DED/

ALASKA INDUSTRIAL DEVELOPMENT AND EXPORT AUTHORITY

Provides financing of minerals development and associated infrastructure to encourage economic growth of Alaska

813 W. NORTHERN LIGHTS BLVD.

ANCHORAGE, AK 99503

907-771-3000

AIDEA.ORG

University of Alaska Fairbanks

UAF MINERAL INDUSTRY RESEARCH LABORATORY

Research supporting development, production, processing, refining, and transportation for mineral resources

DUCKERING BUILDING, 306 TANANA LOOP

FAIRBANKS, AK 99775

907-474-7212

MIRL.UAF.EDU

PHOTO: PIT AT FORT KNOX GOLD MINE

UPDATED JUNE 2017

PHOTO: EXPLORATION BY MILLROCK RESOURCES IN SOUTHCENTRAL ALASKA