

**ALASKA STATE LEGISLATURE
HOUSE RESOURCES STANDING COMMITTEE**

February 19, 2018

1:04 p.m.

MEMBERS PRESENT

Representative Andy Josephson, Co-Chair
Representative Geran Tarr, Co-Chair
Representative John Lincoln, Vice Chair
Representative Harriet Drummond
Representative Justin Parish
Representative Chris Birch
Representative DeLena Johnson
Representative George Rauscher
Representative David Talerico

MEMBERS ABSENT

Representative Mike Chenault (alternate)
Representative Chris Tuck (alternate)

COMMITTEE CALENDAR

PRESENTATION: PROPOSED PEBBLE MINE

- HEARD

PREVIOUS COMMITTEE ACTION

No previous action to record

WITNESS REGISTER

LINDSAY LAYLAND, Deputy Director
United Tribes of Bristol Bay
Dillingham, Alaska

POSITION STATEMENT: Spoke in opposition to the development of the Pebble Mine.

NORMAN VAN VACTOR, President/CEO
Bristol Bay Economic Development Corporation
Dillingham, Alaska

POSITION STATEMENT: Spoke in opposition to the development of the Pebble Mine.

NANCI MORRIS LYON, Owner/Operator

Bear Trail Lodge
King Salmon, Alaska

POSITION STATEMENT: Spoke in opposition to the development of the Pebble Mine.

DAVID CHAMBERS PhD, President/Founder
Center for Science in Public Participation
Bozeman, Montana

POSITION STATEMENT: Spoke in opposition to the development of the Pebble Mine.

DANIEL SCHINDLER PhD, Professor
School of Aquatic and Fishery Sciences
University of Washington
Seattle, Washington

POSITION STATEMENT: Spoke in opposition to the development of the Pebble Mine.

RICK HALFORD, Consultant
United Tribes of Bristol Bay; Registered Guide
Eagle River, Alaska

POSITION STATEMENT: Spoke in opposition to the development of the Pebble Mine.

TOM TILDEN, First Chief
Curyung Tribal Council; Board Member
Choggiung Ltd.
Dillingham, Alaska

POSITION STATEMENT: Spoke in opposition to the development of the Pebble Mine.

ACTION NARRATIVE

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CO-CHAIR ANDY JOSEPHSON called the House Resources Standing Committee meeting to order at 1:04 p.m. Representatives Josephson, Birch, Parish, Talerico, Drummond, Tarr, and Lincoln were present at the call to order. Representatives Johnson and Rauscher arrived as the meeting was in progress.

PRESENTATION: PROPOSED PEBBLE MINE

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CO-CHAIR JOSEPHSON announced that the only order of business would be presentations on the proposed Pebble Mine.

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LINDSAY LAYLAND, Deputy Director, United Tribes of Bristol Bay (UTBB), informed the committee UTTB is a Tribal government consortium based in Dillingham representing 15 Tribes in the Bristol Bay region, including 80 percent of the population living year around in Bristol Bay. She stated the people of Bristol Bay continue to oppose the Pebble project as they have for many years; in fact, she has "grown up with the threat of Pebble Mine." Ms. Layland stressed opposition from the residents of Bristol Bay is not rooted in general disagreement with mining, resource extraction, or economic development, but is based on its location because the Pebble deposit rests under the wetlands, streams, and surface and ground waters responsible for Bristol Bay salmon. Much earlier, this issue was brought forth by Tribal elders and subsistence users who know the waterways and recognized the waters must be protected. Bristol Bay is defined by its fish and pristine fish habitat that provides economic opportunity, however, the fish are also critical to a way of life; according to the Alaska Department of Fish & Game (ADFG), families in Bristol Bay harvest an average of 150-500 pounds of salmon each year for subsistence purposes. Ms. Layland recalled previous information provided to the committee [on 2/16/18] from a representative of Pebble that indicated the North and South Kaktuli Rivers are responsible for 0.5 of 1 percent of Bristol Bay salmon, and she pointed out this percentage referred only to sockeye salmon; however, these rivers provide the spawning and rearing habitat for two important subsistence resources in Bristol Bay: king and silver salmon. She said it is undeniable that the project would impact waters and fish because the construction and operation of the mine would require dewatering streams, filling in wetlands, and changing the waterway, which is the basis for opposition to the mine by the people of Bristol Bay. Ms. Layland noted her resolute opposition to the Pebble project is based upon science and history, and she is passionate about protecting her way of life, her commercial fishing business, her livelihood, and her home.

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REPRESENTATIVE PARISH asked for a sense of Tribal members' support.

MS. LAYLAND, speaking from her experience with members of the UTBB board, said member Tribes are committed to protecting and

preserving their way of life, thus support from Tribal communities is strong. In further response to Representative Parish's question as to whether there is controversy about the project, she acknowledged in any community there are opposing sides, although her personal and professional experience is that opposition is comprehensive.

