JEAC Position Paper draft

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Industry Proclaims “Alaska Needs Engineers”

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• Alaska Needs Engineers

• Catalyst to a Diversified Economy

Engineering plays a key role in supporting the growth and development of our economy as well as in improving the quality of life for Alaskans. As such, there is an important link between our engineering capacity and economic development. We now have quantitative evidence of engineering's contribution on a global scale. A new research report in the United Kingdom from the Royal Academy of Engineering (RAE) makes the case for increased spending on engineering education and infrastructure, finding that there is a direct link between a region’s investment in engineering and overall economic health. Data from 99 countries were examined to create an "engineering index," which quantifies such factors as employment levels, the diversity of the workforce, and the amounts invested in research and infrastructure. The index reveals a strong correlation between the strength of a country's engineering industry and its gross domestic product per capita. Generally, countries with the strongest engineering industries have the highest gross domestic product per capita. Engineers help to develop the physical infrastructure we all rely on in Alaska – transport networks, roads, bridges, waste management, water and energy supplies. In addition, we have them to thank for our digital infrastructure – communications and navigation networks that are part and parcel to urban life. Engineers play a huge role in healthcare and food, and in manufacturing and research.

There is a demonstrable link between engineering and economic development across the world, and Alaska is no different. We need a robust pool of engineers coming from Alaska's universities to contribute globally and locally. Engineers are the catalyst to economic strength and diversity.

- ## Industry Outlook
    - ***Energy (Oil, Gas, and Renewables) – Chantal and Ty***
    - ***Mining – Bryan and Richard***
    - ***Technology (Telecom and IT) - Alex***
    - ***Transportation (Roads, Bridges, and Ports) - Virginia***
    - ***Government – (Facilities and Infrastructure) - Steve, Richard***
    - ***Other Market Sectors – Vertical Construction, Fisheries, forestry, etc.***

Suggested outline for each sector:

- **Background**
- **Facts and Economic Impact**
- **Major production/projects**
- **Exploration and Development**
    - **Projects on line or coming on line**
- **(XX Sector) Needs Engineers**

MINING SECTOR

MINING BACKGROUND

Mining is a growing force in Alaska's economy, providing jobs for thousands of Alaskans and millions of dollars of personal income throughout Alaska. Alaska's mining industry includes exploration, mine development, and mineral production. Alaska's mines produce coal, gold, lead, silver, zinc, as well as construction materials, such as sand, gravel, and rock. There is a potential for other resources to be developed such as cobalt, graphite, and other rare earth metals. Engineering is the cornerstone to exploration, development, and operations.

Historically, mining has been a foundation of Alaska's economy. Many roads, docks and other infrastructure throughout Alaska were originally constructed to serve the mining industry. Major communities like Fairbanks, Juneau, and Nome were founded on mining activity. Today, a rejuvenated mining industry brings a broad range of benefits to Alaska, offering some of the highest paying jobs in both urban and rural Alaska, as well as generating significant local government tax payments and royalties to Native corporations for activity on their land. Alaska's six large operating mines (Fort Knox, Greens Creek, Red Dog, Usibelli, Pogo, and Kensington) providing high paying jobs across Alaska.

Worldwide interest in Alaska's mineral potential continues to increase. Driving interest is demand for metals, primarily from Asian countries like China, Japan, and India. If Alaska were a country they would rank 5th in the world for our abundance of metals and rare earth minerals.

We need more Alaska educated and trained engineers as we continue to meet the logistical challenges of providing accessible energy and surface access infrastructure to remote prospects. Alaskans continue to speak out against anti-mining initiatives in support of responsible resource development for the benefit of all. Our Universities can be a technical advocate and testament to our ability to bring economic development to diverse, remote areas of Alaska without compromise.

MINING FACTS & ECONOMIC IMPACT

- 4,500 direct mining jobs in Alaska (XXXdirect engineering positions)
- 9,000 total direct and indirect jobs attributed to Alaska mining industry (approximately XXX engineering positions)
- $700 million in total direct and indirect payroll
- $250 million in payments to Alaska Native corporations
- $109 million in state government-related revenues through rents, royalties, fees, and taxes
- Mostly year-round jobs for residents of more than 50 communities throughout Alaska, half of which are found in rural Alaska where few other jobs are available
- Some of Alaska's highest paying jobs with an estimated average annual wage of $108,600, over twice the state average for all sectors of the economy
- $34 million in local government revenue through property taxes and payments in lieu of taxes

MAJOR MINING PRODUCTION

· The Northwest Arctic Borough is home to Teck and NANA Regional Corporation's **Red Dog Mine**, a surface mine and mill that produces zinc, lead, and silver in concentrates. Red Dog, one of the largest zinc mines in the world, both in terms of production and reserves, employed 639 people of which over half are NANA shareholders. Red Dog is the sole taxpayer to the Northwest Arctic Borough and the payment for 2013 is estimated at $8.7 million. In partnering with NANA, Red Dog operations paid $143 million to NANA, with $93.5 million of that being redistributed to other regional and village corporations.

