

**ALASKA STATE LEGISLATURE
SENATE RESOURCES STANDING COMMITTEE**

February 18, 2019

3:30 p.m.

MEMBERS PRESENT

Senator Chris Birch, Chair
Senator Lora Reinbold
Senator Click Bishop
Senator Scott Kawasaki

MEMBERS ABSENT

Senator John Coghill, Vice Chair
Senator Cathy Giessel
Senator Jesse Kiehl

COMMITTEE CALENDAR

PRESENTATION: OIL AND MINING SOLUTIONS AT THE UNIVERSITY OF ALASKA

- HEARD

PREVIOUS COMMITTEE ACTION

No previous action to record

WITNESS REGISTER

DR. WILLIAM SCHNABEL, Dean
College of Engineering and Mines
University of Alaska-Fairbanks
Fairbanks, Alaska

POSITION STATEMENT: Presented the examination of the Oil and Mining Solutions at the University of Alaska.

ACTION NARRATIVE

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CHAIR CHRIS BIRCH called the Senate Resources Standing Committee meeting to order at 3:30 p.m. Present at the call to order were Senators Kawasaki, Bishop, Reinbold, and Chair Birch.

PRESENTATION: Oil and Mining Solutions at the University of Alaska

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CHAIR BIRCH announced that the committee will hear a presentation from the University of Alaska on oil and mining solutions. He read the following statement:

As we all know, Alaska holds tremendous potential for oil, gas, and minerals development. The U.S. Geological Survey (USGS) estimates the potential for nearly 40 billion barrels of oil and over 200 trillion cubic feet of natural gas in Arctic Alaska, and the Department of Commerce reports that Alaska is ranked as one of the top 15 locations in the world for known resources of important minerals like zinc, silver, gold, copper, and rare earth metals; but, in order to develop these resources and maximize benefits to the state and to our economy, we will have to overcome technical obstacles to development and we will need a skilled workforce.

Here today to show us how our university system is working to do both is Dr. William Schnabel, Dean of the University of Alaska-Fairbanks College of Engineering and Mines.

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DR. WILLIAM SCHNABEL, Dean, College of Engineering and Mines, University of Alaska-Fairbanks, Fairbanks, Alaska, provided an overview of his educational background. He explained that his duties as dean are to oversee the university's education and research missions.

He said the University of Alaska (UA) has three primary missions: teaching, community service, and research. Many missions at the UA are focused on industrial and resource development because Alaska is a resource development state.

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He addressed student success and detailed graduation rates from 2009-2018 for engineering and engineering related science degrees. Over 2,700 students have graduated with engineering or

computer science degrees from UA-Anchorage and UA-Fairbanks over the past decade. He noted that the state will need approximately 600 new engineers or computer scientists, but the UA is graduating approximately 270 students per year.

DR. SCHNABEL opined that industry in Alaska wants Alaska-trained engineers. Alaska-trained engineers generally are people who grew up in the state and UA graduates know that most resource development is outdoors, out where there is permafrost, cold, and a remote environment. He pointed out in a photo where UA students were outdoors in the wilderness with their geological engineering professors learning their trade.

He said there is a big advantage for industry in having students that are trained in Alaska. Universities in the Lower 48 do not know about permafrost and conditions like Alaskans do. Students that graduate from the UA and go into the engineering workforce tend to stay in the state. Companies that invests in a new employee from Alaska will find that the employee will tend to stay in Alaska, a fact that is important to industry.

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SENATOR KAWASAKI noted that Dr. Schnabel said approximately 600 engineers are needed annually and UA was graduating approximately 270 per year. He asked why UA cannot get to graduating 600 engineers per year.

DR. SCHNABEL answered that there are only so many students in Alaska. The UA has a lot of capacity to grow and the university wants to move in that direction. An area of growth would be to increase the number of female engineering students; however, colleges across the nation average only 20-percent-female students in engineering colleges. A way to get more engineers into the workforce is to encourage young girls to get into engineering.

SENATOR REINBOLD asked how many women were in UA's engineering program.

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DR. SCHNABEL replied approximately 15-17 percent of the engineering student body is female.

He opined that engineering is a profession that people find fulfilling. Engineers trade in the question of, how you do things, so the job of an engineer is to see a need and then to visualize what needs to be built, constructed, or developed from

their vision, and then going through a step-by-step process of creating the thing they visualized. Engineers that UA trains end up having high paying jobs and fulfilling careers.

CHAIR BIRCH asked how the proposed budget cuts might affect UA's engineering programs, noting that a 41-percent cut was proposed.

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DR. SCHNABEL answered that a 41-percent-budget cut would be devastating to UA's engineering college. He said virtually all of the UA's funding goes towards salaries and programs.