REPRESENTATIVE BIRCH asked whether many UTBB constituents commute to work on the North Slope or hold jobs outside of their communities.

MS. LAYLAND said she could not answer.

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NORMAN VAN VACTOR, President/CEO, Bristol Bay Economic Development Corporation (BBEDC), said his corporation is one of six Community Development Quota (CDQ), National Oceanic and Atmospheric Administration, U.S. Department of Commerce, groups in Alaska, and represents 17 coastal communities from Port Heiden to Togiak. [BBEDC's] mission is to support, enhance, and promote sustainable and renewable economy; in the last five years BBEDC has spent an average of over \$22 million per year of net income into the communities and the watershed. He said the following testimony from leaders of the community, and others, will provide science based on fact and not on "the hypothetical." Mr. Van Vactor said he has witnessed the economic engine generated by the annual salmon runs in Bristol Bay; Bristol Bay boasts the most valuable and largest salmon fishery remaining in the world, supplying over one-half of the world's wild sockeye. He explained the importance of the Bristol Bay economic engine and the role of government and regulatory agencies to assist residents of the region and the state, and to protect important cultural and economic resources. He recalled at the time of the new administration [in Alaska], a fisheries' group informed the governor of the utmost importance of fish to the state, a statement repeated recently by ADFG; however, there has been no action. He cautioned that with no action there is reaction, as evidenced by sponsors of HB 199 and the "salmon initiative." Mr. Van Vactor suggested a Bristol Bay management plan would review Pebble's water rights application and other questions that need to be answered. Residents of Bristol Bay have in common their lives and their economic focus on salmon, which extends to other regions of Alaska, the rest of the U.S., and the world. The fishery supports over 14,000 jobs, raises over \$1.6 billion, supports over 2,300 small businesses, and last summer about 60 million fish returned. Further, the

gross revenue of \$1.6 billion is facilitated by ADFG at a cost to the state of about \$2 million. Bristol Bay is sustained by commercial, sport, and subsistence fisheries far beyond the sockeye fishery credited by Pebble's statistics. Mr. Van Vactor said Pebble is advancing its project based on untruths; even though the region needs jobs, it is a deception that the project can build a mine that will not harm salmon. For example, Mount Polley [in British Columbia, Canada] was supposed to be a small mine that would cause no harm. Even with the Pebble Mine's smaller footprint, it is clear the mine cannot coexist safely with salmon when toxic tailings are involved. He said BBEDC supports efforts to protect salmon without turning away responsible mining interests that may provide protections for land and water. He provided an offending statement from a representative of Northern Dynasty Minerals Ltd., comparing the mine site to Kansas [document not provided]. He stressed the legitimacy of supporting the people and the economy of the region, and reported the U. S. Environmental Protection Agency (EPA) acknowledged the value of the resources of Bristol Bay; further, as a businessman, he said he would welcome regulators informing him of the core parameters of the requirements to obtain a permit. Mr. Van Vactor concluded the waters of Bristol Bay support a fishery that is the foundation of the region and is a national treasure, and residents are likeminded in their efforts to protect the resource.

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REPRESENTATIVE BIRCH recalled the committee has heard proposed legislation to raise the minimum tax on oil from the North Slope from 4 percent to 7 percent. He asked what proportion of the value of the Bristol Bay fishery is paid out in taxes.

MR. VAN VACTOR estimated 2.25 percent, which can vary by borough.

REPRESENTATIVE BIRCH questioned whether a more equitable rate would be an increase to 4 percent.

MR. VAN VACTOR said, "... I think there's always room, but at the end of the day, any taxes ... imposed would in all likelihood, quite frankly, unfortunately, get passed along to the lowest common denominator ... our fisher people and the residents of the region"

CO-CHAIR JOSEPHSON noted in 2016, the governor proposed an increase to the fisheries landing tax and to every revenue

[source] in the state; however, every tax [increase] was rejected by the legislature.

MR. VAN VACTOR added [taxes on the fishing industry] have two tiers, a tax based upon shore-based processors and a tax for floating processors, because general funds benefit communities that host shore-based processing plants.

REPRESENTATIVE BIRCH observed other economic development corporations across the state support a variety of industries and asked whether any industry besides fishing is addressed by BBEDC; for example, there are merits to diversity in economic development from high-paying jobs in other industries such as mining.

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MR. VAN VACTOR acknowledged BBEDC has an emphasis on fisheries; he explained CDQ corporations were created under the [Magnuson-Stevens Fishery Conservation and Management Act] and BBEDC benefits from revenue streams in the Bering Sea, and is charged with investing in boats, quota, and allocation. Further, BBEDC is a nonprofit and spends its money back in its communities. He pointed out every CDQ group differs, and the BBEDC board of directors is supportive of sustainable and renewable economy and seeks to develop the right jobs for the right place.