· Located 25 miles northeast of Fairbanks, **Kinross Fort Knox** mine is the largest gold producer in Alaska and has been operating since 1996. The mine produced 359,948 ounces in 2012 and a record 428,822 ounces in 2013. Fort Knox is an open pit mine using standard truck and shovel ore extraction methods. Gold is recovered using both gravity and carbon in pulp processes. A heap leach facility was constructed in 2008. The mine employs 630 people and all employees live and work in the Fairbanks area. Fort Knox is the largest property tax payer in the Fairbanks North Star Borough, paying $5.2 million in 2013.

· The underground **Pogo Mine** began producing gold in 2006, and paid out $56 million in wages and benefits in 2013, while spending over $127 million with vendors and suppliers. Approximately 320 employees, and a large number of contractors work at the mine, operated by Sumitomo Metal Mining. Pogo is about 85 miles southeast of Fairbanks, and produces about 340,000 ounces of gold annually.

· The **Usibelli Coal Mine**, a family-owned mine located outside Healy, is the only operating coal mine in Alaska. The mine has been in continuous operation since 1943 and celebrated its 70th year mining Alaskan coal last year. Of the coal the mine produced half was exported in 2013, while much of the remainder was used to fuel 30% of Interior Alaska's electricity. Roughly 700 tons was exported to customers in Chile, South Korea, and Japan, and the remainder was used to fuel about 30% of Interior Alaska's electricity. The mine employs 120-140 Alaskans, including several second and third generation employees at Usibelli. UCM produced about 1.7 two million tons of coal in 2013.

· Hecla's **Greens Creek Mine**, located on Admiralty Island, in Southeast Alaska near Juneau, is an underground polymetallic mine producing silver, gold, zinc, and lead. The mine is one of the world's top 10 silver producers. It employed 400 people in 2013. Greens Creek is the largest private employer in Juneau and is the largest private property tax payer in the City and Borough of Juneau, paying $1.44 million in 2013. Greens Creek produced 7,448,347 ounces of silver, 57,457 ounces of gold, 20,114 tons of lead, and 57,614 tons of zinc in 2013.

· Coeur Alaska's **Kensington Gold Mine**, located on the east side of Lynn Canal about 45 miles north-northwest of Juneau, resumed production in April 2012. Construction began in July 2005, but project completion was delayed by litigation brought on by environmental groups regarding the Corps of Engineers Permit for the project's tailings facility. Kensington employed 324 people full-time in 2013, paying $38 million in payroll. The mine paid $1.6 million in property taxes to the City and Borough of Juneau and produced a record 114,821 ounces of gold in 2013, up 40% from 2012.

MINING EXPLORATION & DEVELOPMENT

· The **Donlin Gold** project in Southwest Alaska is a world-class gold deposit. NovaGold Resources and Barrick Gold have formed the jointly-owned Donlin Gold LLC to manage and direct the project through its ongoing feasibility study, the permitting process, and into construction and operation. The project is situated on lands owned by the Calista Corporation (subsurface) and The Kuskokwim Corporation (surface). In 2012, Donlin Gold LLC filed permit applications to federal and state agencies for its $6.7 billion gold mine. With little to no infrastructure in the region, logistics and power are key concerns. Donlin

Gold has a local hire rate of 90% Calista shareholders at its camp, and low employee turnover. The project is expected to provide up to 1,400 production jobs.

· The **Chuitna Coal Project**, located in the Beluga Coal Field of Southcentral Alaska, consists of three major components, the Chuitna Coal Mine, a coal transport system and export terminal, and a supporting infrastructure component. The cornerstone of the development is 20,000 acres of State of Alaska leases with measured reserves of ultra low-sulfur coal in excess of one billion tons. The Chuitna Coal Project is currently in the permitting process, with anticipated draft permits in 2014-2015. PacRim Coal anticipates the project will employ approximately 300 – 350 people during production.

· The **Pebble Project** is an initiative to develop a globally significant copper, gold, and molybdenum deposit in the Bristol Bay region of Southwest Alaska, approximately 19 miles northwest of Iliamna/Newhalen. It is owned by Canadian mineral exploration company Northern Dynasty Minerals Ltd. The Pebble deposit is the largest known copper and gold resource in North America. The prospect has the potential to supply 35% of U.S. copper needs in the future. So far, over $500 million has been spent on research through 2011, including socioeconomic studies and $150 million on environmental baseline studies. Information from these environmental and socioeconomic studies will be used to evaluate various mine design alternatives prior to the submission of a proposed development plan for permitting. The Pebble Project is at a pre-permitting phase. If the project is ultimately permitted, the potential for well-paying, full-time production jobs could reach 1,000. Mine operations are likely to continue for 50 - 80 years, create hundreds of millions of dollars in annual operating expenditures, and generate tens of millions of dollars in annual tax payments to government.