SENATOR REINBOLD asked if research has been done in combining the UA's three systems into one system. She said she was told by the previous UA president that the university's union contracts were driving up costs. She noted that the UA's Eagle River campus is in the black because local buildings are used like the local high school's building. She said she did not want to hurt UA's engineering program but asked for the UA to be innovative at a high level to find ways to address its budget. She noted that the UA accounted for \$14 billion to \$16 billion from the state's savings over the past 5 years.

DR. SCHNABEL answered that the UA has looked at the option of combining the Anchorage and Fairbanks engineering colleges and the numbers did not indicate that much money if any would be saved by combining into one school. He said he could not speak for combining the entirety of the UA's colleges, but noted that having separate presences in Anchorage and Fairbanks makes sense from the engineering side.

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He referenced UAF's "Mining and Geological Engineering" as follows:

- Vital workforce and professional expertise for developing Alaska's resources.
- Dates back to the University's founding.
- Job placement rate nearly 100 percent after graduation.
- Over 65 students currently enrolled in mining and geological engineering.

He noted that UA's research is tied to the goals of the state. The engineering college is interested in development, so a lot of research projects are closely tied to the goals of the state, which helps industry in solving some of their issues, therefore students benefit by working on the very problems they are going

to face in the working world. Also, students benefit from working directly with companies that they might work for after graduation.

CHAIR BIRCH asked what the starting salary is for an engineering graduate.

DR. SCHNABEL answered that starting salaries are in the \$100,000 range for mining and geological engineering graduates. There is high demand for engineers and the mining industry pays qualified people well.

CHAIR BIRCH noted that University of Alaska-Southeast (UAS) has a program that provides technology training for local mines: Coeur Alaska-Kensington Gold Mine and the Hecla Greens Creek Mine. He asked if UAF was affiliated with the UAS program.

DR. SCHNABEL answered that the University of Alaska is affiliated with the two mines.

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He noted that both the mining and petroleum industries are interested in the UA doing research as well as tackling some of their specific problems. The UA is good at doing experiments with multiple scenarios in a lab environment because there is a place for research with respect to optimizing processes. He reiterated that students benefit from doing research for the industry that they will ultimately be working in.

He addressed "Arctic mine water remediation at Red Dog Mine" and detailed as follows:

- Goal:
 - Use bacteria from the mine site to remedy acid mine water at Red Dog Mine.
- Benefits:
 - Ecologically sound remediation method,
 - Supports resource development in the arctic on state and ANCSA land holdings.

He explained that the biological treatment process is used where sulfate-reducing bacteria anaerobically takes sulfate in the water and transforms it into sulfides which allows metals to be precipitated out. The bacteria used in the process is generally found on site in a cold weather environment that works in low pH. The hope is to create a biological treatment process by

helping to improve the mine tailings' water that ultimately reduces treatment costs for the mine.

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SENATOR REINBOLD asked if the anaerobic bacteria process is dangerous to humans.

DR. SCHNABEL answered that when working with any bacteria it is important to be careful with respect to human health. He said his gut answer is no, the bacteria are not dangerous to humans because it is found on site.

SENATOR REINBOLD opined that larger quantities of anaerobic bacteria may present a different challenge.

DR. SCHNABEL addressed "Increasing flotation yield" as follows:

- Goal:
 - Improving metal recovery in the mineral processing plant.
- Benefits:
 - Directly improves mine economics,
 - Helps sustain a key economic driver in the state.

He summarized that flotation is a way to concentrate ores by separating what you want from what you don't want. Ore is crushed into a power, a slurry is made, the slurry is placed in flotation tanks, bubbles and additives are added, agitation occurs, and the result is some minerals will float and others will not. Flotation is highly dependent on the chemistry of the ore. When going through a mine's ore body, the ore's chemistry changes. The objective is to work with a mine's current ore chemistry to optimize yields. UA can provide mines with hard data that allows mines to maximize their yields.

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He addressed "Opportunity and demand for skilled workers" as follows:

- World-class underground surface-mine-training facility.
- Alaska Miners Association identified priority occupations:
 - Mill process operators,
 - Mechanics,
 - Underground miners.
- UA maximizes industry partnerships, federal grants, and philanthropic giving to train Alaskans for resource jobs.

DR. SCHNABEL addressed "Training mill operators" and detailed that the UAF created a dynamic mill simulator that allows students to use a computer simulation. The UAF designed and developed the nation's only mine-mill simulator. The simulator is used by the mining industry both domestically and internationally.

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He addressed "Petroleum engineering" as follows:

- Education for oil and gas development in the home of the largest oil field in North America.
- Ninety-eight percent of UA's graduates placed in oil and gas industry after graduation.
- Over 65 students currently enrolled at UAF.

He said the UA's petroleum engineering program is important for several reasons:

- Produces engineers across the state.
- Engineers are serving state government and the legislature to help advise on current issues for policymaking.

CHAIR BIRCH asked how many engineers remain in the state after graduation.

DR. SCHNABEL replied that most of the mining graduates stay in Alaska while a higher percentage of petroleum engineers go out of state. The petroleum industry generally moves their people around a lot.