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NANCI MORRIS LYON, Owner/Operator, Bear Trail Lodge, said her 5-star lodge is located in Bristol Bay and she began her career as an independent fishing guide in the Bristol Bay area in 1985. There are dozens of lodges in Bristol Bay, which has been a key sport fishing destination for many years, and worldwide recognition of this area has established sport fishing as an important part of the local and statewide economy. Her lodge utilizes local businesses for fuel, food, transportation, and other support services, such as employees; in fact, the recreation fishing, hunting, and tourism industries support 1,000 jobs and contribute over \$60 million a year to the economies of Bristol Bay and Alaska. Alaskans and visitors treasure Bristol Bay as evidenced by opposition to Pebble Mine and similar mines. Because of tourism, thousands of visitors bring money into Alaska to witness Bristol Bay's unique beauty. She pointed out the effects of mining on salmon would also affect other species such as grayling, Dolly Varden, Arctic char, and rainbow trout. Pebble's current plan includes

transportation corridors across the Talarik Creek and the Gibraltar Creek; road corridors on or near these fisheries would mean a large percentage of fisherman would not return. Thirty-five roundtrip truckloads crossing creeks and rivers each day, and other activities like blasting, would eliminate visitors' interest: Pebble's current plan would change the landscape. Ms. Morris Lyon is also the lead instructor at the Bristol Bay Fly Fishing and Guide Academy, which for 10 years has sought to involve local residents in guiding and sports fishing, enhance guests' experience in the culture of Bristol Bay, and provide jobs, and she gave an example. She pointed out Bristol Bay can - and is - creating a positive future for residents without jeopardizing existing industries, and strongly suggested the mining industry should wait until new technology provides safe extraction methods, without dangerous chemicals and damaged land.

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REPRESENTATIVE PARISH asked what proportion of jobs in the affected area are affiliated with fishing and tourism, and the growth status of the fishing and tourism industries.

MS. MORRIS LYON said, "... the trend is definitely headed more towards tourism, that's a national fact, and ... tourism is headed to areas that are harder to reach because people crave that"

REPRESENTATIVE BIRCH related the statewide fishing industry has a dismal record for employing Alaskans, and many large fishing ships are out of Seattle. He inquired as to the average annual salary for a guide, and the percentage of guides who are Alaska residents.

MS. MORRIS LYON explained salaries for guides vary and may include room and board, transportation, and gear; she estimated a salary range between \$30,000-\$50,000 per year. Over 85 percent of her employees are Alaska residents, which is a substantial increase from 30 years ago.

CO-CHAIR TARR asked the names of the affected creeks.

MS. MORRIS LYON said Talarik and Gibraltar creeks are recognized throughout the industry.

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DAVID CHAMBERS PhD, President/Founder, Center for Science in Public Participation (CSP2), informed the committee he is a geophysicist with CSP2, which is a small nonprofit located in Montana - with one employee in Alaska - and he was asked to review information previously presented by the Pebble Partnership related to the size of the mine. He directed attention to a PowerPoint presentation entitled, "The Pebble Project A Pathway to Permitting," dated September 2017, which indicated the total resource for the project is 10.8 billion tons; however, recent testimony by Pebble indicated a project of 1.1 billion tons, which is 10 percent less than the information provided to the project's investors. Dr. Chambers pointed out regulatory agencies in the U.S. and Canada ensure companies do not offer fraudulent information to investors, therefore, he reasoned that the higher number is what Pebble has available to develop.

CO-CHAIR JOSEPHSON asked whether Pebble continued to present the aforementioned information to investors after it indicated last fall the mine would be smaller.

DR. CHAMBERS responded, "As far as I know, this is the most recent information and ... they would have to issue a retraction." He then directed attention to a PowerPoint presentation entitled, "The Pebble Project," dated December 2012, which indicated the total resource for the project at that time was 10.7 billion tons; he said this was a preliminary assessment - also known as a prefeasibility study - which looks at the economics of a mining operation to an accuracy of 20-30 percent. During the study, the project revealed three mine plans (cases): investment case, 25-year mine life, 2.0 billion tons of ore; reference case, 45-year mine life, 3.8 billion tons of ore; resource case, 78-year mine life, 6.5 billion tons of ore. He concluded the resource case was only one-half the size of the actual identified resource (slide 61). An untitled slide illustrated the relative sizes of the open pits in the three case models. Slide 57 illustrated a simulation of open pits and the underground deposit that would be accessed by a block cave. He explained an underground block cave is a method that almost always causes surface subsidence because of the removal of material underneath the surface. The area affected by the illustrated block mine is located north and east of the open pits, which is the area of the upper watershed of Upper Talarik Creek; during mine operations, the water must be pumped out of the pits which lowers the ground [water] table, likely affecting the water levels in the creeks, although water losses have not been discussed at this point. Slide 7 illustrated the 2017 20-

year, 1.2 billion tons of ore, small mine scenario, which was similar to the 2012 25-year, 2.0 billion tons of ore mine, except for how the waste rock is handled. He compared Pebble's 2017 proposal, EPA's 0.25 billion ton scenario, and EPA's 6.5 billion tons scenario - as illustrated on slide 8 - and noted EPA concluded its small mine scenario was too large and caused too much environmental damage. Furthermore, the EPA large mine scenario reflected only one-half of the resource. Slide 9 illustrated the layout for the mine pit and tailings dam; however, due to the volume of the 2017 proposal, he opined an additional tailings dam would be needed over the North Fork of the Kaktuli River.