· The **Livengood** gold project about 70 miles north of Fairbanks has recently undergone a feasibility study. The area was mined beginning in 1914, with a new lode discovered in 2007. Tower Hill Mines expects the project to provide approximately 450 jobs during production. Gold resources are estimated at 15.7 million to 20.1 million ounces. An estimated 577,600 ounces could be produced per year for a mine life of 14 years. Approximately $200 million has been invested, including $58 million in 2012. A feasibility study was completed in 2013.

· The **Niblack** prospect in Southeast Alaska, on Prince of Wales Island, would produce gold, silver, copper, and zinc, if developed. The project is owned by Heatherdale Resources Ltd., and is expected to employ 200 people during production. Since 2009, $37 million has been invested, and the focus is now on the pre feasibility study.

· The **Upper Kobuk Mineral Projects** is located in Northwest Alaska on lands owned by the State of Alaska and by NANA Regional Corporation. The prospect area is being explored by NovaCopper Inc., and contains known resources of zinc, lead, gold, silver, and high-grade copper. NovaCopper has an agreement with NANA that provides a framework for the exploration and potential development of the Ambler mining district in cooperation with the local communities. The project employed 80 people in 2013.

· Located just east of Palmer and Sutton, the **Wishbone Hill** coal project completed a feasibility study in 2011. It has been explored since 1983, and is expected to provide up to 125 production jobs.

· Additional **Ambler Region** mining projects on the horizon which would benefit from the Ambler Road Development include the Arctic, Bornite, Sun, and Smucker developments resulting in approximately 1500 direct jobs and 3000 indirect and induced jobs.

MINING NEEDS ENGINEERS

New engineers are needed to replace those who are displaced through promotion, attrition, retirement, moves, and other career changes. The Alaska Department of Labor estimates a conservative XXX engineers needed to fill those positions over the next ten years. By applying a mining industry generally

accepted probability of new developments in the near and intermediate future an additional XXX engineers will be needed to support new operations for a total of XXX engineers which may be employed to support Alaska's Mining Industry over the next decade. Industry is very proud of the University of Alaska Mining programs and supports continued growth and pursuit of excellence.

Why Not Alaska

- **Arctic Engineering Center of Excellence**

The geographic expanse of Alaska and resulting geophysical divisions alone guarantee there are no “one size fits all” engineering solutions for project design and construction. From Ketchikan to Kaktovik covers 15 degrees of Latitude south to north including the Arctic Circle. East to west, from Metlakatla to Attu, crosses 55 degrees of Longitude and the International Date Line. Mountain ranges, rivers, frozen soil and a severe sub-zero climate require innovative engineering solutions to transportation problems whether roads, pipelines, airports or marine traffic. All design and construction must account for the largest earthquakes likely to occur in North America.

Alaska’s coastline and inland waterways dominate marine design upon which most of Alaska’s commerce relies. Due to the opening of the Northwest Passage and a year round sea route through the Arctic Ocean along Alaska’s north coast, new international commerce and shipping will require engineering solutions for a winter ice pack and other cold weather hazards. The route will parallel Alaska’s west coast through the Bering Strait and continue southward hundreds of miles until exiting through the Aleutian Islands into the North Pacific.

Currently there is severe shortage of marine related infrastructure to accommodate the needs and requirements for the potential massive influx of marine and sea going vessels. Only minor monitoring and data collection of wave and wind conditions has occurred. Research opportunities abound. Coastal protection structures, marine facilities such as harbors, wharfs, offshore tendering devices and onshore infrastructure and connecting transportation will need to be planned, designed, constructed and maintained by qualified “arctic engineers.”

Major resource development will continue to be necessary in Alaska to supply energy, metals, minerals and materials needed for our nation’s future which will require a future generation of innovative and forward-thinking engineers.

- **Technologically Advanced Facilities**
- **World-Class Research and Development**
- **Two Universities in One**
- **The Destination Experience**

Alaska is an engineer’s paradise. The outdoor environment as a workplace, the extreme and arduous engineering regime posed by Alaska’s unique arctic environment present unparalleled opportunities and challenges for engineers of all disciplines. To experience the opportunities and prepare for the challenges, UAA and UAF offer academic training and experience necessary to take advantage of Alaska’s exciting future for those engineers trained and proficient in “arctic engineering.”

As most Alaskans know, the recreational opportunities in Alaska remain first rate and challenging. Fishing and hunting are exceptional. Outdoor activities such a mountain climbing, hiking, off road bike riding, back country skiing, trail-running and wildlife viewing provide unlimited outlets for outdoor activities found nowhere else.

- **Industry Call**
- **Preparing for the Future**

(9/5/18 draft ar)