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He addressed "Heavy oil enhanced oil recovery" project as follows:

- First ever field pilot on Alaska's North Slope to validate use of polymer floods.
- Potentially produce 10 percent more heavy oil than current technology used on the North Slope.

He said heavy oil is an important resource to the State of Alaska. There is approximately 25-billion barrels of heavy oil stranded on the North Slope. Heavy oil is very viscous and hard to get out of the ground. Using heat to extract heavy oil impacts permafrost. Injecting or flooding with polymer is a way

to get heavy oil out of the ground. Flooding water laced with polymer will stick together and push the heavy oil through the ground. Hilcorp Energy is interested in testing flooding with polymer in a cold environment and partnered with the UA via a \$9-million grant from the U.S. Department of Energy. The UA flooding studies are underway with an injection well at Milne Point on the North Slope.

CHAIR BIRCH noted polymer usage in the Trans-Alaska Pipeline System (TAPS) as a drag reducing lubricant agent to increase output above the pipeline's design capacity.

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DR. SCHNABEL addressed "Energy Research Consortium of Alaska (ERCA)" as follows:

- Pair industry with university researchers and assets.
- Collaboratively address research needs and gaps.
- Further technology that shapes the future of energy.
- Fully utilize the expertise of UA.

He said the consortium addresses problems that everyone in the industry really needs to see solved. The consortium commenced in 2017 and three problem themes were identified:

1. Coastal and offshore issues.
2. Changing permafrost with respect to oil production.
3. Subsurface imaging using geophysics to image reservoirs.

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He noted that the consortium chose oil and changing permafrost to focus on and detailed issues as follows:

- Well-casing stability and damage due to soil compaction.
- Permafrost effects on roads, pads, pipelines, and permafrost ramifications from well heat.
- Research funding consideration by two major companies.

He summarized that the permafrost issue revolves around the affects from moving hot liquids through wellbores that is surrounded by soil that needs to be frozen. The oil-and-gas industry is working with UA because nobody in the U.S. has more institutional knowledge about building on permafrost.

SENATOR REINBOLD asked if Dr. Schnabel could share the names of the two companies that are interested in the permafrost project.

DR. SCHNABEL answered that he would rather not at the current time until a formal agreement is reached.

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He addressed "Coal gasification" and noted that Alaska has a lot of distributed coal resources. Coal gasification conversion into Syngas has the potential to power diesel generators, infrastructure that is already in place in many rural Alaska communities. The challenge is coal gasifiers are proven technologies on the gigawatt (equal to one billion watts) scale, but rural Alaska communities operates on the kilowatt (equal to one thousand watts) scale. The UAF is working on a project funded by the U.S. Department of Energy to look at a coal gasifier on the megawatt (equal to one million watts) scale.

He noted that UAF is at the end of a front-end engineering and design study to look at if a coal gasifier will work at the university. The U.S. Department of Energy has some potential funding available if UAF thinks the coal gasifier is going to work. The potential is to use Usibelli coal for gasification into Syngas in the campus' large power generator. The project would prove the potential to use Syngas on the megawatt scale which is a step closer to the kilowatt scale.

He addressed "Prospective research: Employing Coal-Syngas to promote renewable energy sources," and detailed potential Syngas use to reduce air emissions in Fairbanks.

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He addressed "Resource industry training programs" as follows:

- The UA has trained over 1,500 workers for oil-and-gas and mining industries in the past 5 years via the Mining and Petroleum Training Service (MAPTS) and the Alaska Process industries Careers Consortium.
- Eighty-five percent of MAPTS graduates are still employed after graduation.

CHAIR BIRCH asked him to address the role of community colleges for the oil-and-gas and mining industries.

DR. SCHNABEL answered that the UA offers associate degrees in programs offered for Occupational Safety and Health via the community college and university systems.

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SENATOR REINBOLD noted Dr. Schnabel's final statement, "A strong engineering workforce is critical to Alaska's economic future." She said she has a problem with the state's educational system that recently aligned its math standards to the Common Core's New Math. She opined that the Common Core's math standards are detrimental to creating engineers.

DR. SCHNABEL replied that he is not familiar with the state's math standards. He opined that math is critical to a successful engineer. He admitted that some students coming into UA's engineer program have trouble with math, some don't, but the ones that end up graduating all get through UA's math program.

SENATOR REINBOLD encouraged Dr. Schnabel to be aware of the state's Common Core math standards and its potential impact on future engineers.

CHAIR BIRCH thanked Dr. Schnabel for his presentation. He noted that the low percentage of female engineer students was the same when he attended UAF's engineering program.

DR. SCHNABEL shared that he observed a recent math competition for middle schoolers and half were girls who were really excited to be good at math.

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There being no further business to come before the committee, Chair Birch adjourned the Senate Resources Standing Committee meeting at 4:20 p.m.