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DR. CHAMBERS noted in 2012, the Pebble Partnership did not provide layouts for the 6.5 billion tons and 10.7 billion tons mines; however, mining all of the resource would require bigger open pits, underground block caving, and handling an additional 9 billion tons of tailings and waste rock. Further, because the proposal expects 2.6 tons of waste would be mined to extract 1.0 ton of ore - a stripping ratio of 2.6:1 - waste rock will be a problem due to its volume and geochemistry, making a larger mine footprint likely. Slide 10 illustrated other mineral prospects that have been identified in the region, and he said the potential for additional mining is very high because additional mining becomes economic once the original mine infrastructure is in place. Dr. Chambers concluded the size of the mine is important to habitat because of the amount of waste, the amount of contamination that takes years to manifest, and the mine's location in a sensitive area.

CO-CHAIR JOSEPHSON asked who holds the Humble, D Block, and H Block claims.

DR. CHAMBERS was unsure.

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REPRESENTATIVE RAUSCHER questioned Dr. Chambers' reference to 25-30 percent accuracy.

DR. CHAMBERS explained there are three types of feasibility studies: a rough estimate at 50 percent accuracy; a prefeasibility study at 30-40 percent accuracy; a full feasibility study at 10-15 percent accuracy. Generally, a full

feasibility study is not done until a mine plan is "solid" because of the expense.

REPRESENTATIVE RAUSCHER asked for the percentage of accuracy reflected [in the documents Dr. Chambers presented].

DR. CHAMBERS said the prefeasibility study in 2012 would be at 30-40 percent accuracy.

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CO-CHAIR JOSEPHSON surmised the presentation indicated a lack of confidence in Pebble's published intent to limit the mine to a 20-year phase, with a reference to expansion.

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DR. CHAMBERS advised companies will always propose an initial phase of a mine based on solid economics; however, the initial proposal might not address the full development of the resource because the full extent of the resource is unknown. After the mine infrastructure is established, "mines expanding after their initial footprint is the rule rather than the exception," he said.

REPRESENTATIVE BIRCH, speaking as an Alaskan mining engineer, expressed his excitement at the opportunity for the development of state-owned land that has previously been identified for mineral potential. He estimated the potential value of the silver, gold, molybdenum, and copper in the deposit at in excess of \$300 billion, which is a significant opportunity for work for Alaskans and resources for the state. In the Western U.S., coal mining and farming are co-located, and he inquired as to the same in Alaska so that the fisheries and mineral development can be pursued at the same time.

DR. CHAMBERS stated Pebble Mine - compared to other mines in Alaska - has the largest risk to habitat because of its location and its size; in addition, mines developing a copper porphyry ore body have a very poor environmental performance record related to water quality, ranging from sulfate [contamination] to acid mine drainage. He recalled the Mount Polley mine failure evaluation panel concluded there needs to be a balance between economic, environmental, and social risks; however, currently there is more emphasis placed on economics.

REPRESENTATIVE BIRCH named several examples from Alaska's rich mining history and expressed confidence all can work for a solution that allows for mining and opportunities for future generations; a world class resource demands a successful process.

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CO-CHAIR JOSEPHSON recalled in 2014 he researched the aforementioned land use plan that designated the area in question for minerals. He related the Tribes located near the mouth of the bay appealed the [Bristol Bay Area Plan] and subsequently the Division of Mining, Land and Water, Department of Natural Resources (DNR), rewrote the management plan and found the area to be mixed use; he asked, "... some of it was for mineral exploration, but literally next door to it, in sort of a checkerboard fashion almost, there were areas designated for habitat. Am I right about that?"

DR. CHAMBERS indicated yes, but deferred to legal counsel. He added in the 1970s the legislature said there was to be no oil drilling in "that whole area."

CO-CHAIR JOSEPHSON referred to Dr. Chambers' previous testimony [before the House Resources Standing Committee meeting on 2/27/17] related to certain closed [borehole] sites and their condition after abandonment. Mark Hamilton, [Executive Vice President for External Affairs, Pebble Partnership, before the House Resources Standing Committee meeting on 2/16/18], stated the sites were properly closed.

DR. CHAMBERS explained he and others looked at exploration well reclamation work in August 2016 - one week after the state conducted its inspection tour - and well closures were not complete, according to requirements. This year the state re-inspected the sites and reported compliance; however, he said he wished to revisit the sites because, prior to 2008, drill cuttings were routinely left on the surface and they have now become acidic. He opined the state should require drill cuttings are cleaned up and the practice de-sanctioned by the state. He confirmed the state re-inspected over 300 sites by aerial survey.

CO-CHAIR JOSEPHSON questioned whether DNR is providing sufficient scrutiny.

DR. CHALMERS said, "I'm totally neutral at this point, but I want to go out and see."

REPRESENTATIVE RAUSCHER surmised Dr. Chambers observed reclamation in process.

DR. CHAMBERS said no, most of the holes he inspected were supposed to have been reclaimed.

REPRESENTATIVE RAUSCHER restated his question.

DR. CHAMBERS advised his inspection revealed several boreholes that were left open temporarily because they were still in use; however, others he inspected were supposed to be completely reclaimed, including some of which were leaking, and some sites with exposed drill pipes, that posed a safety hazard. In further response to Representative Rauscher, Dr. Chambers confirmed the state had "signed off" on said sites.

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REPRESENTATIVE PARISH returned attention to the aforementioned presentation by Mark Hamilton and read from an untitled slide as follows [in part]:

The purpose of the presentation is to facilitate discussions with stakeholders and does not represent an economic analysis, technical mine study, detailed engineering proposal or similar study. It should not be used as the basis for any investment decision.

REPRESENTATIVE PARISH asked whether the presentation Pebble gave to shareholders had a similar disclaimer.

DR. CHAMBERS said, "Not to my knowledge."

REPRESENTATIVE PARISH compared slides from the two presentations and pointed out "mine pit," "waste rock," and "tailings storage facility" had been redacted from the presentation to the legislature. He asked Dr. Chambers for his opinion on the reason for the changes to the presentation.

DR. CHAMBERS remarked:

Just follow the guide of the Pebble Partnership itself. It said that it's presenting a small mine that's environmentally friendly. ... It's not going to

be a small mine and it's not going to be environmentally friendly.

CO-CHAIR JOSEPHSON pointed out the Pebble presentation included a slide entitled, "Figure 2-1 Mine Site Hydrography," which illustrated a tailings cell, a management pond, and open pits.

REPRESENTATIVE TALERICO asked, "... if [the mine plan] grows smaller and smaller, do, do we assume risk assessment goes down because ... of volumes."

DR. CHAMBERS opined the risk goes down in relation to the size; however, EPA judged the risk from a mine smaller than the mine proposed was unacceptable because of its impact on aquatic habitat: streams and connected wetlands.

CO-CHAIR JOSEPHSON asked how the current EPA statement of continuing concern differs from that issued by the previous EPA administration.

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DR. CHAMBERS said the current statement allows the mine to go through the environmental impact assessment process now, but leaves EPA's options open.

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DANIEL SCHINDLER, PhD, Professor, School of Aquatic and Fishery Sciences, University of Washington (UW), provided a PowerPoint presentation entitled, "Bristol Bay fisheries and water quality: what are the risks of mining development?" Dr. Schindler said Alaska's fisheries and fisheries management are the envy of the world. Slide 2 was a graph of sockeye salmon returns to Bristol Bay ranging from 30-50 million fish per year. Last year, in the Nushagak Commercial Salmon Fishery Management District, one million sockeye salmon were caught in one day from a fishery with no enhancement from hatcheries; this is a return from a sustainable fishery based on Alaska's culture, its constitution, ADF&G, and the intact habitat of the fishery. He advised in the Lower 48 many fisheries, particularly salmon fisheries, are in disarray due to a disregard of the importance of habitat to fisheries. Bristol Bay salmon and habitat have been studied by the Fisheries Research Institute, UW, since 1946 at the request of Bristol Bay fisherman. Salmon spend about one-half of their lives in the North Pacific Ocean and guided by their sense of smell - following the chemistry in the water - return to the

rivers and streams of their birth to spawn (slide 3). He stressed the presentation is not about mining or about mining in Alaska, but about mining in Bristol Bay and its impact on Bristol Bay's unique geology and biology; for example, the watershed is complex because retreating glaciers left a layer of gravel and the region produces lots of water, which together create productive salmon habitat. Water flows freely across the porous landscape, and he cautioned in these conditions it is difficult to contain mining problems, and with climate change, the region will become wetter (slide 4).

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DR. SCHINDLER continued to slide 5, noting scientists do not know what part of the Nushagak watershed produced the Chinook salmon caught in the Nushagak River. Slides 6 and 7 pictured a salmon otolith - also known as the ear stone - that is used for navigation and which accumulates rings as the fish ages. The otolith incorporates the chemistry of the water as the fish pass through; thus, scientists can match the chemistry found in an otolith with that of the chemistry in a river or stream to trace the source of the fish. Also shown were maps of the Nushagak River and its Mulchatna and Kuktuli tributaries, indicating the location of returning fish in 2011 (slide 6) and 2014 (slide 7). He compared the tributaries that had low numbers of returning fish in 2011, with high numbers returning to the same tributaries in 2014, and concluded fish habitat is variable across space and through time. Therefore, the primary reason Bristol Bay fisheries are sustainable is that fish have a diverse habitat, and the question of risk is not only to the individual tributary directly impacted, but also the risk to the habitat on a broader scale.

CO-CHAIR JOSEPHSON questioned whether scientists believe "this sort of switching back between the Nushagak and Mulchatna" has occurred over eons.

DR. SCHINDLER said similar studies on sockeye salmon report the same pattern for hundreds of years.

REPRESENTATIVE BIRCH recalled the [Novarupta-Katmai volcanic eruption of 1912] dumped seven cubic miles of ash. He asked for its impact to fisheries, and how resilient fisheries are to a catastrophic event.

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DR. SCHINDLER related the Katmai eruption deposited ash across the region, and the region's lakes have a one and one-half foot layer of ash buried at the bottom. Depending on the location, volcanic ash can damage or boost fish, because volcanic ash is rich in phosphorus which can fertilize lakes, possibly boosting salmon production. However, in the direct outfall of Katmai, salmon streams were probably devastated. He acknowledged salmon are resilient because of the complexity of Alaska's watershed as demonstrated by the presentation; in fact, certain parts of a watershed can be wiped out and recolonized. He restated the complexity of the system ensures reliability. To provide another example of the complexity of fish habitat, slides 8-10 pictured the characteristics of Bear Creek, which is not located near the mine. The stream supports juvenile coho salmon and spawning sockeye; because of ground water influence, the stream is warm at its outflow from a beaver meadow, and cools by 8-10 degrees near the bottom of the stream where it flows into a lake. Dr. Schindler explained how scientists determined the tiny coho travel one mile each way, every day, to the cold water where they feed on sockeye eggs, and then return to the warm water in the same stream to digest. He concluded the habitat provides a variety in temperature, but must also provide connectivity between the various benefits of habitat (slide 11). Bristol Bay and similar reliable fisheries have complexity and variation, thus elements of risk must include both risk from catastrophic events, and risk from the subtle and chronic effects of mine infrastructure, such as roads and powerlines, that add to risk by simplifying the habitat (slide 12). Slide 13 provided examples of how development affects fish - the magnitude of which depends upon the location and operation of the mines - as follows:

- sulfuric acid mine drainage
- copper is a known toxin to fish, and indirectly reduces their ability to "smell their way home, [and] smell their predators, et cetera"
- dust, groundwater, and erosion make containment of contaminants challenging
- dewatering streams and wetlands that are critical fish habitat
- roads and other infrastructure prevent erosion that generates varied habitat
- impacts can be permanent
- risks can be unknown for decades

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DR. SCHINDLER acknowledged the EPA was criticized for issuing a risk assessment without a specific mine plan; however, EPA developed scenarios for a large and a small mine that included all of the risks shown on slide 13. Slide 14 was a picture of the 2015 Samarco mine tailings dam failure in Brazil, and slide 15 was a picture of the 2014 Mount Polley dam failure in British Columbia, Canada. He pointed out the risks to Bristol Bay must also include subtle and chronic issues "that may take a long time to develop ... it's the death of a thousand cuts issue"; for example, a road - not associated with a mine - disconnected wetlands from the main channel of the Chena River, preventing the river from regenerating new habitat (slide 16). Slide 17 was a map of mining deposits in the Bristol Bay region, and he remarked:

If you cover this area in mines, tailings ponds, roads, pipelines, et cetera, you can guarantee you're taking away options for fish, and this has to be part of the assessment when we think about risks to Alaska and its fisheries, relative to the rewards of pulling minerals out of the ground.

REPRESENTATIVE RAUSCHER returned attention to the second bullet point on slide 13, and observed the Copper River supports fish.

DR. SCHINDLER agreed there is copper naturally in the environment and, following acid mine drainage that makes the water more acidic, the copper becomes more soluble, which increases the concentration of copper; in addition, there are factors of the local chemistry and geology. What is known is the rocks have a lot of copper and potential to produce sulfuric acid, and have little buffering capacity.

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REPRESENTATIVE BIRCH asked how UW's research on this issue is funded.

DR. SCHINDLER said the program was established in 1946 with funding from the fishing industry; in the last 20 years, additional funding has been received from a variety of sources such as peer-reviewed grants from the National Science Foundation, private funding from the Gordon and Betty Moore Foundation, and partnerships with the Bristol Bay Science and Research Institute, the Bristol Bay Regional Seafood Development

Association, and the U. S. Fish and Wildlife Service, Department of the Interior. He added his personal work is unpaid.

REPRESENTATIVE BIRCH asked whether UW is engaged in hatchery research.

DR. SCHINDLER said UW has a long history of hatchery research and has withdrawn from hatchery work because "... hatcheries cause more damage to wild stocks than they do good for fisheries and fishing communities."

CO-CHAIR TARR returned attention to Dr. Schindler's statement about the importance of the Bristol Bay fishery because it is an entirely wild fishery and is not supplemented with hatchery stock.

DR. SCHINDLER said the unique genetic diversity of Bristol Bay salmon is intact, unlike salmon of the Columbia River, most places in British Columbia, and any place south of Washington. Hatcheries have essentially polluted the genetics of wild stocks. Although fish return to their natal stream, some stray, and research has proven genes from hatchery fish reduce the fitness of wild populations; therefore, hatcheries are not the solution to maintaining habitat and preserving fisheries in Alaska.

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RICK HALFORD, Consultant, UTBB, provided a PowerPoint presentation entitled, "Bristol Bay & The Pebble Mine." Mr. Halford informed the committee he has worked with most of the groups in Bristol Bay, has flown [as a commercial pilot] for most of the news organizations involved in this issue, and is a guide. He explained he is not an anti-mining person, and spoke of his long experience as a former legislator working on legislation in support of mining issues and with the support "of the Alaska miners." However, after years of reviewing the Pebble Mine, he advised although most [mines] do work, the [Pebble Mine] does not work due to its critical location. Further, the type and size of the ore body are "beyond imagination" as presented by representatives of the project. He suggested the committee review Attachment D [to the Pebble Project application to the U.S. Army Corps of Engineers, provided in the committee packet], because it is the simplest description of the proposal, without disclaimers. Mr. Halford said [Pebble] presentations are based on questions that have never been answered, and on previous mine plans; for example,

some of the proposals were first presented and rejected in 1991 by previous mine operators. He said [opposition to the mine] is not just environmental and local, but "leaders of the industry worldwide," including Cameco, Rio Tinto, Mitsubishi Materials, and Anglo American, have rejected the Pebble Mine based on economics because of the low-grade ore body. He pointed out page 14, Attachment D, describes a \$10.8 billion prospect - as does the presentation to shareholders - and not the 1/10th proposal Pebble is marketing. Slide 2 was a picture of Frying Pan Lake; slide 3 illustrated the impact on the Bristol Bay fishery by volume, and he compared gravity and the connectivity of water to that of blood in the human circulatory system. Mr. Halford said, "It's not just the numbers game ... it's the reality of the way the water system works, the way the human body works, water is the, the blood of the ecosystem." Slide 4 illustrated the actual size of the deposit is 10.8 billion tons, reaching from 1,000 feet above sea level to about 4,400 feet below sea level. Mr. Halford advised at the bottom and the east of the deposit, identified as "open," are some of the highest concentrations; thus, the minimum potential proposed to shareholders is almost 11 billion tons. Slide 5 illustrated the size of recoverable ore compared to other mines; he added the Donlin [gold mine] deposit is also astronomically smaller than that of Pebble, and said, "It's important to understand the, the difference in what they're proposing and what they really mean." Mr. Halford then reviewed some of the activities of the mine plan and emphasized, "That's a lot of activity, that's not a small mine." Continuing the presentation, he directed attention to page 58, Attachment D [4.1.1. Water Balance Model], which refers to the water balance between the edge of Upper Talarik Creek and a 1,750-foot-deep hole, in an area with 1,300 uncased and unplugged [boreholes]. He cautioned as the hole is pumped out, the upper end of Upper Talarik Creek will disappear due to water balance.

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MR. HALFORD urged the committee to question state agencies about water balance, because this is a state land issue, except for a dredge and fill permit, which is one federal issue. Also from page 58 of Attachment D, he read a disclaimer as follows:

The ultimate project design will incorporate detailed analysis of water collection and management ...

MR. HALFORD stressed the project is nowhere near its ultimate design and questions are unanswered, such as the effects of

digging a hole 1,000 feet down below sea level. On page 63 of Attachment D, he read as follows:

The accuracy of water balance models is limited by many factors including the stochastic nature of the inputs and the potential affects of climate change. In recognition of these limitations, an adaptive water management strategy is planned.

MR. HALFORD presented slides 6-7, which were pictures of mine infrastructure, and slide 8, which was a picture of the mine site as it is now. He read from page 70, Attachment D as follows [in part]:

Once mining the open pit stops, dewatering will stop, and the open pit will begin to flood. The pit will continue to fill until the pit lake is formed. Surface runoff from the walls may result in metal leaching. Water quality is expected to be acidic with elevated metals due to overall oxidation of the open pit walls. Pit lake water quality will be monitored, and appropriate actions will be taken to manage wildlife activity on the lake. Once the level of the pit lake has risen to about 890 feet, water treatment will commence.

MR. HALDORD presented slide 9 which was a picture of a pit lake, and said water treatment would prevent water from flowing over the top of the pit; he warned the pit lake would be the same as the [Berkley Pit and pit lake in Montana], with fencing necessary to keep out wildlife, and that anything that lands on the pit lake dies. Continuing on page 70, he read as follows:

The reclamation and closure bond package will include provisions for periodic replacement of water treatment facilities and ongoing operating and monitoring costs over the long-term, post-closure period.

MR. HALFORD remarked:

This reads like perpetual remediation, and do we have a right to pass that on to the next generation of Alaskans, just to monetize something in conflict with the renewable resources that will otherwise go on forever?

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REPRESENTATIVE RAUSCHER returned attention to slide 8 and pointed out the picture is of the area in which machinery was brought in to drill 1,300 holes, which are now closed.

CO-CHAIR JOSEPHSON disagreed that all of the 1,300 boreholes were in the area shown on slide 8.

MR. HALFORD agreed with Representative Rauscher that machinery was needed to drill the holes in that area. He presented an exhibit from [a legal dispute] in 2008-2009 [document not provided] and said:

... doing it takes [putting] shoring out there, [and setting] up a system, and it was all done by helicopter. This one is a bad example, but there were a lot of good examples, so you can't say that 1,300 holes were, and they weren't all deep holes either. Some of them were geophysical to try and tie into bedrock and other things, but our objection to this one was that it was in basically in wetlands, that's a salmon stream behind us. And as it - the rig - kind of beat itself down into its own shoring, the drilling mud spread everywhere, and it was not a good example, from their perspective.

REPRESENTATIVE BIRCH asked for an estimate of employment [numbers] proposed by the project.

MR. HALFORD advised employment information was included in the presentation [at the House Resources Standing Committee meeting on 2/16/18].

REPRESENTATIVE BIRCH estimated the value of the deposit to be \$300 billion and questioned whether Mr. Halford estimated the current value of the project to be \$30 billion.

MR. HALFORD said the value is about 10 percent of the total amount.

REPRESENTATIVE BIRCH asked Mr. Halford whether he was speaking as a volunteer or represented an employer.

MR. HALFORD said he has a current contract for advice to UTBB and has also worked for a number of other organizations. He then referred to a statement by Mark Hamilton [at the House Resources Standing Committee meeting on 2/16/18] that Pebble has

requested "normal standards," and said Pebble has requested formal approval under the [Fixing America's Surface Transportation (FAST-41) Act] program, that would grant expedited federal review of their permit application. He offered to provide copies of said request.

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TOM TILDEN, First Chief, Curyung Tribal Council, informed the committee he was speaking as a board member of the village corporation of Choggiung Ltd., which owns land at the lower part of the Nushagak River. He said he is a fisherman and his father came to Alaska in the winter of 1932 prospecting for gold. Mr. Tilden related his father's story of not finding much gold in the Mulchatna River so instead he caught animals and sold their fur in the spring. Mr. Tilden's father found "gold," not in mineral form, but in the furs and salmon he caught and sold. Mr. Tilden said he has made his living as a subsistence and commercial fisherman since 1965, fishing many methods for salmon, herring, and halibut. Before the commercial season, he puts fish away for the winter. He grew up with his family on the Nushagak River in the village of Portage Creek, living a subsistence lifestyle, and depending upon natural resources to survive. He described in detail his family's use of fish, animals, berries from the land, and birds from the air, all of which depend on clean water. Further, he pointed out the water system provides transportation in winter and summer, and all rivers in Alaska need protection; in fact, according to the Alaska State Constitution, the resources are for all, and a driving force behind statehood was the concept that Alaska would manage and protect its own resources.

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MR. TILDEN related a two-year study found village residents seek the preservation of natural resources and development that does not harm natural resources. He advised: Pebble Mine has promised jobs, but would not put its promise in writing; Pebble said it would be a good steward of the environment, but took water for two years without a permit; Pebble initially did not cap the wells as required by the state. Due to exploration, a negative impact to the community of Newhalen is that low-flying aircraft have caused the moose and caribou to move due to noise pollution. Mr. Tilden visited the Mount Polley [site of a tailings dam failure], Gibraltar, and Highland mines in Canada and said the Gibraltar and Highland mines cannot compare to Pebble because they import water, but Pebble has too much water.

In addition, Gibraltar and Highland mines are located in a highland area and have different geology and hydrology, whereas Pebble is in a wetlands area.

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MR. TILDEN questioned why Rio Tinto and Anglo would withdraw from the Pebble project after making large investments, and cautioned shareholders may pressure the Pebble Mine to amend its plan and use cyanide, because it is the most efficient and cost-effective way to extract gold. Mr. Tilden urged all Alaskans to look closely at the project plan and to consider the value of an abundance of water to the future of the state. In fact, water, natural beauty, and tourism are Alaska's future resource, and he agreed with [former First Lady Bella Hammond] when, in 2009, she said it is time to decide what we really value.

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ADJOURNMENT

There being no further business before the committee, the House Resources Standing Committee meeting was adjourned at 3:07 p.m.